Bangor University

DOCTOR OF PHILOSOPHY

Personal Epistemology and its Influence on Teaching and Learning in Higher Education

Clancy, David

Award date:
2013

Awarding institution:
Bangor University

Personal Epistemology and its Influence on Teaching and Learning in Higher Education

David Michael Clancy

2013

Abstract

Two case studies – Psychology and Sports Health and Exercise Science (SHES), investigated the influence of personal epistemology on teaching and learning in a higher education context. The investigation used the concept of a *socialised habitus of academic personal epistemologies* (SHAPE) on which to base the studies contained within the thesis. The theoretical underpinnings of SHAPE can be found in the work conducted on social practice theory (SPT), which includes Bourdieu (2000), Foucault (1984), Reckwitz (2002); and which draws on situated learning theory, activity systems theory, actor network theory, social learning theory (e.g. Bandura, 1977; Lave, 1988; Lave & Wenger, 1991; Vygotsky, 1978) as discussed in Trowler (2012). In addition, SHAPE draws on the work of Bourdieu (1977) and his theory of *habitus*; and the burgeoning research into personal epistemology (epistemological beliefs is also used in the literature before this term, so they will be used interchangeably). This branch of research began with the seminal work of William Perry culminating in his text entitled '*Forms of intellectual and ethical development in the college years: A scheme*' (1970).

The research was underpinned by an instrumentalist ethos (Dewey, 1930) and adopted a mixed methods research design. Phase One of the research process began with the confirmation of the reliability and validity of a quantitative measure of personal epistemology – The Discipline-focused Epistemological Belief Questionnaire (DEBQ, Hofer, 2000). In Phase One and Two, a shortened, more robust revised version of the DEBQ was then used to test for differences between participants at the group level in different modules of study, and for changes in personal epistemology over the duration of a semester of study. The Approaches to Teaching Inventory (Trigwell & Prosser, 2004) was used in both case studies, as was the DEBQ. The Approaches to Study Skills Inventory for Students (Entwistle, Tait & McCune, 2000) was used in the Psychology Case Study, which also included qualitative data captured via a series of interviews with fourteen students and two teachers from two psychology undergraduate year two modules; and a focus group involving three of the students who had participated in the interview phase. The different phases and methods of data collection allowed the author to make comparisons between the perceptions of, and approaches to, teaching and learning in the two case studies.

The analyses in Phase One resulted in a revised, abbreviated version of the DEBQ. The results from all four phases of the investigation suggest the utility of SHAPE as a concept on which to base future research. The findings from this series of studies suggest the personal epistemology of the teacher has the most profound effect on their students' personal epistemologies as a group over a semester of study, whilst also recognising the contribution other elements of the teaching and learning context make. Variation within groups of students was also evident for dimensions of personal epistemology, and this influenced their perceptions of teaching, learning, and assessment; and how they approached their studies.

The conclusions to be drawn are: SHAPE is a useful addition to the 'tribes and territories' (Trowler & Becher, 2001) discipline level of analysis and is a more nuanced, contextual unit of analysis as recognised and recommended in the text entitled 'Tribes and Territories in the 21st Century: Rethinking the significance of disciplines in higher education' (Trowler, Saunders & Bamber, 2012). The strength of SHAPE lies in its recognition of the epistemological, ontological, and axiological influences on the processes of teaching, learning, and assessment within a higher education context. As such, SHAPE has the potential to make a useful contribution in the changing horizon of higher education manifest in the modular, semester based curriculum, and the burgeoning of 'interdisciplinarity' and its challenge to the established academic disciplinary fields.

Table of Contents

Tables

Figures

Preface

Whilst planning, conducting and completing the research for my thesis I continually reflected on something I had read when looking at the literature:

> "Epistemologies are central to the production and consumption of educational research. Since epistemologies undergird all phases of the research process, engaging with epistemology is integral to learning the craft of research. Moreover, epistemologies shape scholars' abilities to apprehend and appreciate the research of others. Such an appreciation is a prerequisite for the scholarly conversations that signify a field's collective learning." (Pallas, 2001, p.6).

I began to look and reflect on my own position, and admittedly grappled with myself and the literature. I started my journey with an interest in personal epistemology and its influence on teaching and learning in higher education. A journey I continued until submitting, and one I will continue thereafter. However, the journey was not only an investigation of personal epistemology in higher education it was an investigation into my own personal thinking, values and beliefs about knowledge, and knowing and understanding too. I have interrogated my own thoughts, feelings, attitudes, values and beliefs at the early stages of the research and will continue to do so. I kept in mind that Stake (1995) had noted:

> "Good research is not about good methods as much as it is about good thinking" (p.19)

Furthermore, I also tried to be reflexive and self-aware when bearing in mind that Usher et al (1997), amongst other, highlighted that every research method is embedded in commitments to particular versions of the world (ontology) and ways of knowing the world (epistemology).

I have thought about Baxter Magolda (1992, 2002) who described her epistemological journey and the relationships that grew with participants in her study over a number of years. How would I 'frame' myself? I contemplated where I was 'coming from' so to speak. I became very aware of what Crotty (1998) had said:

> "Different ways of viewing the world shape different ways of researching the world" (p.66).

In addition, I noted, and took on board potential sources of bias that Bourdieu (2009) argued contaminated social research. That is, the conventions of the researcher's particular academic discipline, including its traditions, habit of thought, and shared beliefs and evidences (Bourdieu, 2004). The bias resulting from the researcher's "position in the scholastic universe" (Bourdieu, 2009, p.333), and which may have contributed to any potential bias within the research process and product therein.

I have been fortunate enough to have studied in schools of psychology, sociology, and education at different stages of my own education and this 'hybrid' education has served me well. I have constantly reflected on my studies and experiences which have been the result of the interactions I have had with participating teachers and students. I am in no doubt it is this that has resulted in my interpretation of the data. I gave up trying to 'pigeon-hole' myself as psychologist, sociologist, or educationalist, and contented myself in the knowledge that it did not really matter. What did matter, was getting as close to a reality as possible, a reality that reflects an understanding of the complexities of teaching and learning in higher education.

The role of the researcher is to record and learn from participants in an attempt to 'understand' the cultural context. As such, the researcher must become immersed in the culture they are investigating, whilst at the same time attempting to understand it in its natural context. Although ethnography is usually associated with qualitative methodologies, it does not confine itself to these. Instead, as the emphasis is "learning from people" a number of sources of information are relevant and appropriate, and thus contribute to the overall 'understanding'. This includes 'triangulation' using a mixed method, mixed resource approach.

As a result of this process how I see myself has been transformed in terms of my relationships to others, and my assumptions about knowledge.

I have tried to find my own 'voice' and am aware that at times I may have relied too heavily on the work of others as the basis of this thesis. Perhaps I have. This was not the intention. Rather, the intention was to frame my research around previous research, by looking at the literature, asking questions of the findings, and investigating some of the issues raised by the research. My intention was to investigate in greater depth some profound influential issues and their origins and make a contribution to the field of personal epistemology research in a higher education setting. It is envisaged this research will lead to more questions, points for debate, and subsequently more research to investigate my tentative findings. I say tentative, as if given the choice, I would do some things differently. These things I hope to address when continuing my research.

I believe this thesis will never have an endpoint. The ideas will evolve as I evolve. As my relationship with the world changes, so will the way I engage with the emerging questions and themes. My ‘theses’ are therefore not time constrained, and will be on-going as I interact, discuss, debate, investigate, conclude, and reconfigure indefinitely.

I am and will continue to view the world and its complexities through the lens of my personal epistemology, ontology, and axiology; and this will be evidenced in the way I write, in what I do, in what I say, and indeed in what I do not say.

Chapter 1 – Introduction

This thesis will explore a new concept of a 'socialised habitus of personal epistemology' (SHAPE). The theoretical underpinnings of SHAPE can be found in the work conducted on social practice theory (SPT), which includes Bourdieu (2000), Foucault (1984), Reckwitz (2002); and which draws on situated learning theory, activity systems theory, actor network theory, social learning theory (e.g. Bandura, 1977; Lave, 1988; Lave & Wenger, 1991; Vygotsky, 1978) as discussed in Trowler (2012). In addition, SHAPE draws on the work of Bourdieu (1977) and his theory of *habitus*; and the burgeoning research into personal epistemology (epistemological beliefs is also used in the literature before this term, so they will be used interchangeably). This branch of research began with the seminal work of William Perry culminating in his text entitled '*Forms of intellectual and ethical development in the college years: A scheme*' (1970).

The aim of SHAPE is to give a new perspective on habitual practices (Sibeon, 2007) as there is a need to take a more nuanced approach to understanding academic life (Malcolm & Zukas, 2009); and more specifically teaching, learning and assessment within the disciplines. As Fanghanel (2009) argued, previous work conducted by Biglan (1973), and Becher (1989) amongst others has emphasised similarity within "tribes" and "territories" whilst "...glossing over internal differences – the influence of other factors such as local context or individual ideology..." (Fanghanel 2009, p.567). This 'epistemological essentialism' as described by Trowler (2009), fails to reflect the complex nature of higher education as a consequence of using "...broad brush strokes of understanding" (Bamber, 2012, p.156).

However, epistemological essentialism is useful in the way it acknowledges knowledge characteristics as a key driving force to social life; emphasising the importance of socialization into different realms of knowledge within and between disciplines. This permits the 'fractures' that exist within and between disciplines, and indeed the similarities that exist with other sub-disciplinary areas (Trowler, 2009) to be identified.

In this respect epistemological essentialism is useful as a unit of analysis, whilst at the same time recognising and accepting, one has to take into account the wider context of the departmental and indeed 'institutional habitus' (see Thomas, 2002) in addition to external pressure from government and industry (Trowler, 2012)

Whilst it is acceptable that disciplinary identities are "...dialogic and emerging through interactions" (Miller, 2008, p.104 cited by Bamber, 2012), it can be argued this dialogic identity formation also takes place within subcultures evident both within and between disciplines. For example, Trowler emphasises how:

> "...practices which are recurrent, taken-for-granted and found in socially acquired sets of meaning developed and learned through social interactions". (Trowler, 2012, p.37)

Indeed, Trowler and Coopers' (2002) teaching and learning regimes (TLR's) describe how individuals in their interactions, both construct and enact culture acknowledging the power of implicit epistemologies and power relations (Bamber, 2012). Add to this ways of thinking and practicing (WTP) (Entwistle, 2006; Hounsell & Anderson, 2008), and it is evident particular knowledge claims are nurtured and thus deemed more valid in different academic domains.

Aim

The aim of this study is to investigate the utility of SHAPE within a higher education context in order to establish the influence teacher personal epistemologies have on student personal epistemologies; and how this influences perceptions of, and approach to teaching and learning in a higher education context.

Objectives

- To validate in a United Kingdom context, a revised version of a quantitative measure of personal epistemology – the Discipline-focused Epistemological Beliefs Questionnaire (DEBQ, Hofer, 2000).
- To classify groups of students both within and between disciplines using the DEBQ.
- To measure the influence teachers' personal epistemologies on their students personal epistemologies over a standardized time period – a semester of study.

- To measure potential associations between student scores on the DEBQ and a quantitative measure of their perceptions of, and approach to learning (i.e. Approaches and Study Skills Inventory for Students, Entwistle, Tait & McCune, 2000).
- To synthesise quantitative and qualitative data to devise and develop a framework for teacher-learner personal epistemologies and related practice in a higher education context.

To achieve this, the research discussed in this thesis is based around four key questions:

1. What academic personal epistemologies do teachers bring to the teaching and learning context, and how does this influence how they perceive different aspects of teaching and learning?

2. How do teachers perceive knowledge and how does this influence their conceptions of and approaches to teaching?

3. What academic personal epistemologies do teachers have and does this influence the academic epistemologies of their students?

4. How do academic personal epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

These questions are central to the idea of SHAPE. Using a mixed methods design, the research contained within this thesis will address these questions and evidence the utility of SHAPE as a lens through which further research may be conducted. The discussion in Chapter One will start with different theories of learning, including importantly the social aspects therein.

In Chapter Two the author will discuss the contrast between the traditional foundations of epistemology and current thought on *personal epistemology*. In what is referred to as the ‘switch’ the author will discuss the epistemological implications of the shift in higher education over the past 40 years from research rooted in philosophical concepts of approaches to teaching and learning, to theory that has been developed from a psychological perspective.

The theoretical perspectives, methodology, methods employed, and the epistemology (my personal epistemology) behind the decisions made, will be discussed; subsuming the approach taken to gain an insight into beliefs about knowledge and knowing in higher education (Chapter Three).

A series of investigations will contribute toward an ‘understanding’ of how personal epistemology has the potential to influence teaching, learning and assessment practices and processes in a higher education context. These will be discussed in Chapters Four to Seven, and will highlight the findings therein. The results obtained will refer to previous work in the field of personal epistemology and higher education, with conclusions and recommendations for future research in the concluding chapter (Chapter Eight).

1.1 Theories of Learning

A number of theories of learning have emerged over the years to explain how as individuals and groups we learn. These theories have been applied in formal settings such as in classrooms in schools, and the lecture theatres and seminar rooms in universities. Theories of learning date back to 1885 when Hermann Ebbinghaus conducted a number of experiments with participants who learned nonsense syllables and then attempted to recall them. The experiments conducted by Ebbinghaus and those that followed focused on how individuals memorised different types of stimuli. This changed with the work of Sir Frederick Bartlett (1932) who argued memory was not recall but reconstruction where individuals did not remember as such, but constructed a version of the stimulus they had originally encountered. That is, a version that was particular to each individual and was a personal account of what they had seen or heard, and not one that replicated verbatim what they had encountered previously.

Although one could argue these studies are about memory and not learning per se, they have made a contribution to subsequent theories and models of learning. For the sake of brevity and indeed clarity a brief description of these models and theories will follow. Reference will be made to theories and models relevant to this thesis. The intention is not to give a historically comprehensive view of learning theories and models as that would require a far more extensive text than the parameters of this thesis permits. Rather, the intention is to provide a framework, a point of reference for the remainder of this thesis, one which includes *behaviourism, cognitivism, constructivism and humanism.*

1.1.1 Behaviourism

Behaviourism operates on the premise of classical conditioning (Pavlov), operant conditioning (Skinner), and stimulus-response (S-R). That is, all behaviour is a response to external stimuli and can be explained without consideration of internal mental states or consciousness. As such, the originators of and important contributors to behaviourism (e.g. Ivan Pavlov, 1927; B.F. Skinner, 1938; E.L. Thorndike, 1932; J.B. Watson, 1916), assume the learner is essentially passive and responds only to environmental stimuli. Thus, learners start with a clean slate (i.e. *tabula rasa*), where behaviour is shaped through both positive and negative reinforcement. From this perspective, learning is defined as a change in behaviour in the learner, and can therefore be viewed as an extension of logical positivism.

1.1.2 Cognitivism

The cognitivist revolution replaced behaviourism in the 1960s as the dominant paradigm. Cognitivism argued the “black box” of the mind needs to be opened and understood in order to gain an insight into how people learn. Using the metaphor of a computer, cognitivists believed the learner is an information processor where information comes in, is processed, and leads to certain outcomes. The originators of and important contributors to cognitivism (e.g. Gagne, 1965; Reigeluth, 1992), in response to behaviourism, argued people are not “programmed animals” (behaviourism experimented with animals and generalised to humans), that merely respond to external stimuli. Rather, people are rational and require active participation in order to learn, and mental processes such as thinking, memory, knowing and problem solving need to be explored.

1.1.3 Constructivism

One of the foundations of constructivism is Vygotsky's social development theory (1978). Constructivism, a reaction to the didactic approaches of behaviourism and programmed instruction, sees learning as an active, contextualised process of constructing knowledge rather than acquiring it. Learning occurs through experience, activity, and dialogue, with learners constructing their own knowledge based on hypotheses tested through social interactions and negotiations. Here the learner is not a *tabula rasa*, as past experiences and cultural factors are evident in any given context. The originators and important contributors (e.g. Bruner, 1967; Dewey, 1933; Piaget, 1955; Vygotsky, 1978), believe each person has a different interpretation and construction of knowledge. An important point to make is that, a common misunderstanding attributed to constructivism is that teachers should never tell learners anything directly. Constructivism however, postulates a learner will actively attempt to construct new knowledge from previous knowledge regardless of how they are taught.

1.1.4 Humanism

Around the same time as the cognitive revolution, humanism emerged. A central assumption of humanism is that people act with intentionality and values. In contrast to the behaviourist and cognitive viewpoints, humanists believe it is necessary to study the person as a whole, and so the self, motivation, and goals are of particular interest. Key proponents of humanism include Carl Rogers (1969), Abraham Maslow (1970), and Malcolm Knowles (1986). Learning from the humanist perspective is student-centred and the role of the educator is that of a facilitator. A number of theories are related to this perspective are experiential learning (Kolb, 1984), Maslow's (1973) hierarchy of needs, and facilitation theory (Rogers, 1969).

It can be argued that all of these perspective to a greater or lesser extent have a contribution to make toward an understanding of teaching and learning in a higher education context. Of course, this depends on a number of different factors including the teacher, learner, the environment, and the subject matter to name a few. This thesis will attempt to take into account these different factors whilst at the same time exploring how personal epistemology affects or is affected by those factors.

1.2 The learning environment and its complexities

A number of models have been put forward that demonstrate the complexity of the teaching-learning environment in a higher education context. A review of all of these is beyond the scope of this thesis. Thus, for the sake of brevity and clarity, two models that are deemed most relevant to this thesis and its structure are discussed - The Heuristic Model of Teaching and Learning, and the Presage-Process-Product Model of Teaching and Learning (Biggs, 1989; Prosser et al., 1994).

The Hueristic Model of Teaching and Learning (Enwistle, 2009) proposes there are four main influences on learning: student characteristics, nature of the subject matter, teaching carried out by staff, and the learning environment provided by the department. This model displays a number of connections, including student characteristics and approaches to teaching. The original Hueristic Model (Entwistle, 1987) has evolved into its current state, becoming more complex as new influences and issues have been added. Within this model, a number of characteristics: student and teaching-learning environment are pertinent to the research conducted and discussed in the subsequent pages of this thesis. For example, subject-specific knowledge; conceptions of knowledge and learning; approaches to teaching and learning; perceptions of meaning and relevance; and perceptions of task requirements. It is these elements that will be at the core of this thesis, and which subsume the data collection, analysis and subsequent discussion and conclusion.

A similar systemic model was developed by Biggs (1989) (see also Prosser et al. (1994). This widely known 3P Model includes: presage, process and product, the three stages involved in the learning outcome. The presage part of the model describes the antecedents of learning including: student prior knowledge and experiences, motivations, study habits, and teacher beliefs, attitudes, and their intentions with regard to student learning outcomes, assessment. The process part of the model are the strategies students use while learning including student-based and teacher-based factors that interact to produce learning activities and approaches to learning (Arenas, 2009); and the product part of the model is the outcome of these strategies in the form of the student learning outcome. Biggs (2003) argued the challenge is to bring the elements of the 3P Model to a state of equilibrium characterised by meaningful learning through learner-focused activities, which are described as ‘constructive alignment’ (Biggs, 1999).

Within these models, teachers’ approach to teaching is closely linked to students’ perceptions within the context of each learning environment. These two models demonstrate the connection and its complexity. As Entwistle (2009) noted, the main purpose of these models is to provide reflection and discussion with regard to a number of subtle interactions occurring within elements of them that influence the quality of student learning. They are not, and were never intended to be, a diagnostic that defines a pathway toward a definitive, all encompassing, explanation of the complexities involved in teaching and learning in a higher education context. Rather, they can be viewed as an evolving, dynamic exploration of the complexities therein.

1.3 Teaching Conceptions

Kember (2009) when discussing conceptions of teaching highlighted two studies (Kember & Kwan, 2002; Trigwell et al., 1994) that displayed an association between teachers’ approach to teaching and their beliefs about teaching. Earlier, Dall ‘Alba (1991) identified seven ways in which teachers conceived their teaching, ranging from presenting information to conceptual change; an idea evident in the later work of Prosser and Trigwell (2006) who identified dichotomous approaches to teaching they labelled ‘information transfer/teacher focused (ITTF) and ‘conceptual change/student focused’ (CCSF).

Moreover, Samuelowicz and Bain (2001) identified seven teachers’ conceptions of teaching: imparting information; transmitting structured knowledge; providing and facilitating understanding; helping students develop expertise; preventing misunderstandings; negotiating meaning; and encouraging knowledge creation. Samuelowicz and Bain (2001) highlighted how these reflected two orientations to teaching and learning. The first is teacher-centred the second learner-centred, and it is these differing orientations that influence teachers’ view about the nature of understanding and learning and their role in knowledge organisation. A consequence of this is teacher-student interaction differ substantially. A teacher centred orientation involves ready-made ‘understandings’ for students and shows them how to apply knowledge. Whereas a student centred orientation involves intensive interaction between teacher and student where students ‘personalise’ and use their new ‘understandings’ to interpret the world in a different way.

More recently, van Rossum and Hamer (2006) highlighted a hierarchical structure of teaching and learning including:

	Conception of learning	**Conception of teaching**
Conception 1	Increase of knowledge	Well-structures lectures
Conception 2	Memorizing	Lectures with opportunities for questions
Conception 3	Memorizing and application	Interactive lectures
Conception 4	Understanding subject matter	Coaching and facilitation
Conception 5	Understanding reality	Dialogue
Conception 6	Self-realization	Inspiration

It is noticeable that this hierarchy is somewhat similar to the categories proposed by Saljo (1979) and Marton, Dall’Alba and Beaty (2003). All however, highlight the different levels and range of sophistication in the learning process and its application.

Kember (2001, p.205) highlighted how a cluster of beliefs regarding the process of teaching and learning may be related to student conceptions of learning and epistemological beliefs and teachers’ conceptions of learning; and it is these that together form an inter-related set. Earlier, van Rossum & Schenk (1984) conducted a study that related conceptions of learning to approaches to learning.

Moreover, Sheppard & Gilbert (1991) in a study focusing on personal epistemology within four academic departments, concluded beliefs were influenced by: student approaches to learning, student conceptions of knowledge, and their teachers’ beliefs about teaching.

Some twenty years ago, Leinhardt (1993) and Ramsden (1992) argued teaching can be depicted as a continuum at one end of which is the didactic instructor, leader, and disseminator of knowledge and at the other, the passive instructor who is the responder to learners' needs. Somewhere around the centre lie the facilitator and the arranger of the learning environment (Leinhardt, 1993).

However, a matter for concern was raised by Entwistle (1998) when he stated:

> "…academics often lack a developed conception of teaching or an understanding of how their approaches to teaching affect the quality of student learning" (p.6).

Entwistle (1998) emphasised the point further stating:

> "Becoming aware of the variation in the way our colleagues and others conceive of learning and teaching and approach learning and teaching is a key step in developing our own awareness of our own way of conceiving and approaching learning and teaching" (p.22).

So, what are the potential consequences of these diverse conceptions of teaching and learning held by university lecturers?

To put it very simplistically, the teaching approach of the teacher influences the learning approach of the student and subsequently the learning outcome. A view given by Prosser and Trigwell (amongst others) who argued that:

> "While a teaching context may be designed to afford a particular approach to teaching, individual university teachers will form certain perceptions of their situation in that context, which relate to the way they approach their teaching" (Prosser & Trigwell, 1997, p.25).

Moreover, Entwistle (2000) stated:

> "The conceptions of both learning and teaching held by teachers also affect their approaches to teaching (Trigwell & Prosser, 1999). The chain has been completed by showing that the approaches to teaching adopted by teachers also influences their students' approaches to studying and through those, the learning outcomes" (p.5).

This was highlighted by Gow and Kember (1993) who demonstrated that teachers influenced the approaches to learning adopted by their students. Teachers who viewed teaching as knowledge transmission created an environment where a 'deep' approach to learning was rarely evident. However, teachers who saw themselves as the facilitators of student learning created a classroom environment where a surface approach was the exception rather than the rule. Furthermore, research has suggested the way in which teaching is conducted in higher education is dependent on the educational beliefs and presumptions of academic staff (Bain, 2000; Quinlan, 1999; Trigwell et al. 1994; Trigwell & Prosser, 1996), and that there may be consequences for the nature of learning that results (Kember, 1997; Martin & Ramsden, 1998; Samuelowicz and Bain, 2001; Trigwell et al. 1999).

Academics who view teaching as exposition and learning as reproduction, assess students in a way that encourages the reproduction and regurgitation of knowledge in ‘well-practiced’ tasks. In contrast, academics who see their role as facilitating learning , help in the construction of personal meaning/understanding, assessing students in a way that requires purposeful transformation of knowledge to address ‘open-ended’ issues not previously encountered (Samuelowicz & Bain, 2002).

Teachers thus influence the learning of their students by creating particular types of classroom environments that are conducive to very different learning experiences. Research undertaken by Kember and Gow (1994) revealed a substantial and consistent relationship between approaches to teaching and approaches to learning (after Prosser & Trigwell, 1999). However, it was noted the research was not conducted in a ‘real world’ teaching and learning situation (Prosser & Trigwell, 1999). To address this issue, Trigwell et al. (1999) extended the research undertaken by Kember and Gow (1994) by utilising a topic-specific version of the SPQ and topic-specific version of the ‘Approaches to Teaching Inventory’ (ATI). The conclusion drawn from the study was that an important relationship existed between university teachers’ approach to teaching of a particular topic in Higher Education (HE) and the way students approached their learning in that particular topic, and thus confirmed the findings of Kember and Gow (1994).

The burgeoning research conducted in the field of teaching and learning, reiterates this very point. Taking a cursory look at the different conceptions it is evident there is a clear divide of learning as being *quantitative* in nature where the transmission and accumulation of ‘facts’, ‘figures’ ‘knowledge’ is both recognised and rewarded. There is then a noticeable shift toward a more *qualitative* teaching and learning experience where the emphasis lies not in the regurgitation of what the ‘knower’ the authority has transmitted (e.g. teacher, textbook), but in the way in which the teacher recognises that it is the student who is the one who is ultimately responsible for their own learning and is therefore the one who constructs their own meaning of the subject matter. Here the teacher is viewed more in a ‘facilitating’ role than as an authority figure. In a review of 13 studies of higher education teacher conceptions of teaching Kember (1997) synthesised the outcomes of these studies into a two-level categorisation scheme. The higher level contained the two sub-categories ‘teacher-centred’ and student-centred’. A teacher categorised as teacher-centred would have a greater tendency toward a content oriented way of teaching, whereas a teacher categorised as student-centred would teach in a way that concentrated more on student learning. The lower level of Kembers’ categorisation scheme contained five positions ranging from teacher-centred (imparting information) to student-centred (conceptual change and intellectual development).

These conceptions of teaching are developed whilst teachers themselves are students and are carried through to their teaching (Dall’Alba, 1991; Fox, 1983; Martin & Balla, 1991; Pratt, 1992; Prosser, Trigwell & Taylor, 1994; Ramsden, 1992; Samuelowicz & Bain, 1992).

Although the methods may differ, particularly between phenomenographic studies concerned with teacher ‘conceptions’ (e.g. Martin & Balla, 1991; Prosser et al. 1994) and those concerned with teacher ‘belief orientations’ (e.g., Fox, 1983; Kember, 1997b; Samuelowicz & Bain, 1992), there are many points of calibration between the descriptive categories that have been used in the literature (Samuelowicz & Bain, 2001, p.300). It is this research that highlights the way in which teaching is conducted in higher education is dependent on the educational beliefs and presumptions of academic staff (Bain, 2000; Quinlan, 1999; Trigwell et al. 1994; Trigwell & Prosser, 1996), and that there may be consequences for the nature of learning that results (Kember, 1997; Samuelowicz & Bain, 2001 Trigwell et al. 1999).

To summarise, it is widely acknowledged in higher education the student learning experience and ultimately their learning outcome is a product of the teaching they have ‘received’. The word *received* is of particular importance here. Research has shown a number of different approaches and attitudes toward teaching and thus learning in higher education. For example, a series of studies conducted with 24 university teachers (Prosser *et al.* 1994) found six different conceptions of teaching and five different conceptions of learning held by the teachers. These conceptions ranged from a teacher-focused strategy the intention of which was to transmit information to students through to a student-focused strategy the aim of which was to change student conceptions (see also Trigwell and Prosser, 1999).

The importance of these differences and their consequences cannot be understated. For example, Emanuel and Potter (1992):

> "…identified relationships between students' approaches to learning and their preferences for teacher communication styles" (cited in Hativa & Birenbaum, 2000, p.212).

A number of researchers have attempted to highlight the differences in lecturers' approach and attitude toward teaching and learning in higher education. For example, Saroyan and Snell (1997) found that lecturing styles correlated with disciplines: oral lecturers were more common in the humanities; exemplars were more common in biomedical sciences; and information providers and amorphous lecturers more common in science and engineering. Prosser, Martin and Trigwell (2007) argued the way in which teachers comprehend their particular subject area, influences how they represent it to their students, and subsequently how students learn in that particular context.

Clearly, there are links between a teachers' personal epistemology and their conception of the teaching and learning process in higher education. For example, a teacher who has a less sophisticated personal epistemology will see their role as a transmitter of knowledge to their students. Whereas, a teacher with a more sophisticated personal epistemology will see their role as a facilitator in the knowledge construction process. Research has demonstrated that teachers in higher education have a number of different conceptions of what teaching and learning is. Teachers' conceptions about teaching have been shown to range from 'teaching as transmitting concepts of the syllabus' to 'teaching as helping students change conceptions'; with teachers' conceptions about learning ranging from 'learning as accumulating more information to satisfy external demands' to 'learning as conceptual change to satisfy internal demands' (Trigwell & Prosser, 1999).

These conceptions of the teaching and learning process have been reported as exerting an influence on the approach to teaching adopted by university lecturers (Kember & Kwan, 2002; Trigwell & Prosser, 1996), and how they perceive their teaching context (Prosser & Trigwell, 1997). Furthermore, Martin et al. (2000) argued:

> "…that the critical issue is not how much teachers know or what their level of teaching skill is, but what it is they intend their student to know and how they see teaching helping them to know" (Martin et al. 2000, p.387).

An issue also noted by Entwistle and Smith (2002) when discussing 'personal' and 'target' understanding in teaching and learning activities and communications. This has serious connotations, as teachers who view knowledge as being constructed adopt a more student-focused approach to teaching (Martin et al. 2000, p.409).

Over three decades have passed since Saljo (1979) identified five different ways in which teachers conceive of learning defining these as (a) an increase in knowledge, (b) memorising, (c) the acquisition of knowledge for retention or use in practice, (d) understanding, and (e) an interpretative process aimed at the understanding of reality. Later, Marton et al. (1993) found Social Science students held similar conceptions with the addition of a sixth conception. These conceptions included (a) Increasing one's knowledge, (b) Memorising and reproducing, (c) Applying, (d) Understanding, (e) Seeing something in a different way, and (f) Changing as a person.

These conceptions can be differentiated and discussed in terms of quantitative and qualitative conceptions of the learning process. For example, a quantitative conception sees learning as acquiring external knowledge from an external source (e.g. teacher, textbook etc.) (Wilkinson, 1989). In other words, to be successful one has to acquire knowledge transmitted from the source of authority. Here, convergent thinking is encouraged whereby the student's knowledge base is expected to "fall in line" with that of their teacher (see Donald, 2002; Entwistle & Smith, 2002). This conception may be influenced by the subject matter, the approach to teaching (see Prosser & Trigwell, 1999; Trigwell & Prosser, 1996), or learner expectations. Furthermore, Marton et al. (1993) argued a quantitative conception of knowledge sees it as a process of transmission without transformation. Conversely, qualitative conceptions of knowledge view learning as the active construction of knowledge with meaning extracted from the task in hand. Here the individual has a conception of knowledge as being complex and interconnected and relative to individual's interactions within particular contexts (Brownlee et al. 2002).

1.4 Teachers influence on learning

The discussion so far suggests there is no doubt teachers exert a great deal of influence in teaching and learning environments (e.g. Hennessey et al., 2013). For example, Knewstubb and Bond (2009) highlighted variation (depending on what the teacher focused on), in the way the same materials were taught, and how this provided different objects of learning for students (see also Marton, Runesson & Tsui, 2004; Runesson, 1999). The pedagogic practices teachers employ provide a model on which student's base their perceptions on what it is to know (e.g. Conley et al., 2004; Hofer, 2001). As a consequence, student learning is influenced greatly by the methods and techniques employed by their teacher (Hofer, 2001; Yager & Akcay, 2010).

Much of the research conducted with regard to the influence teachers have on student learning in a higher education context has been focussed on the approaches to learning students take to their studies in a variety of contexts. The reason for this is the approach adopted is both student and context dependent. It then follows a student can adopt a different approach in different contexts, depending on the characteristics of the context and the students interpretation therein (Baeten et al., 2013; Baeten et al., 2010; Biggs, 2001).

The research on approaches to learning has its foundations in the phenomenographic work of Ference Marton and Roger Saljo (1976); and later by Biggs (1987a,b) and Entwistle and Ramsden (1983) who used quantitative self-report questionnaires. A seminal paper (Marton & Saljo, 1997), reported the qualitatively different ways students engage with their studies. These two approaches to learning were labelled 'deep' and 'surface'. A deep approach is characterised by the intention to understand, with an intrinsic interest in the content to be learned. For example, relating ideas, using evidence and seeking meaning. On the other hand, a surface approach is associated with extrinsic motivation, with the intention being to avoid punishment or receive reward; an approach that is limited to rote memorisation and which is characterised by a narrow syllabus-bound attitude (Biggs, Kember & Leung,, 2001; Entwistle & McCune, 2004).

Moreover, Nelson Laird et al (2008) discussed how a deep approach is typified by the ability to use various strategies such as reading widely, combining a variety or resources, discussion of ideas with others, reflecting on how individual pieces of information relate to larger constructs or patterns, and applying knowledge in real world situations (see also Biggs, 1987, 1989, 2003; Entwistle, 1981; Ramsden, 2003; Tagg, 2003). Furthermore, deep learning involves the integration and synthesizing of information with prior learning whereby a conceptual shift in one's thinking occurs (Ramsden, 2003; Tagg, 2003).

Conversely, students adopting a "surface" approach to learning, focus on the information itself and the 'facts' therein. This results in students focusing on rote learning and memorization techniques (Biggs, 2003; Tagg, 2003). A surface approach to learning is epitomised with the intention to avoid failure when studying for a test/examination, rather than attempting to understand key concepts and their relationship with; and how it can be applied in other contexts and situations (Bowden & Marton, 1998; Nelson-Laird et al., 2008).

Baeten et al (2013) highlighted how, from a constructivist perspective, learning is an active process rather than a passive reception of information (e.g. Mayer, 2004). Furthermore, they discussed that to foster student active knowledge construction, it was necessary to adopt constructivist teaching methods (e.g. Loyens & Rikers, 2011). Thus, student-centred teaching methods that emphasise students' active role in the learning process are essential (Elen, Clarebout, Lĕonard & Lowyck, 2007; Loyens & Rikers, 2011). Baeten et al. (2013) stated that these student-centred teaching methods are characterised by 3 main features:

- Active involvement of students in constructing knowledge for themselves (Kirschner, Sweller & Clark, 2006; Stuyven, Dochy & Janssens, 2008);
- Selecting, interpreting and applying information to problem solve (Stuyven et al., 2008); and

- Coaching and facilitating from the teacher (Beijaard, Verloop & Vermunt, 2000).

(Source: Baeten et al., 2013).

It is these student-centred teaching methods that increase the likelihood of students adopting a deep approach to learning (Baeten et al., 2013; Hannafin et al., 1997; Lea, et al., 2003; Mayer, 2004). That is, learning which is focused on understanding and conceptual change (Bonwell & Sutherland, 1996; De Corte, 2000; Hatch & Farris, 1989; Holt-Reynolds, 2000; Kroll & Laboskey, 1996; Tynjälä, 1999).

Within a higher education context, a deep approach to learning is most valued (Baeten et al., 2013); particularly within the constructivist paradigm. Szili and Sobels (2011) reported that when students were active participants in the acquisition and thoughtful transformation of information into knowledge they could understand (Killen, 2007), subsequent reflection on the student part displayed 'higher order' thinking skills. Moreover, Killen (2007) highlighted how constructivist learning environments involve a deliberate, progressive construction and deepening of meaning, rather than a passive process where students receive information, where the expectation is that in order to be 'successful' within their chosen field of study, regurgitation is the order of the day. Emphasising this, Beausaert et al (2013) reported how a teacher-centred approach predicted a surface approach to learning and a student-centred approach predicted a deep approach to learning. Moreover, students who perceived their teachers as more student-centred were more likely to adopt a deep approach to learning.

However, it is challenging to enhance students' deep approach to learning (Baeten et al., 2013; Marton & Saljo, 1976). For example, Baeten et al (2013) in a large –scale study involving over 1500 students and 45 teachers, manipulated the teaching and learning environment, and found no increase was evident for a deep approach, regardless of the treatment group. Baeten et al (2013) gave two potential explanations for their findings. First, a 'ceiling effect' may have occurred whereby students scored high initially on the deep approach and low on the surface approach. Two studies (Vanthournout et al., 2009; Wilson & Fowler, 2005), which support this explanation have shown that a student-centred learning environment is conducive to an increase in a deep approach to learning. The difference between these studies and the Baeten et al (2013) study was students initially scored low for a deep approach, thus allowing for any shift to be evident in the measure taken. A second alternative explanation put for by Baeten et al. (2013) was a deep approach is only dynamic in subgroups of students, not the group as a whole.

These findings suggest the timing of the moment of measurement is crucial. One could hypothesise that initially students are more intrinsically motivated, and as their workload increases, so does their adoption of a more surface approach to study (Baeten et al., 2010). Moreover, the type of assessment used within the teaching-learning environment is influential, as is the timing of the administration of the questionnaire, particularly if it is near the assessment period. Consequently, the type of assessment and its perceived aims and objectives can influence student responses on self-report measures of approaches to learning. If there is not 'constructive alignment' (Biggs, 1999) of the teaching, learning and assessment ethos within the specific context being researched, particularly the assessment, there will be a profound effect on student responses on the measures of their approach to learning. This also raises the question of student approaches to learning only being measured by quantitative means. One could argue that to get a fuller picture, a variety of methods should be adopted.

Students may have different perceptions of the same teaching-learning environment (Stuyven et al., 2008), and as a consequence student-centred teaching methods may not work for all students (Baeten et al., 2013; Ertmer & MacDougall, 1996). In a recent review of the literature, Baeten et al (2010) highlighted aspects of the teaching-learning environment that were influential in either encouraging or discouraging particular approaches to learning. Amongst these were: contextual factors, perceived contextual factors, and assessment.

These contextual factors include: assessment, feedback, teacher, interactivity and discipline. For example, Trigwell, Posser and Waterhouse (1999) noted the difference between a student-centred and teacher-centred approach to teaching in the way a student approach to learning is encouraged. A student-centred approach to teaching was associated with a student deep approach to learning; and a teacher-centred approach to teaching associated with a surface approach to learning. Moreover, Garrison and Cleaveland-Innes (2005), noted how an emphasis on teacher active involvement in the teaching-learning environment contributed toward a deep approach to learning. Nelson Laird et al. (2008) also noted the important role context has on the adoption of a deep approach to learning. Referring to previous work (e.g. Biggs, 1989; Entwistle & Ramsden, 1983; Tagg, 2003; Zeegers, 2001), Nelson Laird (2008) emphasised how it was often the case that the learning task itself, and the conditions therein are influential in the process of adopting a particular approach to learning.

As academic tasks influence the approach to learning students adopt (Ramsden, 2003) and these tasks differ from one discipline to another (Nelson Laird et al., 2008); in order to understand the student process of learning, there is a need to examine what both teachers and students do within different academic contexts, and this should take place both within and between disciplinary fields of study. As Stes, Gijbels & Van Petegem (2008) highlighted approaches to teaching are not stable characteristics. That is, they are not trait-like, and as such reflect the contextuality of student approaches to learning. For example, Lindblom-Ylänne et al. (2006) found that teaching approaches varied across different teaching contexts, with the student-focused approach being the most sensitive to contextual influences.

1.5 Assessment

Assessment is generally seen as the most direct influence on student study behaviours. This is manifest in the amount of time students put into their learning, and the ways in which they undertake their studies (Entwistle, 2009). However, Baeten et al (2010) noted student success in assessment does not necessarily require a deep approach to learning. Moreover, the teacher also plays a role in the approach to learning students adopt. If teachers' intention is to change the conceptions of their students (Trigwell et al, 1999), and the teacher is more involved (Garrison & Cleveland Innes, 2005), their students have an inclination toward a deep approach to learning. A crucial part of assessment is the perceived demands of the type of assessment, which influence students' approach to learning, (e.g. Segers et al., 2006). A phenomenon that occurs whatever assessment mode is used (Baeten et al., 2010). Thus, it is how the assessment is perceived and what its demands are that affect the direction learning takes (Entwistle, 2009), be this understanding or reproduction and regurgitation in the form of rote memorisation. This process includes the feedback that students receive, which is influential in determining the extent to which the learning strategy of students can be enhanced.

Generally speaking, students believe multiple-choice questionnaires (MCQs) only require rote learning and thus a surface approach to study. On the other hand, essays are perceived as requiring in-depth understanding, and as a consequence, encourage a deep approach to learning (Scouller, 1998; Thomas & Bain, 1984). Short-answer questions (SAQs) are an alternative to MCQs and essays and whilst not requiring the time to develop an essay, they do 'tap into' more advanced ways of thinking (Entwistle, 2009). Thus, SAQs can be viewed as a half-way-house between the standardization of a quantitative measure of learning in the form of a MCQ, and the qualitative (and some might argue, subjective) nature of the assessed essay.

A prime example of how student perceptions of assessment can be influenced was highlighted in Noel Entwistle's book entitled 'Teaching for Understanding at University' (2009). He noted that the introduction of MCQs and SAQs across a number of departments within one university was accompanied by the explanation by staff to students that MCQs would test understanding in conjunction with their breadth of knowledge; and SAQs would involve problem solving by utilising appropriate concepts and techniques (Entwistle, 2009). The outcome of this process was the successful guidance of students toward a deep approach to learning.

1.6 Perceived contextual factors

Parpala et al (2010) found disciplinary differences in student conceptions of good teaching. Moreover, their results also suggested different approaches to learning occurred as a consequence of experiencing the teaching-learning environment in different ways. For example, Baeten et al (2010) noted how, if students perceive the approach to teaching to be student-centred, the more they are inclined towards a deep approach to learning. Furthermore, research has demonstrated student approaches to learning are related to perceptions of content, the context and demands of different learning tasks (Brennan et al. 2010; Richardson, 2000).

One example of this is a recent Economic and Social Research Council (ESRC) funded project entitled ‘Social and Organisational Mediation of University Learning’ (SOMUL), there was variation across five departments in each of three academic subjects with regard to knowledge, its application and how its ‘intake’ was achieved (Brennan et al., 2010). However, the differences were modest in terms of levels of significance. It was therefore suggested that idiosyncratic contextual factors may be more important than formal aspects of the curriculum or institution in determining students’ conceptions of learning, approach to learning, personal development and personal change. Around the same time, Parpala et al (2010) noted differences in perceptions of teaching-learning environments in different faculties (2509 students, 10 faculties). Subsequently, Parpala et al. (2011) argued that conceptions of good teaching are context bound and related to students’ conceptions of learning (see also Carpenter & Tait, 2001; Kember, Jenkins & Ng, 2004; Kember & Wong, 2000).

Moreover, the association between deep approaches to learning and a student perception of a teaching-learning environment that encourages understanding has been noted in a variety of educational contexts in different subject areas (Entwistle, Tait & McCune, 2000; Parpala & Lindblom-Ylänne 2012). A number of studies have found a positive/deep, negative/surface relationship between student perceptions of the teaching–learning environment and their approach to learning (Kreber, 2003: Lawless & Richardson, 2002; Parpala et al., 2010; Richardson, 2005; Richardson & Price, 2003; Sadlo & Richardson, 2003).

It has been highlighted how students’ preference for methods of teaching that support understanding (or are perceived to do so), are significantly correlated with a deep approach to learning (e.g. Entwistle and Tait, 1990; Kember et al. 2008; Papinczak et al., 2008; Parpala et al., 2010). Moreover, Chamorro-Premuzic et al (2007) noted how a student preference for interactive teaching modality significantly positively correlated with deep approach and significantly negatively correlated with surface approach.

Indeed, Baeten et al (2010) highlighted that several student factors are influential in the encouragement or discouragement of the adoption of deep approaches to learning; and these are a result of students’ perceptions of the context (Entwistle, 1991; Zeegers, 2001). A number of studies conducted (e.g. Entwistle & Ramsden, 1983; Marsh, 1987) identified a variety of aspects that are important in the perceptions of university teachers and teaching: clarity, level, pace, structure, explanation, enthusiasm, empathy. It is the last 'Es' that appear to directly encourage the adoption of a deep approach to learning in students (Entwistle, 2009).

Instructional interventions will always be interpreted by students, and this influences the effects therein (e.g. Elen & Lowyck, 2000). For example, a perception that there is an excessive workload placed on students has been associated with the adoption by students of a surface approach to learning (Baeten et al., 2010; Diseth, 2007; Entwistle & Ramsden, 1983; Kember, 2004; Lawless and Richardson, 2002); and less so with a deep approach to learning (e.g. Cope & Staehr, 2005; Diseth, 2007). One could therefore posit, that a teacher-centred, information transmission approach to teaching (or a perception of this), would encourage a surface approach to learning.

Evidence also suggests that if students perceive the teaching to be 'good', there is more prevalence within those groups of students toward a deep approach to learning and less so, a surface approach (Crawford et al., 1998; Diseth et al., 2006; Entwistle & Tait, 1990; Lawless and Richardson, 2002; Trigwell and Prosser, 1991a; Wilson et al., 1987). Moreover, in a study conducted by Leung, Lu Chen and Lu (2008), a teacher-centred approach was associated with a surface approach to learning and a student-centred approach to a deep approach to learning.

From the perspective of the teacher, they may sometimes feel inclined to cover as much of the topic area as possible (Entwistle, 2009). This may result in essential features of the subject being diminished, and a surface approach to learning adopted as a consequence of this. However, reducing the breadth and increasing the depth, permits more time for difficult topics, and gives students an increased opportunity to achieve a more thorough understanding within the learning context through grasping *threshold concepts* (e.g. Meyer & Land, 2005). It is this process that encourages the learner through a student-centred approach, to come to terms with the way in which the logic underlying knowledge within the subject is structured and arrived at. Consequently, the student is more engaged in meaningful learning, and is more adept at relating ideas and sees the interconnectedness of the subject as a whole, rather than fragmented elements requiring regurgitation or rote-learned detail (Entwistle, 2009). Furthermore, Bain (2004), found in a comprehensive study conducted in the USA, that the best teachers kept the topic as simple as possible initially, with the gradual introduction of detail and complexity following, but only after the basic ideas had been grasped.

1.7 Teacher-student relationship

Mottet, Frymier and Beebe (2006) put forward three propositions to explain the way in which teachers and students influence each other through relational power:

- Instructor-student relationship similar to interpersonal relationships and involves influence
- Instructors and students influence each other by conceding power to one another
- Quality of instructor-student relationship increased when appropriate communication between them used and reduced when inappropriate communication used

Goodboy et al. (2011) also discussed teacher-student relationships when positing teacher's use of antisocial power bases impede students leaning outcomes and create negative teacher impressions. On the other hand, the use of prosocial power bases fosters student learning and creates favourable teacher impressions.

Interestingly, Goodboy and Bolkan (2011) noted how research suggests that both instructional and learning outcomes are related to student motives (Goodboy, Martin & Bolkan, 2009; Martin, Cayanus, Weber & Goodboy, 2009; Martin, Mottet & Myers, 2000; Weber, Martin & Cayanus, 2005; Williams & Frymier, 2007). Moreover, they highlighted the importance of the way in which a teacher communicates with their students, influences the motives of these students within the particular teaching and learning context.

In a utopian scenario Schrodt et al (2008) argued for a process whereby teachers and students negotiate

> “...power and exercise social influence together as they co-create meaning and communicate in ways that facilitate learning” (p.181)

Whilst highlighting how such mechanisms are lacking investigations or publications in any numbers worth noting.

In a related topic, Ramsden (2003) argued teaching was in essence a conversation. It is this ‘conversation’ manifest in persuasive activities that is at the core of the relationship between a teacher and their students. Moreover, Knewstubb and Bond (2009) used the term ‘communicative alignment’ to capture the relationship between teachers and students in higher education. Here the focus is on the ‘awareness’ participants have during particular communicative events (e.g. lecture, seminar). The concept of communicative alignment is drawn from phenomenographic research into awareness, intention, discernment, variation and outcome space (e.g. Marton & Booth, 1997; Marton & Fazey, 2002; Runesson, 1999; Runesson & Marton, 2002). There is a difference however, as communicative alignment has as its goal, the description of the relative understandings amongst all participants in a communicative event. That is, the intention, motivation and actions of the teacher, and how they are perceived by the learner. Thus communicative alignment captures the dynamic, fluid interaction where on the one hand, the lecturer has in mind what they want their students to hear, understand and react to. Whilst, at the same time, it describes the different ways in which students perceive their teachers intention.

An alternative alignment model, posited by Wulff (2005), suggests learning is made more effective through the alignment of content, teacher and students via strategies including structure, engagement, rapport building and interaction (Knewstubb & Bond, 2009).

There are however, two notable differences between the two models. First, Wulff’s alignment model has been developed from work involving teachers in higher education; whereas the communicative alignment model has emerged from work involving both teacher and student in a higher education context. Second, Wulff’s model has been used to guide teaching practice; with the communicative alignment model being used to describe the teacher-learner relationship.

The conclusion to be drawn hitherto, is that teachers and students enter the learning context with relational goals (Frymier, 2007), and these relationships are interpersonal (Dobransky & Frymier, 2004; Frymier & Houser, 2000; Nussbaum & Scott, 1980); and essential to student study (Worley et al., 2007). The development of a rapport between the teacher and student is vital, and can have a positive influence by structuring and encouraging social interaction (Coupland, 2003; Jorgensen, 1992). A rapport in this sense describes a mutual, trusting and prosocial bond (Catt et al., 2007; Faranda & Clarke, 2004; McLaughlin & Erickson, 1981; Perkins et al., 1995). Thus, the role of the teacher is critical in shaping the interaction through modelling supportive and facilitative behaviours that are conducive to an optimised teaching-learning environment (Fassinger, 2000; Johnson, 2009; Karp & Yoels, 1975). When teachers engage in such behaviours the result is increased student engagement (Fassinger, 2000; Frisby & Myers, 2008; Goodboy & Myers, 2007) as they are motivated by, and satisfied with, the teaching-learning context. Students who interact more, reap positive benefits (Wasley, 2006), and have a greater sense of connectedness, which has been related to increased performance in assessment tasks (McKinney et al (2006). For example, Frisby and Martin (2010) reported that perceived teacher rapport consistently emerged as a predictor of learning and participation, and thus provides further support for the crucial role the teacher plays in the learning arena.

Moreover, Goodboy and Bolkan (2011) highlighted how all teachers in higher education influence their students through the use of power in the teaching-learning context. These power relations are deemed essential in the attainment of educational goals, and have important implications for teaching and learning in higher education (Schrodt et al., 2008).

According to Goodboy & Bolkan (2011, p.110) teachers have five power bases:

- Coercive power – the power to punish students;
- Reward power – to give rewards or remove punishments;
- Legitimate power – assigned from a position of authority;
- Expert power – appearing competent and qualified; and
- Referent power – power to make students identify with the teacher

And these have different consequences for students. Prosocial bases of power (i.e. reward, expert, referent) are positively related to student learning; and antisocial bases (i.e. coercive, legitimate), are negatively related to learning (Richmond, 1990; Richmond & McCroskey, 1984; Roach, 1999; Schrodt et al., 2007). Moreover, students may also be motivated to have differing communication experiences with their teacher as a result of the type of power they display (Goodboy & Bolkan, 2011).

In the results from their study, Goodboy and Bolkan (2011) discussed how, when teachers were perceived by students to use prosocial bases of power (i.e. reward, referent, expert), an association was evident with relational, functional and participatory communication motives of these students. Furthermore, Schrodt et al (2008) noted that students value and look up to teachers who use prosocial behaviours. Conversely, when teachers were perceived as using coercive power, and were lacking in expert power, students were motivated for excuse-making and sycophancy; and were unlikely to communicate for the functional motive.

Goodboy and Bolkan (2011) concluded that teacher prosocial bases communicate to students that they are approachable and competent. This evidence suggests that teachers use reward, expert and referent bases of power to optimise the teaching-learning environment and thus increase student engagement. Moreover, students feel comfortable with their teachers when they perceive similar backgrounds and attitudes (Goodboy & Myers (2007), and promoting referent power appears to build an interpersonal relationship appreciated by students. It is this base that empowers student learning potential (Schrodt et al (2007).

A further aspect of teacher-student relationships was highlighted by Knewstubb and Bond (2009) who stated

> "Conceptions of knowledge, teaching and learning affect what is heard and communication can be more difficult between lecturers and students whose experience derives from differing 'epistemological cultures'. But, depending on the particular aspects that are discerned in the context, different understandings may emerge, not only between students, but in student-lecturer relationships" (p.191).

By using the concept of SHAPE in the studies discussed in subsequent chapters of this thesis, it is envisaged the relationship between teacher and student will be illuminated.

1.8 The social aspects of learning

A number of theories and perspectives have emphasised the social aspects of learning. For example, situated learning (a general theory of knowledge acquisition) argues learning is a function of the activity, context and culture in which it occurs (i.e. it is situated). Social interaction is a critical component of situated learning, and learners are part of a "community of practice" where particular beliefs and behaviours are acquired. As learners become more immersed in the community, a process of "legitimate peripheral participation" (Lave & Wenger, 1991), takes place. Here, over a period of time the learner becomes more actively engaged within the culture and assumes the subsequent role of expert (see also McLellan, 1996). Wenger (1998) argued that such communities develop around areas of interest. This idea has been developed further by researchers such as Brown et al. (1989) who emphasised the idea of a "cognitive apprenticeship", whereby learning takes place in particular domains, and is manifest in the way students acquire, develop, and use cognitive tools. Learning is therefore advanced through collaborative social interactions and the social construction of knowledge. Brown et al. (1989) emphasise a new 'epistemology for learning' one involving active perception in preference to concepts and representation.

Bandura's Social Learning Theory (1977), related to work of Vygotsky (1978) and Lave (1991), explains human behaviour in terms of continuous reciprocal interaction between cognitive, behavioural, and environmental influences. Here, individuals are more likely to adopt a modelled behaviour if it results in outcomes they value; or indeed if the person modelling such behaviours is seen as a role model or figure of admiration. Vygotsky's Social Development Theory (1978) noted the role of speech in thinking whereby social interaction plays a fundamental role in the development of cognition, and cognitive development requires social interaction. Vygotsky argued the higher functions originate as actual relationships between individuals develop and evolve (Vygotsky, 1978, p.57), a theory that is an attempt to explain consciousness as the end product of socialization.

Prior to the theories described above, Dewey (1916) argued that knowledge is socially constructed, emphasising the important role of community in learning; and how a community improves as its members become more immersed within that community. Dewey argued that we value things in either a positive or negative way, and this is displayed in the way we act toward it. Furthermore, like Vygotsky (1978) previously, Habermas (1987) highlighted the importance of language in his text “Theory of Communicative Action” whereby social knowledge is governed by binding consensual norms that define the reciprocal expectations about behaviour between individuals.

Habermas described how:

> “…communicative action is dependent on situational contexts, which represent in turn segments of the life-world of the participants in interaction (Habermas, 1987, p.278).

Moreover, he stated:

> “…worldviews are constitutive not only for processes of reaching an understanding but for the social integration and the socialization of individuals as well. They function in the formation and stabalisation of identitities, supplying individuals with a core of basic concepts and assumptions that cannot be revised without affecting the identity of individuals and social groups” (1987, p.64).

Habermas argued that:

> “Participants in interaction…coordinate their plans for action by coming to an understanding about something in the world” (1987, p.296).

The author agrees with Abbas and McClean (2003) who stated for Habermas ‘lifeworld’ is a complex world of practices, customs and ideas when not threatened are taken for granted, and as such:

> “…we take the ‘lifeworld’ of university teachers to mean their values, traditions, practices and ideas, individually and as an occupational group. It refers to how they see themselves and their role: for example, to the way everyday work is done and talked about; to formal and informal personal relationships with students, colleagues, managers, officials; to what inspires commitment, interest, satisfaction, and a sense of security; to how they position themselves in relation to different actors’ demands on them; and to the degree of control over their own work that they experience” (Abbas & McClean, 2003, p.72).

Further emphasising the importance of language in the socialisation process Gadamer (1977) posited that it is in language that individuals' experience of the world is expressed and understood. To learn a 'language' is to participate in an informal apprenticeship. Greater expertise in the use of appropriate expressions and phrases therefore indicates the internalisation of certain opinions and convictions. Some parallels are apparent with Wittgenstein (2001) who argued language is not a set of tools to be mastered. Rather, language is something that shapes our thinking and doing, and that when interpreting a speaker, beliefs and utterances are identified in relation to the world in which both speaker and interpreter are located. Thus the interpreter relates the beliefs and utterances of the speaker with their own (Davidson, 1980).

It is for these reasons Huber and Morreale (2002, p.1/2) stated, scholars of teaching and learning must address field-specific issues if they are going to be heard in the own disciplines, they must us a language that their colleagues understand, a language which is part of a discipline's "style".

1.9 Disciplinary differences

Disciplinary differences are an under-researched area of teaching and learning in higher education (Bamber, 2012). The author would go further and state research exploring differences within disciplines is scarcer.

Krause (2012), citing work conducted by a number of authors (e.g. Becher & Trowler, 2001; Beck & Young, 2005; Hegarty, 2008), highlighted how the intellectual and professional identities of academics are still centred around disciplinary fields. Earlier, Entwistle (2009) stated it is the disciplines that create strong communities of practice, which share knowledge, values and attitudes; with Kember and Leung (2011) suggesting disciplinary tribes influence the formation of socially-constructed beliefs about epistemology. Entwistle (2009) discussed the 'inner logic' of the subject and disciplines and their accompanying pedagogy when identifying three important aspects of teaching, learning and assessment in higher education:

- Distinctive ways of thinking and practising;

- Particular forms of teaching and learning which suit the subject best; and noted how the
- Notion of inner logic has something in common with signature pedagogies in the professions.

Entwistle (2009, p.103) When discussing 'intended learning outcomes' in reference to The Enhancing Teaching and Learning Environments (ETL) project suggested a suitable frame of reference would be the ways of thinking and practicing (WTPs) found in the discipline or professional area (Entwistle, 2006; Hounsell & Anderson, 2007)

Moreover, Wareing (2009) highlighted how:

> "Epistemologically, different fields place different emphasis on, for example, objectivity and subjectivity..." (p.917)

Historically, research has suggested that those who teach in the 'hard' disciplines are teacher-centred and those teaching in 'soft' disciplines are more student-centred. Becher and Trowler (2001) proposed the reasons for such differences are the cultural and epistemological differences between "tribes" (Lea & Callaghan, 2012). However, a recent study (Stes et al. 2008) did not find any association between approaches to teaching and discipline.

The reason for this may be explained by Entwistle (2009) who stated

> "...in most departments there are schisms in beliefs about the subject and how it should be taught; several communities of practice may thus coexist" (p.150).

It is these schisms that may account for the inconsistency between the claims of Stes et al. (2008) and Becher and Trowler (2001) before them and indeed inconsistencies in previous research.

Entwistle (2009, p.23) emphasised how subject areas differ and 'understandings' are

> "...expressed within an accepted academic discourse, using the concepts and ways of treating evidence that are characteristic of the discipline being studied"

And,

> "...each discourse amounts to a contrasting culture into which students have to be gradually inducted".

This was evident in the ETL project undertaken between 2001 and 2004. This project identified 'ways of thinking and practising' (WTP), in different disciplines reflecting

> "...distinctive aims that apply within an area of a discipline or course unit" (Entwistle, 2009, p.58).

These aims formed particular understandings through forms of discourse, which valued particular ways of acting (McCune & Hounsell, 2005). Moreover, WTPs described how disciplines represented (and debated) the nature of knowledge in their domains, what counts as 'evidence' and the process of creating, judging and validating knowledge (Anderson & Housell, 2007).

Adding weight to this argument, the literature does suggest fields of study (i.e. discipline) do influence the approach to study adopted by students. For example, Kember, Leung and McNaught (2008), and Lawless and Richardson (2002), noted how teaching and learning environments in the arts and social sciences were more conducive to a deeper approach to learning than science and economics. Moreover, Valk and Marandi (2005) found that students from the disciplines of biology, geography, physics, and chemistry, had deeper approaches to learning when compared with students from mathematics, informatics, social sciences, philosophy, education, economics, and law; and Smith and Miller (2005) when comparing psychology and business students, found a significantly higher number of 'deep' students in psychology than business. Earlier, Eley (1992) found that students from English literature, politics, and philosophy were 'deeper' than students who were studying biochemistry, mathematics, statistics, accounting, and business.

A note of caution however, must be taken. If one looks at these examples carefully, it is evident there is a lack of consistency with regard to approaches to learning within disciplines. That is, the same discipline giving different results when measuring approach to learning in different studies. One reason for this may be that the teachers and students participating in these studies had differing personal epistemologies, even though they were studying within the same discipline. One could therefore argue, that discipline per se is less influential than one might initially assume. For example, Edmunds and Richardson (2009) when investigating the approaches to learning of students drawn from the disciplines of sociology, biosciences, and business studies, did not find any notable differences between students in each of these fields of study. Moreover, in a study reported nearly twenty years earlier, Watkins and Regmi (1990) highlighted a lack of difference between students drawn from the disciplines of humanities, science, and management studies.

Whilst acknowledging there are real differences between fields of study and in order to operate in another field we need to learn its practices and become familiar with its knowledge base (Wareing, 2009). It could be argued that within these 'fields of study' there may be subcultures, and it is these that need to be taken into account in addition to the much vaunted disciplinary differences perpetuated and researched over the past forty years since the seminal work of Biglan (1973).

It has been recognised, following the work of Becher (1989), that academic tribes and territories is too broad a brush stroke to capture the nuanced, complex, idiosyncratic, and contextual nature of teaching and learning in higher education. As Barnett (1994) pointed out

> "Disciplines are not the harmonious enterprises sometimes assumed but are rather, the territories of warring factions…" (p.61)

Moreover, Trowler (2008) cited conflicting beliefs and practices within a newly formed law department created by the merger of two universities. Adding to the burgeoning argument, Wareing (2009, p.922), noted disciplinary 'stories' overlook differences within our disciplines, differences that can be epistemologically significant, and sometimes more pronounced within disciplines than between disciplines. This was evident in a study conducted in 2010 and reported in 2012 by Lea and Callaghan. The unit of analysis was discipline, which failed to establish differences between academic cultures and their accompanying epistemologies. One could suggest this establishes the requirement to investigate subcultures within disciplines as the unit of analysis. An issue recognised by Lea and Callaghan (2012) who noted a need for ‘contextual’ research into aspects of teaching and learning. Furthermore, Pizzolato (2008) stated at the time:

> “There has not been an investigation into whether epistemological orientations are in fact coherent and consistent or if they change with the context” (p.229)

Chapter 2 - Foundations of Epistemology

2.1 The Classical Conception

Epistemology is the theory of knowledge. It confronts the question of what knowledge is, and how it might be acquired systematically. It demands that what we *claim* to have attained as knowledge be opposed not only to casual belief or accepted opinion or even beliefs that turn out to be true, but also to even carefully considered beliefs based on the most plausible and persuasive of explanations. Rational justification is thus central to epistemology, and the well-known classical formula that equates knowledge to 'justified, true belief' places the emphasis on the rigorous scrutiny of the justificatory grounds that are held to elevate what is believed, to the status of what is known.

Knowledge is genuine understanding – a conscious grasp of the meaning of the relationship between justification, truth and belief. 'Truth' and 'justification' presuppose the idea of an external reality independent of 'belief'; that is, they point to the ontology of things or states of affairs awaiting discovery or interpretation by way of a subjective psychology of cognition. This means that knowledge - a form of understanding - can be attained only in conceptual form. We could say that knowledge is a conceptual grasp of the way things really are, coupled with an understanding of *why* things are as they are. It suggests that the relationship between (subjective) belief and (external or objective) truth productive of knowledge rests upon a perfect correspondence between thought and reality – and the notion of correspondence has, of course, been influential in the development of modern epistemology and the Philosophy of Science. But 'correspondence' need not necessarily be understood as a congruent relationship between 'meanings' and tangible objects or processes as has been the automatic tendency in modern Empiricism. In *The Republic*, for example, Plato distinguishes between "knowledge and opinion" arguing that individual knowledge is knowledge of *something* that exists. But "opinion" can be mistaken and does not correspond with an existent *something* and is therefore not knowledge. Genuine knowledge thus unavoidably involves the correspondence of, on the one hand, our *conceptual* understanding of what we hold to be true and why this is so, with, on the other, a world existing independently of any subject attempting to comprehend it. But for Plato, this is a state of conceptual understanding that corresponds to absolute and universal *Ideas*. This is the most famous version of Ontological Idealism – Hegel offers a more recent one (Westphal, 1999), but a 'materialist' version of this correspondence between conceptual thought and reality (i.e., one that seeks to describe the fabric of reality as composed of a 'non-ideal' substance - perhaps as 'things –in –themselves' or 'empirical objects') - does not take us much further philosophically. In synthesising a genuinely informative account of the implications of referring to 'justified, true belief' we must introduce a set of problematic epistemological, ontological, methodological, psychological and semantic concepts. None of these can be dealt with critically in isolation, but if we provisionally accept the outline of the problem of distinguishing knowledge from mere opinion or mere belief presented hitherto, we can perhaps work back to it from some more familiar theoretical and methodological ground.

If we begin with an attitude to inquiry that is always conscious of the central importance of rigorous justification for belief we naturally enter a discourse about science and non-science. This distinction in practice rests upon the reliability of investigative methods and the quality and testability of explanation. In other words, we face a first order confrontation with what is meant by justified, true belief. We already know that method and explanation is, first and foremost, a conceptual matter – and we should know that the idea of 'evidence' presupposes the desirability of some conceptually understood and (at least provisionally) accepted aspiration to determine a correspondence between what is (subjectively) believed and what is (objectively) the case. This systematic strategy is what we understand by a scientific attitude and in any particular discipline – however 'pragmatically' or serendipitously we begin our inquiries - we are at some point presented with the opportunity to reflect upon and establish a *critical* understanding of the way we conceptualize the very subject *matter* we have chosen to study: is, for example, the study of economics the study of natural phenomena or political phenomena; is chemistry *really* a branch of physics? Properly described, this is the start of a *philosophy of concept formation* relevant to our chosen branch of investigation and in its most fundamental phase, a we have hinted at above, this is an *ontological* enquiry that presupposes an understanding of truth as some form of correspondence with the world. In further synthesis, dependent upon the outcome of concept formation and ontology lies the possibility of developing a coherent *methodological* framework. In short, taking epistemology seriously demands that we articulate the nature of the relationship between ontology and method. We can say that the aim of ontology is to determine the *kind of object* that a particular branch of systematic inquiry seeks to investigate; but it would be more accurate to emphasize that the quest for an *ontological characterization* of the subject matter has a deeper motivation in that it allows us to determine the type of *explanation* appropriate to the subject matter. Assuming that we have worked on our ontological insight to our subject matter, this is perhaps as close as we can get in the space available here to an understanding of what is meant by *justifying* (grounding the explanation of) beliefs. However, more usefully, with this understanding we have at our disposal a framework with which we are able to classify the general characteristics of various theoretical approaches to phenomena with a view to revealing their explicit or implicit epistemological predilections.

2.2 Modern views

Following the Renaissance, *Rationalism* and *Empiricism* came to the fore. Descartes was the originator of modern rationalism and Locke the founding father of modern empiricism (Packer & Addison, 1989). Descartes' account is predominantly one of an active mind, whereas Locke's account is one of a passive mind, mirroring an external reality (Packer & Addison, 1989). A *Rationalist* perspective sees knowledge as formal and composed of syntactic rules and elements (Triadafillidis, 1998), whereby justification is provided by consistent procedures of formal logic. A *Traditional empiricism* perspective sees the structure of knowledge including statements of regularities among data that are in the form of causal laws. If these structures correspond with reality, then they are justified knowledge (Packer & Addison, 1989).

Kant was influential in the development of a contemporary form of Rationalism known as *Structuralism* in an attempt to restore the conflict within rationalism. Structuralism was further developed by Claude Lévis Strauss who proposed society is organized by communication and exchange. This is manifest in information, knowledge, and myths (Audi, 1999); and as such it is this information, knowledge and myths that are perpetuated by members of groups themselves. The tenet being, sense data is meaningless without interpretation. Thus, the role of an individual is one of an interpreter of data, a focus clearly absent in the traditional rationalist perspective (Muis et al, 2006).

2.3 Postmodernist/poststructuralist views

There are three fundamental aspects of postmodernist/postructuralist thought: language, culture and power. It is these that form our 'truths'.

Although divergent in some respects, postmodern positions have a number of shared principles. Knowledge, from a postmodernist perspective is provisional and dependent on the context of inquiry (Woods, 2009). As such, knowledge can only ever be partial, fragmented and incomplete (Woods, 2009). Lyotard (1984) argued that scientific knowledge is not the totality of knowledge, as it has competitors that also have value. Postmodernist positions recognize the plasticity and constant change of reality and knowledge, stressing the importance of concrete experience over fixed abstract principles, and argue that knowledge is subjectively determined by multiple factors, including language, culture and power. Indeed, Belsey (2002) noted

> "Command of new knowledge very often amounts to learning the appropriate use of new vocabulary and syntax" (p.3).

Furthermore, the postmodern perspective recognises knowledge is relative and fallible rather than absolute and certain (Tarnas, 1991). The main tenet of such perspectives is therefore a:

> "…focus on dissonance, rather than consonance, and every particular, whether it be a person, place, idea, or text, is perceived as influential among all elements with which it is connected, and all universals can be deconstructed and shown to be dissonant" (Muis et al. 2006, p.8)

Postmodernism sees text and language as fundamental phenomenon of existence and questions reality and representation. There is a focus on power relations and hegemony and that all aspects of human psychology are completely socially determined. Reality, knowledge, and value are constructed by discourses which are embedded in social practices; and it is these that reflect the conceptual schemes and intellectual values of the community or tradition in which they are used (see Jacques Derrida, 1998)

Poststructuralism emphasises the various aspects of a particular culture including ordinary, everyday materials, to its most abstract theories and beliefs. It is these that determine one another. There is a rejection of reductionism, and recognition that different perspectives have cultural values and bias. Heidegger (2010), who extended the work of Nietzsche (1954) argued "truths" are illusions that are perpetuated. Poststructuralism argues that no theory, particularly one in the social sciences is capable of reducing phenomena to elemental systems or abstract patterns. In other words, phenomena are inextricably linked with the values therein.

From a postructuralist perspective, Bourdieu (2000) emphasises the importance of social process and agency. Moreover, Baudillerd (1988) argued we live in a world of images, which are only simulations. It is these simulations that produce 'truth' in the form of consensus values and "science", which in themselves are labels of particular explanations of reality. As such, Derrida (1998) argues there is nothing that can be used as a stable and timeless model.

Michel Foucault (1972) discussed power relations to explain how everyday practices enable people to define their identities and organise knowledge. Such power is evident in all walks of life through social roles and their accompanying institutions. It is these that regulate behaviour through 'gatekeeping' activities whereby 'knowledge' and 'truth' and socially accepted 'reality' are produced (Erikson & Murphy, 2010). Power relations therefore control what constitutes reason, knowledge and truth (Belsey, 2002).

In essence, postmodern-postructuralist views accentuate how there exist multiple, legitimate versions of reality or truths embodied in different perspectives. As such, postmodern methodologies are either post-positivist or anti-positivist substituting 'scientific method' with feelings and personal experience (Rosenau, 1995). A consequence is there are an infinite number of interpretations to each 'reality'; or as Foucault (1972) would say everything is interpretation. Thus, from this viewpoint, all aspects of human psychology are socially determined.

It is clear from the discussion hitherto that "knowledge" is a contentious issue, particularly how it is defined, perpetuated and indeed justified. This debate has also been evident in the psychological as well as the philosophical arena.

2.4 'The Switch' - Personal Epistemology

The twentieth century witnessed a shift from a philosophical to a psychological focus with regard to issues related to knowledge and knowing (e.g. Dewey, 1916; James, 1890; Peirce, 1906). As a result, interest in the relationship between knowledge and schooling burgeoned with the epistemological conceptions of students, teachers and others being qualitatively and quantitatively assessed, evaluated and studied.

Peirce saw himself very much as a scientist, and founded 'pragmatism' which he described as the 'philosophy of the laboratory scientist'. Peirce defined truth as a time when investigators reach the same conclusion. Thus, consensus occurs when beliefs influence ideas about the phenomenon under investigation.

Research into personal epistemology can be thought of as beginning with the work of William Perry in the 1950s. Personal epistemology (Hofer & Pintrich, 2002) describes individual (and indeed groups) beliefs:

> "…about how knowing occurs, what counts as knowledge and where it resides, and how knowledge is constructed and evaluated" (Hofer, 2004b, p.1).

The research conducted by Perry was not focussed on personal epistemology per se; he did not present his work as the study of students' epistemological beliefs. However, his conceptions of dualistic and relativistic perspectives incorporated beliefs about the structure and nature of knowledge, as well as the source and justification of that knowledge (Buehl & Alexander, 2001). Because Perry focussed on students' learning experiences, the beliefs described by his work address aspects of academic knowledge as well as general epistemological beliefs (Buehl & Alexander, 2001).

Subsequent research has produced a number of frameworks toward an understanding of the broader constructs of "personal epistemology". However, the research has taken place under diverse disciplinary traditions and paradigms (Hofer, 2004b, p.1); and has on the whole adopted either qualitative (e.g. Baxter Magolda, 1992, 2001; King & Kitchener, 1994) or quantitative methodologies (e.g. Schommer, 1990).

A discussion will follow that highlights how personal epistemology relates to and influences established expectations of teacher knowledge and how an awareness of such influences is of benefit toward an understanding of the purposes of teaching, the knowledge required or perceived as required, and teacher identities within particular contexts. For example, Stark (2002) highlighted how:

> "…teachers' beliefs strongly influence the way they enact their professional roles. Teachers' disciplinary socialization and their current beliefs about the fields they teach influence how they plan courses as well as how they teach them" (p.128).

Reference will be made to a *socialised habitus of academic personal epistemology* (SHAPE) whereby individuals within a learning context become initiated and immersed in a community of practice (Lave & Wenger, 1991; Wenger, 1998).

It is for this reason Hativa and Goodyear (2002) suggested:

> "…instructional development programs should address not only mastering teaching skills and techniques but also deeper aspects that contribute to good teaching such as beliefs about knowledge, learning and teaching. Without attention to these deeper issues, new teaching methods are almost certain to fail" (p.353).

Moreover, a substantial body of research now recognises the relationship between knowing and learning, (Brownlee et al, 2002).

Hativa and Goodyear (2002, p.353) emphasising teachers need:

- To be aware of what is guiding their current view of teaching and thus their practice.

- To be exposed to alternative conceptions of teaching and learning in order to promote reflection on their own and others' experience.
- To be aware of their assumptions and make their implicit beliefs explicit.
- To build on their disciplinary orientation and on beliefs that stem from the discipline.

Prior to this a number of domains of knowledge have been identified as essential for effective teaching (Grossman, 1995; Shulman, 1986; Wilson, Shulman, & Richert, 1987). These can be summarised as:

- *Subject-matter knowledge* – knowledge of the subject matter one is teaching.
- *General pedagogical knowledge* – knowledge of and skill in, the use of teaching methods and pedagogical strategies that are not subject-specific.
- *Pedagogical content knowledge* – specific knowledge of how to teach the particular topic or content in the particular subject domain. This includes teachers' effective representations of the specific subject matter content, useful teaching examples and analogies, knowledge of common misconceptions etcetera.
- *Knowledge of learners* – familiarity with the particular students in the class, their problems and needs in learning.
- *Knowledge of learning* – knowledge of learning theories and of the physical, social, psychological, and cognitive development of students; knowledge of motivational theory and practice.
- *Knowledge of educational goals* – knowledge of educational purposes and values, and
- *Knowledge of self* – the teacher's awareness of their own values, dispositions, strengths and weaknesses, and their educational philosophy, and purposes for teaching.

(Source: Hativa & Goodyear, 2002, p.347).

Teachers need to be aware of the types of knowledge required to be a successful teacher, the types of knowledge that are recognised, established and accepted as good practice. However, fundamental shifts are taking place with an emphasis on how teachers conceive of what is good practice, what it is that influences such conceptions, and how these differ from context to context (module to module), and domain to domain (subject to subject). A burgeoning of research into personal epistemology and its influence on teaching and learning has occurred over the last 40 years. This has resulted in a number of theories being put forward including:

- Epistemology is developmental, development is the aim of education (Kohlberg and Mayer, 1972), and thus part of the goal of education is to foster epistemological development (Baxter Magdola, 1992; King and Kitchener, 1994; Perry, 1970).
- Epistemology exists in the form of beliefs, and learning is influenced by the epistemological beliefs that individuals hold (Ryan, 1984; Schommer, 1990; 1994a,b).
- Epistemology is either theory-like (Hofer and Pintrich, 1997) or exists as more fine-grained epistemological resources, and in the process of learning such theories and resources are activated and engaged in ways that are context-dependent (Hammer and Elby, 2002; Hofer, 2001).

Subsequent pages of this thesis highlight the research conducted within the framework of the three theories (developmental, beliefs, and contextual), and relates them to teaching and learning in a higher education context. Thus, the emphasis will be on research that has focussed on academic epistemological beliefs. That is, research that has taken place within education settings and has drawn its sample from students or individuals within a learning context. This is not to suggest that the various research projects and programmes omitted do not have something to contribute. It is for the sake of clarity alone that this decision has been made.

Developmental models

A developmental perspective of personal epistemology suggests individuals move through a patterned sequence of development in their beliefs about knowledge and knowing (Hofer, 2001). The developmental models of personal epistemology all have a connection in some way to the seminal work of William Perry and his research team. Perry's longitudinal study of male only Harvard students in the late 1950s and early 1960s involved annual interviews during their university studies. This resulted in Perry classifying students into four differing categories – *dualistic, multiplism, relativism, commitment within relativism.* Initially, he developed the Checklist of Educational Values (CLEV), and administered it to a random sample of 313 first-year students in 1954-1955. Subsequently, he invited 31 students (27 male, 4 female) for annual interviews.

Perry suggested students began with a *dualistic* perspective of knowledge where there is right and wrong, and the role of the teacher is to communicate this. In Perry's view, individuals then progress to a *multiplist* view of knowledge typified by an acknowledgement of diverse views and a level of uncertainty in knowledge claims. Individuals see views (conflicting or otherwise) at the end of this phase of development, as equally valid, and they have the potential to move from *multiplism* toward *relativism* whereby there is a recognition some views are better than others. Subsequently (if reaching this phase), individuals develop toward *commitment within relativism.*

Perry, following up from the survey using the CLEV, conducted a second longitudinal study with a randomly selected group of 109 first-year students (85 male, 24 female) from the entering classes of 1958-1959 and 1959-1960 who were followed throughout their four years of college (Hofer & Pintrich, 1997).

Although Perry makes no claims for this as a formal development process, the scheme itself and the inherent developmental mechanisms share much with other Piagetian-type developmental schemes, whereby individuals interact with the environment and respond to new experiences by either assimilating to existing cognitive frameworks or accommodating the framework itself. (Hofer & Pintrich, 1997).

As is the case with all research, Perry (1970) noted a number of limitations to his studies. For example, participants were student volunteers from a single college, the investigators who abstracted the scheme had also served as the interviewers, and validation was conducted in relation to the data from which the scheme itself was derived. In addition, the sample was largely composed of White, elite, male college students educated at Harvard during the 1950s. Furthermore, concerns were raised about whether the responses form a true structural, developmental trajectory or are more an artefact of the socialization process in the values of a Western liberal arts education (Hofer & Pintrich, 1997)

In response to the limitations of the Perry sample, Belenky et al (1986) beginning with the framework supplied by Perry, set out to understand themes of knowing particular to women. Belenky *idem* interviewed 135 females 90 of who were either enrolled in one of six diverse academic institutions, or were recent alumnae. They utilised both a phenomenological (allowing interviewees to provide their own frame of meaning throughout semi-structured interviews that ranged from 2-5 hours), and interview-case study approach.

Belenky et al's (1986) scheme focussed on the role of self as knower with a progression involving integration and coordination of subjective and objective modes of knowing (Hofer, 2001). These modes of knowing included five positions – *silence, received knowing* (similar to Perry's dualism), *subjective knowledge* (similar to multiplism), *procedural knowledge*, and *constructed knowledge*.

Like Perry, Belenky et al (1986) did not intend to assess epistemological beliefs per se, but based their work on that of Perry previously. However, their research diverged from Perry in several respects. First, the initial question was broader than the one used by Perry and, given the diverse nature of their sample; it was not situated in an academic context. Second, specific aspects of women's lives were targeted in contrast to Perry's nondirective questions. Finally, with respect to questions about ways of knowing, the more educated women received a longer and more detailed series of questions than did the less educated women. This was not necessary in Perry's work as all participants were at various points in their college education (Buehl & Alexander, 2001).

Belenky et al's (1986), research like that of Perry previously, was not without its critics. Strack et al. (1991) expressed a concern about the ordering of the interview. A section on "Relationships" preceded the sections on "Education" and "Ways of Knowing". Given their finding that many women have a relational, connected approach to knowing, it is hard to know the degree to which this may have been primed by the interviewers in these earlier questions; such context effects have been demonstrated to influence question interpretations (Hofer & Pintrich, 1997).

Belenky et al. (1986) emphasised how the role of 'self' affected how women thought about truth, knowledge and expertise. They argued as self-knowledge develops so does one's view of self in relation to knowledge and truth. This in turn leads to individuals seeing themselves as constructors of knowledge where:

> "Answers to all questions vary depending on the context in which they are asked and on the frame of reference of the person doing the asking" (Hofer & Pintrich, 1997, p.138).

Mindful of the studies conducted by Perry (1970) and Belenky et al. (1986), Baxter Magolda became interested in possible gender-related implications, and designed a longitudinal study of epistemological development and how epistemological assumptions affect interpretation of educational experiences (Hofer & Pintrich, 1997). Baxter Magolda's 5-year longitudinal study involved 101 randomly selected students (of whom 51 were female and 3 from minority populations) from Miami University in Ohio. This resulted in seventy complete longitudinal sets which were interpreted in the development of the epistemological reflection model (Baxter Magolda, 1992). The first-year interview was designed to address six areas of epistemological development: the roles of the learner, instructor, peers, and evaluation in learning; the nature of knowledge; and decision making. Subsequently, questions about the nature of knowledge, out-of-class learning, and student changes in response to learning experience were added to the interview schedule in follow-up interviews (Hofer & Pintrich, 1997)

Baxter Magolda's (1992) study similar to the work of Perry previously, focused on the epistemological assumptions affecting interpretations of educational experiences if the college classroom and resulted in the Epistemological Reflection Model (ERM) which contains four qualitatively different "ways of knowing," absolute, transitional, independent, and contextual. Baxter Magolda (1992) reported each of these ways of knowing leads to particular expectations of the learner, peers, and instructor in a learning setting, as well as to an understanding of how learning should be evaluated and how educational decisions are made. These "ways of knowing" are aligned with Perry's positions and with Belenky et al.'s perspectives. Baxter Magolda suggested four sequential ways of knowing – *absolute*, *transitional*, *independent*, and *contextual*. Overall the pattern of development was similar for males and females, although initially gender-related patterns emerged in the early stages they converged in later stages. That is, males had initially more "impersonal" and "individualist" and females more "personal" and "interindividualist" ways of knowing. A*bsolute* knowers view knowledge as certain and believe that authorities have all the answers. *Transitional* knowers discover that authorities are not all-knowing and begin to accept the uncertainty of knowledge. *Independent* knower's question authority as the only source of knowledge and begin to hold their own opinions as equally valid. C*ontextual knowers* are capable of constructing an individual perspective by judging evidence in context. Expertise itself is subjected to evaluation, and knowledge evolves and is:

> "…continually reconstructed on the basis of new evidence and new contexts (Baxter Magolda, 1992, p.189).

Baxter Magolda's study differed from previous studies (e.g. Belenky et al., 1986; Perry, 1970), as it was assessing beliefs that were more academically focused, and was the first longitudinal study using interviews that included and equal number of male and female participants. However, critics of Baxter Magolda noted her research addressed a number of beliefs that were not necessarily epistemological in nature (i.e., beliefs about the role of the learner, peers, and instructor, and beliefs about evaluation). In her defence, Baxter Magolda argued each of the four proposed ways of knowing are characterised by a core set of epistemic assumptions, and these are believed to impact:

> "…particular expectations of the learner, peers, and instructor in learning settings, as well as to an understanding of how learning should be evaluated and how educational decisions are made" (p.29).

King and Kitchener (1994) again drew in part on the work of Perry but focussed on how epistemological assumptions influence thinking and reasoning. Their work based on 20 years of cross-sectional and longitudinal research involving interviews with participants (high school age through to adulthood) resulted in the Reflective Judgement Model (RJM). The emphasis of the RJM is on the development of the *process of knowing and reasoning* and is a seven-stage model covering three levels of development – *pre-reflective*, *quasi-reflective*, and *reflective*.

King and Kitchener interviewed nearly 1700 individuals (i.e., over 150 high school students, 1,100 college students, 200 graduate students, and over 150 nonstudent adults) over the course of 15 years and found that individuals' assumptions and beliefs about knowledge were related to how they chose to justify their beliefs (Buehl and Alexander, 2001).

To summarise, each of these developmental models has its roots in the traditions of cognitive development, and share a common view that individuals move through some specified sequence in their ideas about knowledge and knowing, as their ability to make meaning evolves. That is, they:

> "…share interactionist, constructivist assumptions and sketch similar trajectories of development. The path of epistemological development begins with an objectivist, dualistic view of knowledge, followed by a multiplistic stance, as individuals begin to allow for uncertainty. Typically, a period of extreme subjectivity is followed by the ability to acknowledge the relative merits of different points of view and to begin to distinguish the role that evidence plays in supporting ones' position. In the final stage, knowledge is actively constructed by the knower, knowledge and truth are evolving, and knowing is coordinated with justification" (Hofer, 2001, p.359).

Moreover, arguing for a developmental perspective in interpreting individual epistemological thinking, Moore (2002) claims that "learning" in its most complete sense is inherently development, that for Perry and others:

> "…true education, especially liberal arts education, was fundamentally, about this kind of development – namely, the evolution of individuals' thinking structures and meaning making toward greater and more adaptive complexity (p.23).

Independent beliefs

An alternative approach to understanding personal epistemology in the context of higher education was pioneered by Marlene Schommer (Schommer, 1990; Schommer et al., 1992). Her interest in how epistemological beliefs influence comprehension and academic performance led her to develop a programme of quantitative research rather than the qualitative developmental research conducted previously. Schommer whilst drawing on the work of Perry proposed a model of beliefs about knowing and learning rather than organised positions or stages as proposed by Perry previously. Schommer proposed beliefs are more or less independent, and may or may not develop in synchrony, and devised the Epistemological

Beliefs Questionnaire (EBQ) to measure five hypothesised dimensions – *structure*, *stability*, *source of knowledge*, and *control* and *speed of knowledge acquisition*. Empirical work conducted has identified four of five factors listed below which exclude *source of knowledge* (e.g. Jehng et al., 1993; Schraw et al., 1995):

- Certain knowledge (certain versus tentative)
- Simple knowledge (isolated, unambiguous bits of info versus knowledge as highly related concepts)
- Quick Learning (learning occurs quickly or not at all versus learning as gradual enterprise)
- Fixed Ability (intelligence is fixed versus intelligence is incremental)

Schommer was not the first however, to have investigated how beliefs that individuals hold about knowledge and knowing affect the learning process. Ryan (1984), found a relationship between students' personal epistemologies and their information processing strategies, measured by Bloom's taxonomy (Hofer, 2001).

Ryan (1984) classified 91 college students as being highly dualistic or highly relativistic, after asking them to describe how they knew when they understood material presented to them. The highly dualistic students saw knowledge as either right or wrong, reported that they reached understanding when they could recite the facts. In contrast, students classified as highly relativistic (i.e., believing that knowledge is context dependent) stated that they understood the material when they could apply it in another situation.

Schommer (1990) conducted a text comprehension study and found that students who believed in certain knowledge generated absolute conclusions that were inappropriate; and those who believed in quick learning were more likely to give oversimplified conclusions and have low test scores. Moreover, Schommer et al., (1992) posited beliefs affect the choice of study strategies adopted by students, and Hofer (2001) argued:

> "It seems plausible that students' beliefs and theories about knowledge influence the goals and standards that determine engagement in learning, depth of processing, and comprehension monitoring (p.370)

Subsequent research conducted by Schommer and colleagues (1992) explored college students' comprehension of a highly integrated text from a statistics book. Measures assessing mastery of the material, prior knowledge, and use of study strategies were administered. Students' confidence in understanding the passage was also assessed. The results revealed, the more students regarded knowledge as a collection of isolated facts, the worse they performed on the mastery test and the more they overrated their ability to comprehend the text.

Kardash & Scholes (1996), conducted a study involving 78 college students primarily juniors and seniors who read an inconclusive text about the relationship between AIDS and HIV. The researchers concluded that the more students believed in the uncertainty of knowledge, the more likely they were to express the inconclusive nature of contradictory evidence on a controversial topic; with students who viewed knowledge as certain more likely to misinterpret contradictory evidence.

Contextual

The developmental and belief theories are well established. However, a third *contextual* perspective (Hammer and Elby (2002; Hofer and Pintrich 1997), has challenged the conventional notions of personal epistemology, arguing that rather than epistemologies being trait-like, they are more fine-grained and context dependent. Hammer and Elby (2002) posited individuals have a number of "epistemological resources" that are activated in different situations, and argue the epistemological resource theory/framework provides a more predictive and explanatory power than either the epistemological beliefs or developmental stages interpretation; with Hofer and Pintrich (1997) arguing for 'epistemological theories' whereby:

> "…under *nature of knowledge* we suggest that there are two dimensions: *certainty of knowledge* and *simplicity of knowledge*. Within the area of *nature of knowing* we propose two other dimensions: *source of knowledge* and *justification for knowing*" (p.119).

It might therefore be more appropriate, to speak of epistemological positions only in specific contexts rather than as descriptors of an individual's views in general (Buehl & Alexander, 2001; Roth & Roychoudhury, 1994). A view akin to that previously expressed by Hofer and

Pintrich (1997) who argued for the situated and contextual nature of epistemological theories where the role of the student is to become part of a community of practice (Lave, 1988; Lave & Wenger, 1991) in which students are socialized to the values and beliefs of the academic enterprise.

Taking the contextualist perspective further, one could argue beliefs about each of the dimensions of knowledge and knowing might differ not only between classes from different subjects, but also between classes from the same field of study depending on for instance the beliefs of the teacher and how these are instantiated in classroom tasks and pedagogy (Hofer and Pintrich, 1999). Earlier Hofer and Pintrich (1997) argued that:

> "Based on the very limited studies to date, it appears that theories about knowledge may be activated by a variety of academic tasks" (p.128).

Hofer and Pintrich (1997) stated, for the sake of conceptual clarity, beliefs should be limited to individuals' beliefs about knowledge as well as reasoning and justification processes regarding knowledge. However, they also recognised beliefs about learning and teaching are related to how knowledge is acquired, whereby beliefs about learning, teaching and knowledge are probably intertwined. Moreover, they recognised that beliefs about learning, intelligence, and teaching are related to epistemological beliefs and that general thinking and reasoning processes are also related to epistemological thinking. However, they argued to progress in our understanding of the structure and function of epistemological beliefs than more global and inclusive definitions there is a need to delimit the construct of personal epistemology to beliefs about knowledge and knowing.

Although Piagetian theory and most of the epistemological schemes covered here have presumed an interactionist model, the study of epistemological beliefs has treated them as individual cognitive constructs. Roth and Roychoudhury (1994) go so far as to suggest that:

> "…it might be more appropriate to speak of epistemological positions only in specific contexts rather than as descriptors of an individual's views in general" (p.17).

Thus, personal epistemology is complex and socially constructed; that is, individuals actively construct or make meaning of their experiences, and development occurs as a function of one's interactions with the social world (Baxter Magolda, 1992; Belenky et al., 1986; Bendixen & Rule, 2004; Hofer & Pintrich, 1997; Jehng et al., 1993). The commencement of education initiates the development of individuals' academic epistemic beliefs, which are socially constructed and context bound; and these beliefs are primarily influenced by the academic context (Muis et al., 2006)

The notion that the role of the student is to become part of a community of practice (Lave, 1988; Lave & Wenger, 1991) has fostered a reconceptualization of schooling as a cognitive apprenticeship in which students are socialized to the values and beliefs of the academic enterprise. Thus a 'community of practice' (e.g. Lave, 1988; Wenger, 1998), and its accompanying socialization takes place where participants in or members of a group share beliefs and values within a particular context. This is highlighted by research emphasising the importance of 'situated learning' where certain 'behaviours' are apparent in particular educational contexts (e.g. Brownlee et al., 2002; Quinlan, 1999).

2.5 Socialised Habitus of Academic Personal Epistemologies (SHAPE)

Scott and Briggs (2009) citing Luke (2003) discussed Bourdieu's concept of social habitus to describe a set of enduring dispositions or stock of knowledge as a result of particular cultures. Moreover, Scott and Briggs (2009) argue inquiry is both directed and situated within fields of investigation that have and value differing types of "fact", the validity of which is assessed in line with established knowledge systems. These systems are created and reproduced (Fries, 2009) to perpetuate "knowledge" shaped by objective conditions and constraints (Calhoun, 2003).

As Bourdieu (1988) states:

> "Even the words we employ to speak about social realities, the labels we use to classify objects, agents and events, like the names of occupations and of groups, all the categorical oppositions we make in everyday life *and* in scientific discourse are historical products" (p.779).

It is this process that ensures ‘cultural capital’ whereby forms of knowledge, skills and expertise are given ‘value’ within a particular field via certification, qualifications and diplomas (Fries, 2009).

People engaging in social practices shape their own identities and those of others (Trowler, 2012). Moreover, Bamber (2012) argues academic identity continues to be contested and dynamic, with multiple interpretations of academic identity; and highlights for Taylor (2008), four types of identities that can be distinguished:

- Identities taken through shared practices, accepting given truths;
- Identities which are constructed and contested;
- Identities which are co-constructed, reflecting non-rational processes;
- Identities which are constructed in complex contexts

(Source: Bamber, 2012, p.157)

It is therefore useful to view academic identities as

> “context-specific assemblages that draw on shared but open repertoire of traits, beliefs and allegiances” (Taylor, 2008: 38 cited in Bamber, 2012).

Moreover, Krause (2012) noted

> “...as communities develop, social practices, values and attitudes are reinforced and become routinized (Reckwitz, 2002)” (p.187).

These communities can be formed both within and between disciplines. That is, a community can be manifest in different modules of study within a degree programme.

Bourdieu (1967) described how habitus embodies cognitive schemata that guide behaviour in terms of the nature of social reality. These dispositions through beliefs, values and attitudes are formed and moulded from particular structures through a process of socialization. Thus, habitus influences the way in which individuals and groups behave in certain situations. Similarly, Trowler (2012) noted how 'structure dispositions' describe tendencies

> "...to act and respond in particular ways which are broadly conditioned by factors external to the individual" (p.35).

In essence, this is how SHAPE is characterised in particular elements of undergraduate study (i.e. a module of study). The idea being that socialization takes place within subcultures embedded within disciplinary fields of study.

For example, Brennan et al. (2010) stated degree course study involved the transmission of knowledge in order to invoke particular ways of knowing, and these include accompanying sets of values and attitudes. However, they acknowledged this is not the whole story citing the SOMUL project, which highlighted sources of commonality and difference within and between disciplines. The conventional wisdom is typified by the comment of Parpala et al (2010) who stated:

> "Disciplines have their own categories of thought, which provide members of the same academic field with shared concepts of theories, methods, techniques, and problems (Yiijoki, 2000)" (p.270)

However, as was evident in the SOMUL project, the importance of context in shaping teaching, learning and assessment practices is evident (Mathieson, 2012). As Mathieson (2012) argues, from a critical realist perspective, academic knowledge is bounded in social and historical "truth" and not the objective truth some would have students believe.

The idea of disciplinary differences has its foundation in the work of Biglan (1973a, b) and later Kolb (1981) who identified groupings of disciplines or fields with similar approaches to academic tasks, such as teaching and learning. These dimensions help identify culturally similar fields (Nelson Laird et al., 2008). It is through a process of socialization into a field of study, that faculty and students learn appropriate behaviours including how to teach and learn (Becher & Trowler, 2001). The discipline or field of study reflects the values and norms held by its constituent individuals or dominant groups (Nelson Laird et al., 2008; Roxa et al., 2011).

Elen and Clarebout (2001) argued because of the interactive nature of learning, instructional and epistemological beliefs affect learning activities within a learning environment. These beliefs subsequently change as a result of participation in that learning environment, and learners become members of a community that has been formed in a particular context. It is for these reasons Snow et al. (1996), concluded that individuals form and hold beliefs that serve their own needs, desires and goals. The purpose of which is social control leading to a bias in one's perceptions and judgement in social situations. Furthermore, Nicol (1997) stated:

> "Learning is now understood to be situated in academic and disciplinary contexts that influence…how [students] construct interpretations of how they are supposed to learn, what is worth learning, and what it means to be a student" (p.113).

Thus, students adapt to the specific needs of a discipline and its accompanying modes of thinking and learning (Donald, 2002; Hativa & Birenbaum, 2000). As Linton and colleagues (1994) aptly put it:

> "Disciplinary styles are not just frames or shells into which content can be cast, but habits of thought and communication grounded in the objectives, values and "world view" of each discipline" (p.65).

Furthermore, Breen (1999) posited:

> "The encultration of students into their discipline is a central aim of Higher Education. (p.13).

Prior to this Jenkins (1996) highlighted the extent to which academics value their discipline; and it is these values around which the university is organised. It is these values that serve to provide a shared social context for students to learn disciplinary knowledge (Lattuca & Stark, 1994). Consequently, there is the perpetuation of particular types of knowledge, and the way knowledge claims are justified within different academic contexts. This is evident in the different learning, teaching and assessment methodologies and methods in differing contexts.

By rewarding particular behaviours teachers can be viewed as ‘gatekeepers’ of knowledge whilst at the same time being instrumental in the process of discouraging, or in more extreme circumstances, discrediting other types of knowledge claims and their accompanying justification.

Moreover, it is teachers who bring about different modes of learning and thinking in their students (Donald, 2002), and it is for this reason Martin et al. (2000) argued:

> "…that the critical issue is not how much teachers know or what their level of teaching skill is, but what it is they intend their student to know and how they see teaching helping them to know" (p.387).

Implications for the practice and development of teachers are evident. Teachers have to be mindful and acutely aware of the influence they consciously (or indeed unconsciously) exert on their students. It is important that teacher development programmes include within their syllabus content that highlights these issues.

Entwistle and Smith (2002) noted how teachers conceived of the curriculum (their ‘personal understanding’), and how these conceptions influenced the expectations of what students should be learning and how they should be learning it (the ‘target understanding’). An issue recognised by Brown and Duguid (2002) who argued teachers daily actions are strongly influenced by their beliefs and values, and these beliefs about the nature of knowledge and conceptions of learning influence students’ approaches to learning (see also Biggs, 1999; Marton, Dall’ Alba & Beaty, 1993; Meyer & Boulton-Lewis, 1999; Pillay, 2002; Schommer, 1993)

However, Entwistle (2000) highlighted a potential problem when stating:

> "…academics often lack a developed conception of teaching or an understanding of how their approaches to teaching affect the quality of student learning" (p.6).

He emphasised this further by stating

> "Becoming aware of the variation in the way our colleagues and others conceive of learning and teaching and approach learning and teaching is a key step in developing our own awareness of our own way of conceiving and approaching learning and teaching" (p.22).

The significance of these issues in relation to teaching and learning in higher education cannot be understated. For example, Gow and Kember (1993) demonstrated that teachers influenced the approaches to learning adopted by their students. Samuelowicz & Bain (2001) reiterated this by stating teaching practice depends on the educational beliefs and presumptions of academic staff (Bain, 2000; Quinlan, 2002; Trigwell et al. 1994; Trigwell & Prosser, 1996), and that there may be consequences for the nature of learning that results (Kember, 1997; Trigwell *et al*. 1999).

This has been further underscored by research demonstrating an empirical relationship between teachers' views of teaching and students' approaches to learning (Kember & Gow, 1994; Prosser & Trigwell, 1999; Prosser, Trigwell &Waterhouse, 1999). Furthermore, research has demonstrated a relationship between student perceptions of the learning context; approaches to study in that context and the quality of the learning outcomes (see Ramsden, 1992; Marton *et al*. 1997; Prosser & Trigwell, 1999; Trigwell & Prosser, 1991; Van Rossum & Schenk, 1984). For example, Campbell *et al*. (2001) reported how the learning strategy adopted by a student in a given situation is:

> "…determined by a complex interaction between first, the student's pre-existing beliefs about knowledge and learning, and general pre-disposition towards particular approach to learning, and, second, the students' perceptions of the learning approach that is required by the educational context" (p.175).

This social aspect of teaching and learning has been highlighted over a number of years with Ford and Forman (2006) underscoring the point when stating:

> "In any academic discipline, the aim of the practice is to build knowledge or, in other words, to decide what claims "count" as knowledge, distinguishing them from those that do not. Deciding what counts as knowledge implies authority, and thus the raison d'etre of academic practices is how these practices ground disciplinary authority" (p.3).

Moreover, Blakemore (2007) noted:

> "Tribes and territories are natural and inevitable aspects of human existence. Tribes often cohere around what they believe in and value" (p.4).

(An idea previously posited by Becher and Trowler (2001).

Inevitably, there are consequences of these beliefs and values as Quinlan (2002) noted:

> "Differences in disciplinary cultures, including differences in the world views and knowledge structure, are likely to translate into differences about the practices of teaching among teachers of different disciplines" (p.60)

This position has developed from a major caucus of work over the preceding four decades. Significant contributions have been made by Biglan, (1973), Becher (1981, 1989), Becher and Trowler (2001) Cobern (1993) Donald (1986, 1990, 1992, 2002), Lattuca & Stark (1994), Shuell (1992), and Stark (2000).

Quinlan (2002) went further when arguing:

> "To neglect the academic socialization into the norms of the discipline is to neglect a significant aspect of the knowledge and belief structures of academics" (p.61).

Allied to these disciplinary perspectives, concepts such as "situated learning", "cognitive apprenticeship", and "communities of practice" (Brown, Collins & Duguid, 1989; Greeno, 1998; Lave & Wenger, 1991, 1998; Sfard, 1998; Wenger, 1998), changed the emphasis to the social aspect of learning whereby learning is recognised as taking place in everyday activities within particular academic communities.

Roxå et al (2011) argued for an approach to culture that focuses on the *sense-making process* within a group; and the

> "...set of meanings, and values shared by a group of people" (Alvesson, 2002, p.29).

Culture from this perspective is a process (Ancona et al. 2009), involving 'sense-making' processes within groups. Thus, groups differ from other groups as they have different norms, beliefs, values and traditions (Roxå et al. 2011). These norms, values etcetera, are perpetuated over time and tend to become individuals enacting these processes (Trowler & Cooper, 2002).

However, subsumed within disciplinary cultures are subcultures. These subcultures may to a greater or lesser extent, oppose the norms and value systems dictated by the predominant culture (Roxå et al. 2011). In the context of this thesis modules of study are the subcultures within an academic discipline. In Goffman's (1959) terms occurs 'back stage', out of the 'limelight' of the discipline so to speak; where it is considered 'safe' to deviate to some extent from the overarching norms etcetera of the discipline as a whole.

The idea being, that in teaching and learning contexts a *socialised habitus of academic personal epistemologies* (SHAPE) is found whereby teachers and their students have a number of *epistemological expectations* (subsuming their beliefs, values and attitudes). It is these epistemological expectations that come into play and evolve in response to the particular demands of differing academic contexts. That is, they are not trait-like but are more flexible and malleable, and this 'plasticity' permits them to be moulded then accessed as and when required. This SHAPE is formed when dispositions influence how individuals and groups view the world and the structures within which they operate. Popper (1974) in his autobiography stated:

> "…learning consists in theory formation: that is, in the formation of expectations. The formation of a theory or conjecture has always a "dogmatic" and often a "critical" phase…there can be no critical phase without a preceding dogmatic phase, a phase in which something – an expectation, a regularity of behaviour – is formed, so that error elimination can begin to work on it" (p.51).

Dispositions in this context are those described by Bourdieu (1989) when discussing *habitus* as a set of acquired dispositions that function on a practical level as categories of perception as well as being the organising principles of action. Here, human actions take place in social fields which try to distinguish themselves from others. Bourdieu argued that habitus is the key to social reproduction because it is central to generating and regulating the practices that make up social life. Furthermore, habitus is a pattern of behaviour that is:

> "...an acquired system of generative schemes objectively adjusted to the particular conditions in which it is constituted" (1989, p.40)

That engenders:

> "...thought, perceptions, expressions, actions" (1989, p.45)

It is these thoughts, perceptions, expressions, actions that occur within socially situated conditions; and these are inculcated and reinforced through education and culture. Thus, the way students adapt is by developing their habitus within a field of study, and it is this structuring during encultration which goes unnoticed as the blind spots, ideologies and prejudices of the field are acquired (Roth, 2001, p.6). Thus, the point of view of a conscious observer is a consequence of habits or dispositions that enable interaction with or make sense of the world (Dennett, 1991).

This idea is not new and follows the work of Kuhn (1962) who used the term 'paradigm' to refer to a body or theory that is subscribed to by all members of a field of study; and which establishes greater social connectedness amongst scholars. Kuhn suggested budding scholars must be socialised to the regnant paradigm (Biglan, 1973, p.211).

Therefore, in addition to the domains of knowledge described on page thirty-eight, teachers also need to know the social norms and values which form an important part of the conceptual framework of academic disciplines. These conceptions are partially defined by, and may be inferred from the social rules and norms through which this knowledge is communicated and used, for example through attitudes, values, beliefs, ways of behaving and using language (Breen, 1999).

Furthermore, it is increasingly being recognised our beliefs and values strongly influence our daily actions; and conceptions and beliefs about knowledge and learning influence how a learner determines what is required to acquire certain types of knowledge or behavioural outcomes (Pillay, 2002).

2.6 Epistemological Expectations

Greene (2009) investigated the expectations of 282 faculty members who completed an online survey that described four hypothetical students with differing kinds of epistemological and ontological cognitions. The same members of staff were asked to rank the hypothetical students potential success in their course, and give them a predicted grade. The results highlighted how faculty members gave higher grades to students who they believed to have more sophisticated epistemologies. Greene (2009) concluded

> "These results suggest faculty expectations do influence the likelihood of academic success" (p.237)

Moreover, Greene concluded

> "These findings provide support for continued investigation into students' personal epistemologies and how they can be fostered to align with collegiate faculty's expectations" (Greene, 2009, p.238)

It is worth noting Greene suggests the importance of students aligning their personal epistemologies with those of their teacher (as was the case with Fruge and Ropers-Huilman, 2008). This lends weight to the idea of SHAPE and its potential to act as a framework on which to investigate teaching, learning and assessment practices within higher education at a more fine-grained, nuanced unit of analysis with greater breadth and depth than previous investigations have permitted.

Interestingly, Greene (2009) noted 23 faculty members found it difficult to make grade-based, but not ranked-based distinctions between the 4 hypothetical students. The reason for this was, according to faculty members, was student personal epistemologies had little to do with their ability to be successful. Rather, success depended on students' ability to 'know the material' and write logical answers in essays. An opinion that suggests a quantitative, product-based, positivist ethos with regard to teaching and learning with little sympathy for, or awareness of the impact this attitude could have on students, in the form of their subsequent approaches to, and experiences of learning. This may have been one of the reasons why Knewstubb and Bond (2009), argued conceptions of knowledge, teaching and learning can be problematic if teachers and students experiences are derived from a dissonance between “epistemological cultures”.

Student expectations of higher education are manifest in ‘scripts’ Jonassen et al (2003). It is these scripts that act as a lens through which students perceive and experience learning. How they listen to lectures, predict examination questions or ‘cram’ for examinations are a few examples. It is likely teachers also have scripts for teaching (Marra, 2005), which are influential in the way they create the teaching-learning environment for their students. The theories referred to above, go some way to explaining how, when an individual enters a social situation (in this case a learning context), they have certain expectations of what will take place, and what is expected of them. These expectations are based upon previous experiences. As an individual becomes more ‘acclimatised’ to the learning context, so their epistemological expectations change and evolve in response to the influences around them. For example, the language used, the actions of others within the group, the acceptable norms, beliefs, values all have a part to play within a particular ‘community of practice’.

It is these that form the SHAPE, one’s persona within a particular teaching and learning context. From a ‘cognitive apprenticeship’ perspective, an individual would initially look toward what or who they perceive to be an authority within the context, be it a teacher or text on which to base their beliefs, values and behaviours. This includes the ‘correct language’ including its phrases, terms, acronyms and idiosyncrasies within the context. Something that an ‘outsider’, someone not part of the community, would have difficulty in comprehending as they would not have encountered, experienced and become accustomed to its nuances.

Interestingly, as we become more immersed in a field we tend to utilise acronyms more extensively, and these can be somewhat puzzling to someone who is new to the community, someone who has to second guess and fill in the gaps – they have to read between the lines so to speak. Thus knowledge is perpetuated in the practices and processes therein. In order to prosper in such contexts an individual has to take on board the whole spectrum of that context, including the beliefs, values and attitudes of the group as they converge toward the 'consensus' – a consensus the teacher has a significant influence over. They are attempting to guide their students' learning and thinking (Donald, 2002) toward that of a neuroscientist or psychologist or a particular aspect of that field, for example.

Thus, it is individuals' person-world relationship that changes and evolves as they become more immersed in a teaching and learning context. Each individual will experience this differently depending on their circumstances and personal histories, reconstructing the 'knowledge' in line with their epistemological expectations. Such expectations will also depend on their teacher and how they (intentionally or not) manipulate the teaching and learning context to satisfy their own needs, desires, values and intentions. These epistemological expectations are manifest in a teacher-focussed or student-focussed approach to teaching depending on the teachers SHAPE, and student's learning is a consequence of this. This interplay is described by Entwistle and Smith (2002 *op cit*) who posit the 'personal understanding' of the teacher that describes how they conceive of the context and the subject matter, and 'target understanding' which is what they intend their students to know and display.

It is only recently that personal epistemology research has focused on teacher beliefs and how these influence the teaching and learning process. For example, Hofer (2004a) reported how:

> "It appears that instructional practices are interpreted through the lens of students' epistemological assumptions, but that these perspectives are evolving and instructors have the power to influence them" (p.158).

Research has demonstrated epistemological beliefs exert a strong influence on a teacher's chosen method of teaching (Breen, 1999, p.2). These apparent differences have not only been found in the teaching across disciplines in terms of the processes, but also in the values and emphases placed on the curriculum and assessment issues (Braxton, 1995; Smart & Ethington, 1995). These factors 'tie in' to issues around their apparent differing conceptual structures and knowledge validation methods (Donald, 1995; Shulman, 1988). For example, Williams and Burden (1997) argued that teacher beliefs influence everything they do in the classroom, even when acting spontaneously or from habit without thought for their actions.

Moreover, it has been demonstrated that teachers in higher education have a number of differing conceptions of what teaching and learning is (which may be influenced by their personal epistemologies). Their conceptions about teaching ranging from 'teaching as transmitting concepts of the syllabus' to 'teaching as helping students change conceptions' (Prosser & Trigwell, 1999; see also Ramsden, 1992; Sherman et al., 1987). Teachers' conceptions about learning have also been found to differ ranging from 'learning as accumulating more information to satisfy external demands, to 'learning as conceptual change to satisfy internal demands' (Prosser & Trigwell, 1999, p.145-150; see also Fang, 1996; Kember, 1997). These conceptions of the teaching and learning process have not only been reported as exerting an influence on the approach to teaching adopted by university lecturers (Trigwell & Prosser, 1996) but also how they perceive their teaching context (Prosser & Trigwell, 1997).

In summary, there is evidence to suggest personal epistemology, regardless of the theoretical stance, is context dependent and is thus affected by a number of factors influencing particular learning environments (e.g. lectures, seminars, modules). For example Baxter Magolda (1992) reported that epistemological beliefs are socially constructed and that they "ebb and flow" from context to context; later Schommer-Aikins (2004) stated that knowledge is affected by how one relates to other people; and Hammer and Elby (2002) argued that personal epistemology is context dependent and epistemological resources are accessed depending on the learning environment and situation.

This is in keeping with Prosser and Trigwell (1999) who conceive of the different elements of learning as present simultaneously in awareness and existing in varying degrees of focus depending on the situation experienced. This all ties in with research conducted by Prosser and Trigwell (1997) the conclusion of which was that the teaching context may encourage a particular approach to teaching, but teachers have certain perceptions of their role within that context and this is related to their approach to teaching in that context (p.151). This is also true from a student perspective where different learning environments and instructional approaches require different learning strategies for success (Birenbaum, 1997). For example, Laurillard (1997) found that mathematics and engineering students changed their approach according to the different demands that they perceived to be imposed by varied tasks.

It is the contention of the author that a socialised habitus of academic personal epistemology (SHAPE) has much to offer in understanding teaching and subsequently learning in higher education. Kuhn (2001) argued that individuals' epistemologies influenced the way in which they are disposed to use their intellectual skills, and that they also influence the acquisition of new knowledge.

There needs to be a shift from personal epistemology to social epistemology as we attempt to understand teaching and learning in higher education. Social epistemology in this context is the study of the:

> "…social or interactive practices of multiple agents in order to see how their interactions encourage or obstruct knowledge acquisition" (Goldman, 1995, p.193).

According to Goldman (1994) there are two categories of social practices. First, the *practices of speech*, where the speaker (i.e. teacher) tries to inform or persuade an audience, and supports his claims with reasons or argumentation; Second, the *inferential practices of hearers* (i.e. students) who try to decide how much they trust what the speaker has to say assessing their credibility and competence. Such practices are guided by and guide the epistemological expectations and the subsequent SHAPE of all involved.

It is clear that teachers need to be aware of what is guiding their current view of teaching and thus their practice. Teachers also need to be aware of their assumptions and expectations and make their implicit beliefs explicit (Hativa & Goodyear, 2002). Practitioners change and improve by becoming aware of their theories of action – the sources, underlying assumptions, values, and attitudes (Cannon & Lonsdale, 1987; Moon, 1999; Schon, 1987). Fundamental changes to the quality of university teaching and learning are unlikely to happen without changing teachers' conceptions of teaching (Kember & Kwan, 2002).
From the constructivist perspective of Bruner (1986, 1990, 1996), learning is an active process in which learners construct new ideas or concepts based upon current and past knowledge and experiences. Learners transform information, construct hypotheses and

make decisions relying on cognitive structures, (i.e. schema, mental models) to do so. These structures help provide meaning and organisation to experiences. Seel (2001) noted it is these mental models that guide and regulate all human perceptions of the physical and social world. The learner constructs a mental model in order to simulate the relevant properties of the situation to be cognitively mastered. Klix (1971) had earlier argued, learning processes involve the interactions of a learner with a physical or social situation, and it is these processes that lay the foundations for the acquisition of knowledge and accepted behaviours. Furthermore, Klix (1978) argued learner perceptions have to correspond to the demands of specific contexts. It can therefore be argued mental models involve a situation-dependent reconstruction of previously generated mental models (Seel, 2001).

As Habermas (1987) stated

> "In the process of understanding, individuals make use of interpretations that are culturally transmitted and make reference to something in the observed world, in the social world, which they share" (Vol.1, p.500).

Moreover, situated cognition posits cognitive processes occur as an individual interacts with his or her environment, and cognition (i.e. learning, thinking, acting) consists of those interactions between learners and situations (Seel, 2001, p.405).

In order to understand teaching we need to know how teachers' conceptions and choices are entrenched and experienced in higher education; and what are the influences on such processes and practices.

> "…understanding teaching necessitates understanding teachers thinking, beliefs and knowledge regarding teaching, learning and students" (Hativa & Goodyear, 2002, p.355).

Festinger's (1954) Social Comparison Theory argues there is a drive within individuals to look to outside images in order to evaluate their own opinions and abilities. These images may be a reference to physical reality or in comparison to other people. Thus, we are constantly looking for a 'frame of reference' something on which to "anchor" our thoughts, assumptions, beliefs, and values – our *epistemological expectations*. Peer pressure can have a significant influence on our decision-making regarding the defence of our epistemological expectations or the challenge of others.

One only has to look at the social psychology experiments of Asch (1951) that demonstrated how we conform with the view of others even if initial beliefs have a strong foundation and can be justified without challenge. Conformity is a type of social influence involving a change in belief or behaviour in order to fit in with a group, and is a change in response to real (physical presence of others), or imagined (pressure of social norms/expectations) group pressure. Asch demonstrated agreement with the majority position is brought about either by a desire to 'fit in' (normative), or because of uncertainty with one's own position (informational), or to simply to conform to a social role (internalisation).

Thus, conformity takes a number of forms. *Internalisation* occurs when an individual publicly changes their behaviour and privately and agrees with group too. *Ingratiational Conformity* occurs when an individual conforms to impress or gain (similar to normative influence but motivated by need for social rewards) favour/acceptance from others. *Normative Conformity* occurs when an individual yields to group pressure because they want to fit in with group – a result of being scared of being rejected by the group (e.g. Asch study). *Informational Conformity* occurs when an individual lacks knowledge and looks to the group for guidance, or when an individual is in an ambiguous situation and socially compares with the group

If conformity can be demonstrated in a controlled environment where the judgement of the length of a line is asked for, in more ambiguous situations there is greater potential for influencing individuals within a group setting. Thus, consensus can be reached as a consequence of the manipulation of variables within a teaching and learning context, and subsequently permits the formation of "communities of practice". Wenger (1999) posited three dimensions of such communities:

- What it is about – a joint enterprise as understood and continually renegotiated by its members.

- How it functions – mutual engagement that bind members together into a social entity.
- What capability it has produced – the shared repertoire of communal resources (routines, sensibilities, artefacts, vocabulary, styles, etc.), that members have developed over time.

Research has highlighted how personal epistemology, teaching and learning involve social processes. For example, Schommer-Aikins (2004) Embedded Systemic Model points to social influences, interaction between personal epistemology and concepts of teaching and learning; and that personal epistemology is likely to influence how students learn, how teachers instruct and knowingly or unknowingly how they modify student personal epistemologies. Furthermore, Baxter Magolda's (2004) when discussing epistemological assumptions argued personal epistemology is socially constructed and context bound. People actively construct or make meaning of their experience, and their beliefs about self, learning, classroom instruction, and domain-specific beliefs are part of their personal epistemology.

These issues are important in understanding teaching and learning in higher education and its accompanying practices and processes. For example, Bendixen and Rule (2004) demonstrated student personal epistemology is associated with academic performance, conceptual change, and text comprehension, and teachers' educational beliefs have been linked to instructional decisions and classroom practices (see also Donald, 1983; Dressel & Marcus, 1982; Phenix, 1964; Stark, 2000).

2.7 Academic personal epistemologies

As the research evolves and burgeons, it would be useful focus on academic personal epistemologies rather than personal epistemologies as the umbrella term that research moulds within its own epistemological grounding. The reason for this is 'personal epistemology' per se is about knowledge and knowing. Whilst acknowledging perceptions of roles, for example, in teaching and learning practice and process as related; for the sake of clarity, advocates of personal epistemology would prefer a demarcation of the two (e.g. Hofer & Pintrich, 1999). However, focussing just on individuals' and groups beliefs about knowledge and knowing does not capture the complexities of teaching and learning in higher education. It is important to also emphasise the part the perceptions and conceptions individuals have and how these influence teaching and learning in higher education. Beliefs about knowledge and knowing and beliefs about teaching and learning are not mutually exclusive they are intertwined in a two-way dynamic process. We must not separate them if we want to build up and construct a good picture, a global picture, one that reflects and captures the essence of the process therein. Whilst one can never hope to complete the 'jigsaw' of teaching and learning because of its contextuality and complexity, what research can do, is investigate and evaluate it in its most natural state. Yes, it is "messy" and not without its difficulties.

However, what we must not do is fall into the trap of a reductionist perspective when trying to get a 'handle' on, and indication of what is taking place. What we must do as researchers is get away from an artificial representation by taking away the very essence of the phenomenon we are interested in.

Taking a developmental perspective one might assume academic epistemological beliefs generalise across domains in the early years of education. However, as levels of exposure increase so do students' expertise in particular domains and thus their academic epistemologies override their general epistemologies (Muis et al. (2006). Students are capable of distinguishing between the two. However, more in-depth research is needed to investigate how dimensions of personal epistemology vary between different disciplines and different contexts within the disciplines.

2.8 Domain-specific personal epistemologies and the instructional context

2.8.1 Domain Specificity versus Domain Generality

In most studies of personal epistemology, domain is often used interchangeably with academic discipline (Buehl & Alexander, 2001; Hofer & Pintrich, 1997).
Bauersfeld (1988) focused on processes by which the teacher and students constitute practices and social norms through classroom interactions. Consequently, students are

viewed as contributors to developing classroom practices that enable and constrain individual beliefs and activities. Bauersfeld (1988) described learning as the:

> "…subjective reconstruction of societal means and models through negotiation of meaning in social interaction" (p.39).

Royce (1978) taking a developmental perspective, hypothesised that because people develop more specialized forms of knowledge as they progress through their education, it follows that specialized forms of knowledge are also dependent on three differing epistemologies: rationalism (which is primarily dependent on logical consistency), empiricism (which requires an analysis of sensory inputs and their meaning), and metaphorism (which is dependent on the degree to which symbolic cognitions lead to universal rather than distinctive awareness (Muis et al., 2006) All three of these epistemologies are involved in each field of knowledge, but to varying degrees, with each field giving greater credence to one or more of the three ways of knowing. Scientific and social scientific knowledge involve all three epistemologies, but the epistemologies for each are differentially weighted. For science, empiricism is given the most weight followed by rationalism, then metaphorism. For social science, empiricism is given the most weight followed by metamorphism, then rationalism. The high degree of metamorphism for social science reflects a continuous search for the "right" paradigm, and the low rationalism weight signifies that the right paradigm has not yet been identified (Muis et al., 2006)

Royce & Mos (1980) demonstrated these differences by measuring university professors' epistemic profiles, from various domains and found differences across domains with respect to the epistemologies they espouse, their criteria for knowing, and the nature of justification. Later, Donald (2002) assessed university professors' views about domains as a function of the criteria and validation processes used to determine how beliefs become justified knowledge. The three domains compared were natural sciences, social sciences, and humanities. Donald (2002) observed that, in the natural and social sciences, the predominant validation process and criteria employed were use of empirical evidence (for validation) and consistency, correspondence, and reliability (the criteria used for justification). In the humanities however, the predominant validation process was acceptance by an external authority either through peer review or in terms of the plausibility or credibility of information. The criteria most frequently reported by experts in the humanities included precision, accuracy, specificity, and coherence.

Moreover, Donald (2002) found distinct differences within domains on the basis of whether a specific domain was considered pure or applied. ‘Pure’ Social sciences used empirical evidence as a validation process, whilst also relying on conflicting evidence, counterexamples, and alternative explanations. In contrast, domains in the social sciences that were considered applied did not consider these secondary validation processes acceptable. Donald (2002) observed that professors from more well-structured domains had less variability in their responses than those from more ill-structured domains (Muis et al., 2006)

2.8.2 Socialisation and its effects

There is a general assumption by students and staff alike that undergraduate study serves the purpose of socialisation into a way of thinking (see Akerland & Jenkins, 1998; Kolb, 1981; Newton, Newton & Oberski, 1998). This socialisation has been described as ‘encultration’, a process of learning where a student not only learns the subject matter, but a particular way of thinking (Jehng et al., 1993; Newton 2000). Moreover, Stodolsky (1988) and Stodolsky and Glaessner (1991) have suggested that students’ knowledge is indicative of the instruction they receive. However, Buehl and Alexander (2001) argue that little is known about the influence classroom instruction exerts on students’ beliefs (p.416). A view underscored by Schraw (2001), who stated:

> “From an applied perspective, previous research has done little to link the empirical and philosophical research on epistemological beliefs to educational practice” (p.452).

Evidence suggests that academics in what are regarded as ‘hard’ areas of study require more ‘convergent’ memorisation and application of course material (Neumann, 2001) whilst ‘soft’ disciplines are more likely to pursue analysis and synthesis of the course context and accept more ‘divergent’ thinking (Braxton, 1995; Smart & Ethington, 1995). This is also reflected in the underlying assumptions and practices in assessment. In a large-scale study conducted by Warren Piper et al. (1996), it was found that hard pure and hard applied disciplines gave greater credence to examinations than soft pure disciplines, which had a preference for continuous assessment in the form of essays, short answer papers and project reports.

Variation in student's epistemological beliefs has been found to be closely linked to their major area of study (Jehng et al., 1993; Lonka & Lindblom-Ylanne, 1996; Paulsen & Wells, 1998). The study conducted by Jehng et al (1993) involved 386 college students drawn from different disciplines. The findings suggested that students in 'soft' fields believed less in the certainty of knowledge and relied more on their own reasoning abilities, viewing learning as not being an orderly process. A view corroborated by Paulsen and Wells (1998) and Lonka and Lindblom-Ylänne (1996). Furthermore each academic subject includes epistemological issues regarding what learning means in the subject and how knowledge in the subject should be developed (Calderhead, 1996).

Donald (1995) reported how faculty across five areas (physics, engineering, psychology, education, and English) differed in how they conceptualised knowledge validation. For example, faculty in the pure disciplines (e.g., physics) were more likely than those in applied areas (e.g. engineering) to discuss the use of conflicting evidence, counterexamples and alternative explanations. Although this research effectively shows disciplinary differences in how teachers teach subject matter, it does not, for the most part, examine how these disciplinary differences might translate into differences in how students conceptualise knowledge within the various subject domains (Palmer & Marra, 2004).

Students differ in their approach to study between disciplinary areas, particularly for assessment, be this in the form of examinations or essays. Entwistle (1995) and Entwistle & Entwistle (1991) examined differences in students' study strategies across disciplinary fields and found some differences in how students approached studying for exams and preparing essays. For example, medical students were more likely to rely on rote memorisation and zoology students on visualization than students in psychology or social history (Palmer & Marra, 2004).

Schommer (1993) compared the epistemological beliefs of students majoring in different disciplinary domains. Comparing technology and social science majors, she found social science students were more likely than technology students to believe that knowledge was a collection of simple isolated facts. Similarly, Paulsen and Wells (1998) examined the epistemological beliefs of students in hard vs. soft and pure vs. applied fields. With results similar to Donald (1995), Paulsen and Wells found that students in applied fields were more likely than students majoring in pure fields to hold the naïve belief that knowledge is a simple collection of facts. Furthermore, students who majored in hard (engineering and science) fields were more likely than students with majoring in soft (social science and humanities) fields to believe that knowledge is certain and unchanging. Similar results were obtained by Jehng et al. (1993) who found that students in hard fields were more likely than students in soft fields to believe that knowledge is certain, that learning is orderly, and that experts and teachers are the source of knowledge.

Hofer (2002) pointing to research conducted by Schraw and Olafson (2002) stated:

> "In short, I think our mental theories about our disciplines and our teaching practices are more complex and nuanced, and far less "consistent" than suggested in this article" (p.169).

Furthermore, Hofer (2002) stated that part of student acculturation into particular disciplines is a process of learning:

> "what ways of knowing are privileged in each area, and why (although we know little about what happens when individuals serve their "cognitive apprenticeships" in fractured communities with divergent ontological and epistemological camps)" and that "I would expect that teachers'…would be likely to show variation in their beliefs about disciplines, rather than consistency across domains, and that making such distinctions is productive" (p.169).

Why the interest in the link between personal epistemology and learning? Hofer and Pintrich (1997) argued that:

> "beliefs about learning and teaching are related to how knowledge is acquired, and in terms of the psychological reality of the network of individuals' beliefs, beliefs about learning, teaching, and knowledge are probably intertwined" (p.116) and that "It may be that the more peripheral ideas about learning and teaching are developmental precursors to the core ideas about epistemology" (p.119).

Moreover, Muis et al. (2006) argued:

> "…it appears that dominant epistemologies of each educational domain influence instructional practices, which in turn influence students' domain-specific epistemic beliefs" (p.41)

2.9 Teacher Epistemological Beliefs

Teachers' personal epistemologies impact how they teach (Brindley, 2000; Windschitl, 2002 cited in Marra 2005).

Kember (2001) remarked there was a:

> "...logical link or relationship between how [students] conceived of teaching and learning" and how "These beliefs were also consistent with their epistemological beliefs" (p.206).

Furthermore, Buehl et al. (2002) argued that:

> "…what is taught and how it is taught could significantly affect students' beliefs about knowledge" (p.419), and that student epistemological beliefs vary by area of study (see also Hofer, 2000; Stodolsky & Glaessner, 1991).

It can be argued and supported that epistemological beliefs exert a strong influence on a teacher's chosen method of teaching (Breen, 1999; Brindley, 2000; Marra, 2005; Windschitl, 2002). The apparent differences have not only been found in the teaching across disciplines in terms of the processes, but also in the values and emphases placed on the curriculum and assessment issues (Braxton, 1995; Smart & Ethington, 1995). These factors 'tie in' to issues around the apparent differing conceptual structures and knowledge validation methods (Donald, 1995). For example, Williams and Burden (1997) argued that teacher beliefs influence everything they do in the classroom, even when acting spontaneously or from habit without thought for their actions. Moreover, Brown and Duguid (2002) argued our beliefs and values influence our daily actions.

That is:

> "…our daily actions are influenced by our beliefs and values, and these beliefs about the nature of knowledge and conceptions of learning influence students' approaches to learning (Biggs, 1999; Marton et al. 1993; Meyer & Boulton-Lewis, 1999; Pillay, 2002; Schommer, 1993)"

Evidence suggests that teachers' practices may contradict their own beliefs (Hofer, 2002; Schoenfeld, 1985). Murray and McDonald (1997) highlighted the potential disjunction between lecturers' conceptions of teaching and their claimed educational practice, with lecturers displaying mixed or confused conceptions.

Sheppard and Gilbert (1991) examined epistemological beliefs in four academic departments and concluded that beliefs were influenced in an inter-related way by the students' learning approaches, their conceptions of knowledge and their teacher's beliefs about teaching. Furthermore, Sheppard and Gilbert stated epistemological and beliefs about the process of teaching and learning should be viewed as an inter-related set (Kember, 2001).

Pajares (1992) offers a synthesis of findings on beliefs after a review of literature which provides the following key points of reference:

1. Individuals develop a belief system that houses all the beliefs acquired through the process of cultural transmission.
2. The belief system has an adaptive function in helping individuals define and understand the world and themselves.
3. Knowledge and beliefs are inextricably intertwined but the potent affective, evaluative, and episodic nature of beliefs makes them, a filter through which new phenomenon are interpreted.
4. Thought processes may well be precursors to and creators of beliefs, but the filtering effect of belief structures ultimately screens, redefines, distorts, or reshapes subsequent thinking and information processing.
5. Epistemological beliefs play a key role in knowledge interpretation and cognitive monitoring.

6. Beliefs are instrumental in defining tasks and selecting the cognitive tools with which to interpret, plan, and make decisions regarding such tasks; hence, they play a critical role in defining behaviour and organising knowledge and information.
7. Beliefs strongly influence perception, but they can be an unreliable guide to the nature of reality.
8. Individuals' beliefs strongly affect their behaviour.
9. Beliefs about teaching are well established by the time a student gets to college.

(Source: Pajares, 1992, p.324)

2.10 Student Epistemological Beliefs

Evidence suggests that epistemological beliefs impact on student approaches to learning and consequent learning outcomes (Tolhurst, 2007). Moreover, research has demonstrated epistemological beliefs have been shown to influence a number of different aspects of student learning (e.g. Andre & Windshitl, 2003; Brownlee et al., 2002; Buehl & Alexander, 2001; Hofer, 2001; Hofer & Pintrich, 2002; Schraw, 2001; Tolhurst & Debus, 2002;). For example, epistemological beliefs have been used to predict different elements of academic performance including: comprehension, cognition in different academic domains, motivation, approaches to learning, and self-regulated learning (e.g. Bräten & Stromso, 2004, 2005; Paulsen & Feldman, 2005, 2007; Schommer-Aikins & Easter, 2006; Schraw & Sinatra, 2004).

Tolhurst (2007) also noted that preliminary research findings had suggested the structure of learning environments influences student epistemological beliefs; and, that after a curriculum structured to develop and enhance more sophisticated epistemological beliefs, students who had acquired such beliefs achieved higher results in their final grades for their course. Earlier, Vermunt and Vershaffel (2000) pointed to the importance of ensuring students participate in teaching-learning environment that foster active knowledge construction. Moreover, it has been shown that students approach learning tasks differently as a consequence of whether they view knowledge as a constructive process or handed down by authority (Muis, Bendixen & Haerle, 2006). That is, students who do not believe teachers are the main source of expertise, tend to have constructivist conceptions of teaching and learning (Otting et al., 2010).

Research supports the view that students have qualitatively different learning experiences (Laurillard, 1979, 1997; Eley, 1992; Gibbs, 1993) as a result of a number of factors (including teacher personal epistemologies and approaches to teaching as discussed previously). This 'variation' can take the form of an 'approach to learning' (Biggs, 1987a, 1987b; Entwistle & Ramsden, 1983; Marton & Saljo, 1976; Meyer, 2000), influenced by students' perception of the learning environment, based on prior experiences of learning (Prosser & Trigwell, 1999), different teaching/learning contexts (Dahlin & Watkins, 2000; Meyer, 2000) and the perceived assessment requirements (Biggs, 1999). These factors are clearly influential in the learning outcomes of students. A number of studies (Biggs, 1988 – History; Dahlgren, 1988, - Economics; Hazel *et al*., 1996 – Biology; Keogh, 1991 – Chemistry; Saljo, 1997 – Education; Trigwell & Prosser, 1991 – Nursing) have reported qualitatively different student learning outcomes within disciplines in terms of their level of 'understanding'. For example, Dahlgren (1988) reported that only eight out of thirty-three students demonstrated the desired 'understanding'.

This potential 'negative' can be turned into a 'positive' with regard to student learning outcomes. We have already established the influence a teacher has on their students and how this subsequently lays the foundations (amongst other things) for the learning outcome of the student. As Wisker *et al*. (2002) so aptly put it:

> "The connection between teaching strategy, context and student learning approaches, has also been established (see Martin & Ramsden, 1998; Prosser, et al., 2002). It is argued that teachers working within the same general curriculum embody different conceptions of what is to be learned and how it is to be learned and consequently create very different 'objects of study' to their students (p.341)

Student perceptions of instructional practices are interpreted through their epistemological assumptions that are evolving and may be influenced by instructors in multiple ways for example discussion in the classroom (Hofer, 2004a). Furthermore, Brownlee et al. (2002) argued it is likely that epistemological beliefs, which are considered to filter all knowledge and beliefs, influence beliefs about learning and teaching in specific learning situations and, therefore, how a person is likely to approach learning and teaching in particular contexts.

The aim of teachers and educational developers, should be to encourage qualitatively “better” experiences for students; experiences which must be tailored to particular contexts in which teaching and learning takes place.

Knefelkamp (1999) basing her research on the Perry scheme described eight

> “…learner characteristics” including such categories as views of the role of the instructor and views of the role of the student, and primary intellectual tasks. Earlier, Baxter Magolda (1992) described how students had qualitatively different ways of viewing themselves as learners, their instructors, peers, and the evaluation process” (after Hofer, 2001, p.372/373).

And Hofer (2001) suggested:

> “…we need to continue to consider models that suggest more contextual, situated, nuance understanding of personal epistemology. We may be moving toward an integration of ideas from multiple models: an identifiable set of dimensions of beliefs, organised as theories, progressing in reasonably predictable directions, activated in context, operating as epistemic cognition” (p.376/377).

What we must do now, is to investigate these issues in more depth, drawing attention to the potential differences both within and between disciplines.

2.11 Rationale for the research

An important point raised by Tolhurst (2007) and one which the author wholeheartedly agrees with is that as educators:

> “...we need to consider the messages we convey to our students implicitly through the course structures we utilise, and the effects they might have on students’ learning” (p.232)

Moreover, Schommer-Aikins and Easter (2006) argued the study of personal epistemology is important as it is likely to influence student learning in a variety of ways.

Wareing (2009) noted a scarcity of literature with regard to how students learn in specific disciplines, with Young (2010) stating there is a perception that teaching issues are discipline-specific and practitioner interest is kept by utilising such parameters even if it is not the case. Earlier, Healey and Jenkins (2003) noted how conceptions of knowledge found within disciplines need to be understood in the context of curriculum development; and that academic development in the United Kingdom, United States and Australia had its foundations within disciplines.

However, there needs to be recognition that there is variation in university academic staff (Young, 2010), and this difference is evident within disciplines, as there is sometimes unity across different disciplines on certain issues in teaching and learning in higher education. A consequence therefore is a questioning of discipline-specific pedagogy (Young, 2010).

This is where an investigation of the SHAPE concept would prove useful as it has the potential to provide a framework on which to base future research in a more nuanced way than disciplinary research has previously achieved. The burgeoning of ‘interdisciplinarity’ and the research on ‘subcultures’ within disciplines (e.g. Lattuca et al. 2010), are prime examples of where this would be most appropriate. SHAPE has the potential to provide a finer-grained contextual emphasis for understandings of teaching and learning in a university setting.

This is important as Lyons (2003) noted the complexity and relational character of teaching as ‘nested’ and manifest in the relationships between people (e.g. student-teacher). It is within these relationships that influences on engagement with the subject content and the teaching-learning environment take place; and are a result of the particpants epistemological beliefs (Niessen et al., 2008).

Haggis (2009) noted the influence of postmodernism/postructuralism and critical theory is having on our questioning of the nature of knowledge, seeing it as contingent, distributed and social. This shift from the individual to social has connotations for learning in higher education, and has resulted in the need for research that recognises and utilises recent developments in the field of social science: dynamic systems theory, actor network theory and complexity theory amongst others. The author agrees with Haggis (2009) who argues it is these theories that offer the potential for radically new perspectives to emerge. Moreover, Belsey (2002) stated:

> “Poststructuralism proposes that the distinctions we make are not necessarily given by the world around us, but are instead produced by the symbolizing systems we learn” (p.7)

As discussed, previous research has strongly suggested the learning context influences how students perceive their role in the process of learning (Ryan, 1984; Schommer, 1993). A number of studies have demonstrated epistemological beliefs are significantly related to academic performance (Hofer, 2000; Ryan, 1984; Schommer, 1993), conceptual change (Qian & Alvermann, 1995, 2000), text comprehension (Schommer, 1990), reasoning (Bendixen, Dunkle & Schraw, 1994), and strategy use (Schommer, Crouse & Rhodes, 1992). It is vital therefore, that educators consider ways in which to promote more sophisticated student personal epistemologies. Then, and only then, will teaching and learning in higher education context become more effective (Tolhurst, 2007)

Furthermore, Buehl et al. (2002) argued it is essential we begin to unravel the nature of the relationship between epistemological beliefs and formal education. It is for this reason they highlighted two very important questions that need addressing:

1. How are students’ epistemological beliefs influenced by classroom instruction?
2. Do students of different epistemological orientations benefit from varied forms of instruction and classroom activities?

(Buehl et al., 2002, p.445).

This requires research that utilises a mixed methods design in order to illuminate the influence personal epistemology has on teaching and learning in a higher education context by addressing the four key questions this thesis is based upon:

1. What personal epistemologies do teachers bring to the teaching and learning context, and how does this influence how they perceive different aspects of teaching and learning?

2. How do teachers perceive knowledge and how does this influence their conceptions of and approaches to teaching?

3. What academic epistemologies do teachers have and does this influence the academic epistemologies of their students?

4. How do these academic epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

There has been a plethora of research utilising quantitative methods in personal epistemology research since the work of Perry (1970). However, over recent years there has been a noticeable re-emergence of qualitative research following the initial work of researchers such as Baxter Magolda. This has been a result of the realization and evolution of personal epistemology research that recognises:

> "The inclusion of qualitative data collection and analysis has the potential to provide additional insight into those aspects that may result in changes in epistemological beliefs, and future studies should include such features" (Tolhurst, 2007, p.232)

To close this section of the argument I point you in the direction of Gadamer (1977) who stated:

> "It is not so much our judgements as it is our prejudices that constitute our being" (p.1).

This is not a criticism of the socialisation processes and practices within disciplines in higher education, but a pointer toward SHAPE and its utility in understanding teaching and learning.

2.12 Research Question

Hofer (2001) stated hitherto, little research had been conducted on teachers' personal epistemologies, how they develop, are affected by teacher education and how teacher beliefs affect the development of students' beliefs. Research that has been conducted has involved pre-service school teachers (e.g. Brownlee et al. 2002; Schraw & Olafson, 2002; White, 2000).

This thesis has one primary purpose: to highlight how the personal epistemologies of teachers have the potential to influence the approach to teaching they adopt which in turn influences the personal epistemologies of their students, their approach to learning and accompanying learning processes.

If one looks at the literature, it could be argued academic personal epistemologies form the predispositions individuals have (be that a teacher or learner), when they exposed to and experience different teaching and learning contexts.

Hofer and Pintrich (1997) highlighted how:

> "…based on the very limited studies to date, it appears that theories about knowledge may be activated by a variety of academic tasks" (p.128).

Furthermore, Brownlee et al. (2002) reported how:

> "…a substantial body of research now recognises the relationship between knowing and learning" (p.8)

With Birenbaum (1997) arguing different learning environments and approaches to teaching require different learning strategies to be successful in that particular context. For example, Kember and Gow (Gow & Kember, 1993; Kember & Gow, 1994) reported their quantitative studies indicated a correlation between teachers' conceptions of teaching and their students approaches to learning at a departmental level. However, Trigwell et al (1999) pointed out that the results may have been due to disciplinary differences, and therefore do not allow comparison of the relations between approaches of teachers and students.

In addition, Pillay (2002) stated:

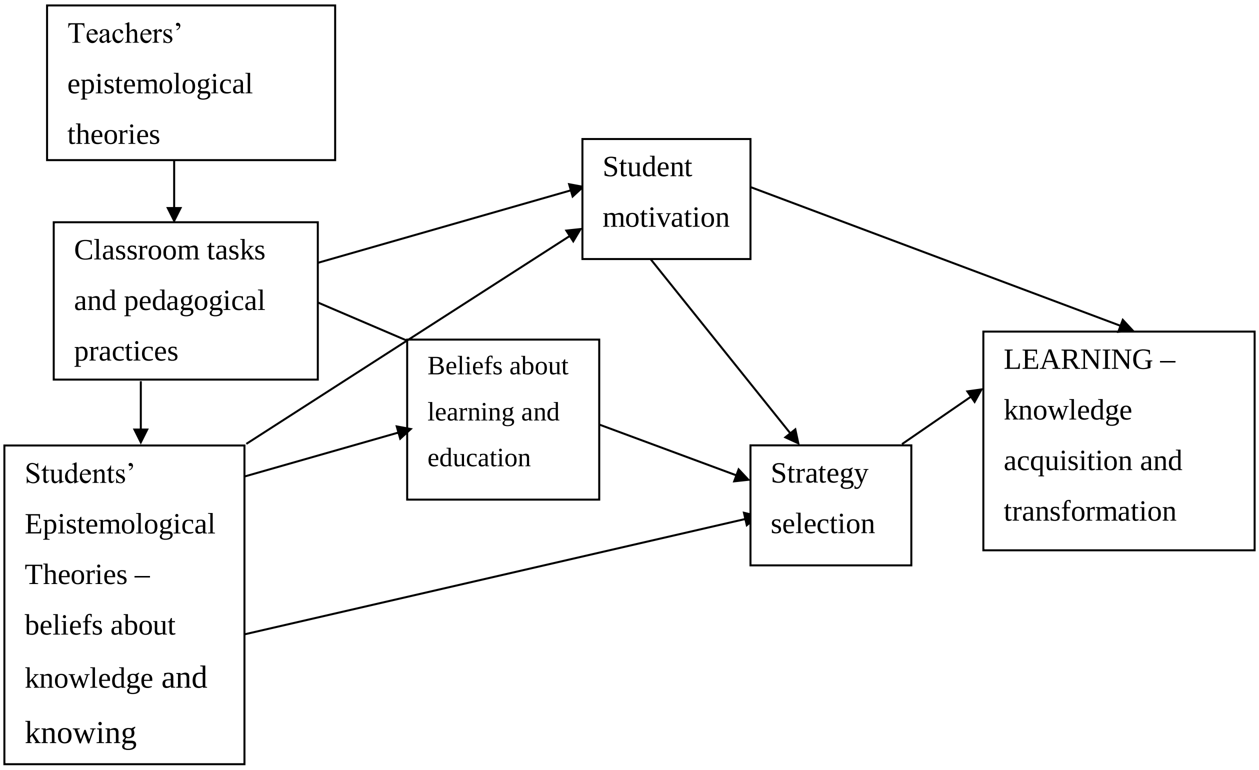
> "Conceptions and beliefs about knowledge and learning is increasingly being recognised as influencing individuals' perceptions and judgements about a task in a learning context and helping learners to determine what needs to be done to acquire certain types of knowledge or behavioural outcomes" (p.94).

Earlier, Sheppard and Gilbert (1991) and later (Kember, 2001) had argued that an inter-related set including the way by which students' learning approaches, their conceptions of knowledge and their teachers' beliefs about teaching contributed to the development of epistemological beliefs in 4 academic departments. The author agrees with Pillay (2002) who stated:

> "Learners' perceptions of what is useful in a learning task are shaped by their informal and formal conceptions and beliefs about the nature of knowledge, the learning process, the context, prior knowledge and experiences, and how it will benefit them in the future (Pillay et al., 1998; Schommer, 1993). Just focusing on the processes of learner-centred education is not sufficient; it is necessary to broaden the scope to include learners' beliefs and conceptions about knowledge and learning and how such learning experiences articulate into productive activities in the "real world"." (p.95).

Hofer (2001) noted a wide variation that exists in knowledge beliefs among college seniors (Baxter Magolda, 1992; Perry, 1970), and suggested we need to further investigate the particular antecedents of development during this period and the role instruction plays. Furthermore, Hofer stated the beliefs of teachers may also influence this process (See Fig.1 overleaf for a working model of these relationships).

Fig. 1 - A working model of how epistemological theories influence classroom learning (Hofer, 2001, p.372)



Using this model, the author will investigate these antecedents and the potentially influential role personal epistemology they play within teaching and learning processes within a higher education context (Chapters Four, Five, Six and Seven). The reason for using this model is that it subsumes the elements of teaching and learning which this thesis focuses on and thus provides a framework on which to base the inquiry contained in subsequent pages of this thesis. Hofer's model reflects in some way the 3P Model (Biggs, 1989; Prosser et al., 1994) and the Heuristic Model of Teaching and Learning (Entwistle, 2009), as it includes student characteristics in the form of their personal epistemologies and their approach to learning; the beliefs about the nature of the subject matter; the teaching carried out by staff manifest in their approach to teaching and their accompanying personal epistemologies; and the resulting teaching and learning experiences therein, including the acquisition and/or construction of knowledge. As such, Hofer's model will provide the basis for the series of case studies discussed in Chapters Five, Six, and Seven, and the discussion and conclusions in Chapter Eight.

Chapter 3 – Theoretical, measurement and contextual considerations in the discussion of personal epistemology in higher education

3.1 Introduction

The current investigation

The current investigation is a collective case study, and has four main goals:

- To investigate the concept of a ‘Socialised Habitus of Academic Personal Epistemologies’ (SHAPE)

- To explore the influence personal epistemology has on teaching and learning in a higher education context;

- To generate exemplars that may be used to investigate different contexts from the ones explored within this thesis; and

- To generate questions and/or issues for further research.

These goals envelop the four phases of the research incorporated within the overarching investigation into personal epistemology and teaching and learning in higher education (see Table 3.1 below); and address the four questions the author believes to be key to gaining an understanding of the influence context has on teacher personal epistemologies and as a consequence, the personal epistemologies of their students.

The 4 key questions

The case studies in Psychology and SHES addressed four key questions (below). The SHES and Psychology case studies addressed questions one and two; the SHES case study question three; and the Psychology case study question 4 (See Table 3.1).

1. What personal epistemologies do teachers bring to the teaching and learning context, and how does this influence how they perceive different aspects of teaching and learning?

2. How do teachers perceive knowledge and how does this influence their conceptions of and approaches to teaching?

3. What academic epistemologies do teachers have and does this influence the academic epistemologies of their students?

4. How do these academic epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

By utilising what can be described as a ‘hybrid’ of methods and analyses, the current investigation will ‘triangulate’ (Denzin, 1989), both the methods and sources of data to permit a more robust investigation to be undertaken. Thus, the research is not only a mixed method but also a mixed model design. The current study used what Denzin (1970) described as *within-method* and *between-method* triangulation. Within-method triangulation uses varieties of the same method to investigate a research issue (e.g. a family of different statistical tests), and between-method triangulation, which draws on contrasting research methods (e.g. questionnaire, interview).

Moreover, the current research design drew on *conjunctive* and *disjunctive* methods (Howe, 2012). Conjunctive mixed methods research is characterised by quantitative and qualitative methods working in a more integrated way, where different methods are brought together to address the same research questions. A conjunctive mixed methods design can be therefore seen as between methods triangulation. On the other hand a disjunctive mixed methods design is characterised by within methods triangulation, where different methods are used to answer different research questions. These designs seek to either confirm or call into question given claims. However, an alternative is holistic triangulation (Mathison, 1988) where the aim is to accommodate discordant data allowing a more comprehensive explanatory framework (Howe, 2012). It was envisaged that by utilising this extensive multidimensional triangulation (in the sense of extending knowledge) methodology, the research would derive a better understanding of the issues involved (Taylor, Kermode & Roberts, 2007). This holistic approach adopted by the current investigation, drew on different forms of triangulation (e.g. Denzin 1970, 1978), which included methodological, data, and unit of analysis triangulation.

Methodological triangulation

This particular form of triangulation is typified by the use of two or more research methods in one study (Taylor, Kermode & Roberts, 2007); with across method triangulation involving a combination of research strategies, which can be qualitative and quantitative methods. For example, the current study combined interview data with focus group and questionnaire data for the psychology case study embedded within the overarching research discussed in subsequent pages of this thesis.

Data triangulation

Data triangulation uses multiple sources of data in order to obtain the views from different people experiencing the phenomenon under investigation (Roberts & Taylor, 2002). Using the example of the psychology case study again, students and their teachers were interviewed using the same questions and completed the same questionnaire (DEBQ) to establish their views about the same phenomenon.

Unit of analysis triangulation

Unit of analysis triangulation involves the use of two or more approaches to analyses in order to validate the same set of data (e.g. Begley, 1996). This can take the form of different qualitative techniques or different families of statistical tests to verify results. In the current study several levels of analyses were conducted. For example, in Chapter 5 for the case study in Sports, Health and Exercise Science (SHES), pre and post questionnaire results were analysed using different statistical tests (parametric and nonparametric) to clarify results.

Table 3.1 – Research study sample and phases

Phase	Sample	Data type	Methods	Methods/techniques used to triangulate data
1	Students N = 500 from a total of 11 modules of study drawn from a variety of disciplines	Quantitative	DEBQ.	Factor analysis; MANOVA; Games-Howell post-hoc tests.
2	Students N = 175 from 4 Sports Science Modules; Teachers 4 from the same modules	Quantitative	DEBQ; ATI.	ANOVA; Games-Howell post-hoc tests; Kruskal-Wallis tests.
3	Students and their teachers from 2 Psychology Modules. Student interviews N = 14; Teacher interviews N =2; Student questionnaires N = 111; 13.	Qualitative/Quantitative	Interview; ATI; DEBQ; ASSIST.	T-tests.
4	Students from 2 psychology Modules N = 3	Qualitative	Focus group	

**DEBQ – Discipline-focused Epistemological Belief Questionnaire; ATI – Approaches to Teaching Inventory; ASSIST – Approaches and Study Skills Inventory for Students*

3.2 Rationale for the adoption of mixed methods in this thesis

Collins et al. (2006) gave five broad rationales for the use of mixed methods:

- To improve the accuracy of the data
- To produce a more complex picture
- As a means of avoiding biases in single method studies
- A way of building on initial findings
- An aid to sampling – survey to screen potential interviewees

Prior to this, Greene et al. (1989) stated there are 5 major purposes or rationales for conducting mixed methods research

1. Triangulation – convergence and corroboration
2. Complementarity – elaboration, enhancement, clarification
3. Initiation – discovering paradoxes and contradictions, leading to reframing of question
4. Development – findings from one method to inform another method
5. Expansion – expand breadth and range of research, different methods for different inquiry components

These purposes and rationales subsume what Onwuegbuzie & Teddlie (2003) described as a 7 stage mixed methods process subsuming:

1. Data reduction;
2. Data display;
3. Data transformation;
4. Data correlation;
5. Data consolidation;
6. Data comparison; and
7. Data integration.

Whilst the author agrees in most part with Denscombe (2008), he does not necessarily concur with Greene et al's (1989) reasons given for employing mixed methods research (MMR). For example, MMR is a means of achieving convergence and corroboration through a process of triangulation. As noted by the author in Section 3.5.3, a shift occurred in the 1980's whereby triangulation was viewed as a means of extension rather than confirmation. Indeed, Greene et al (1989) do acknowledge this when highlighting 'initiation' and 'expansion' as two of their five purposes for MMR; where paradoxes and contractions and a pluralistic methodology are not frowned upon.

Bergman (2010) argued mixed methods research is suited to exploring variations in the construction of meaning and concepts; its strength being the utilisation of qualitative data derived from a subset of survey data, which permits the investigator to relate two data sets and their findings (Woolley, 2009). As Slomin-Nevo and Nevo (2009) suggest, utilising two or more sets of inferences helps to reveal different aspects of the phenomenon under investigation and thus provides an enhanced, more complete view of reality (Erzberger & Kelle, 2003; Lancy, 1993; Teddlie & Tashakorri, 2008; Tobin & Begley, 2004).

Due to the complex nature of this research study, it was necessary to combine the quantitative/positivist and qualitative/interpretivist paradigms embedded within a collective case study. This mixed-method, mixed-model design (Johnson & Onwuegbuzie, 2004), included a number of different pieces of research completed across a number of different phases, with a number of different analyses – quantitative and qualitative, all of which contributed toward the overall investigation. This partial, sequential, equal status mixed methods design (Leech & Onwuegbuzie, 2009), allowed the author to conduct a number of analyses with subsamples of students and teachers across different phases of the research to answer the 4 key questions cited at the beginning of this chapter.

Qualitative and quantitative data was collected across four phases by means of questionnaires, semi-structured interviews, and a focus group interview (Table 3.1). Chapter Four discusses Phase One, which included the testing of a research instrument prior to its use as a data collection tool, and its subsequent use for a between-participant quantitative analysis. Phase Two, Chapter Five discusses a case study involving groups of students and their teachers drawn from four Sports, Health and Exercise Science (SHES) modules within an undergraduate degree. This SHES case study included between and within analyses to explore the personal epistemologies of teachers and their students within four different contexts (modules) from the same disciplinary field. Chapters Six and Seven discuss Phase Three and Phase Four of the research, a case study involving teachers and their students drawn from two modules within an undergraduate Psychology degree. This data provided comparative, qualitative and quantitative, within and between group participant analyses.

The Quantitative Qualitative Debate (based on positivist and interpretive epistemologies)

Beneath the theoretical perspectives of positivism and interpretivism lie three main epistemological roots, objectivism, subjectivism, and constructivism. These epistemologies lead to a fundamental understanding of the nature of knowledge, its form and how it comes into being, at its deepest level.

Objectivism asserts that research can lead us to know and verify an objective truth, whereas subjectivism claims there are infinite personal interpretations of events, none of which is superior to another; and constructivism posits an objective world mediated by an individual's conceptual and experiential lens or framework that is developed through the ongoing interactions with and in the world. Broadly speaking, the conventional wisdom is that quantitative approaches align with objectivism and qualitative approaches align with subjectivism yet, both qualitative and quantitative approaches can be found in constructivism (Kayrooz & Trevitt, 2004).

Moreover, Cousins (2009) highlighted how:

> "…the two approaches overlap more than is commonly recognised, as both qualitative and quantitative research involves interpretation" (p.97).

And, Stake (1995), who had previously stated:

> "Interpretation is a major part of all research. I am ready to argue when someone claims there is more interpretation in qualitative than quantitative" (p.9).

Philosophical Issues and Debates

There is a continuing debate, whether a quantitative or qualitative approach is "better", one which has been evident for many years. Recently however, mixed methods research utilising both approaches has burgeoned. This is in recognition that the approaches can be complementary and that almost every applied social research project lends itself to a combination of methods. However, there have been dissenters who point to the incompatibility and incommensurability theses to "contend that qualitative and quantitative methods rest on different paradigm assumptions and hence cannot be combined." (Denzin, 2012, p. 82).

Let us return for the moment to the debate. Arguing for a qualitative approach Donald Campbell stated "All research ultimately has a qualitative grounding", whereas Fred Kerlinger from a quantitative perspective stated "There's no such thing as qualitative data. Everything is either 1 or 0" (cited in Miles & Huberman, 1994, p.40). The fundamental differences lie in the assumptions made about research. These differences are both epistemological and ontological rather than at the level of data itself. It is a consequence of these beliefs that common myths exist about the differences between qualitative and quantitative research:

- Quantitative research is confirmatory and deductive in nature
- Qualitative research is exploratory and inductive in nature

Although most quantitative research is viewed as confirmatory and deductive it can also be exploratory. On the other hand, whilst qualitative research is generally viewed as exploratory, it can also prove beneficial when being used to confirm specific deductive hypotheses. Thus, the statements above are not strictly "true", they are beliefs. What is true is differences exist, but these are not methodological, rather, they are philosophical. Qualitative researchers have different epistemological and ontological assumptions than quantitative researchers.

Onwuegbuzie and Teddlie (2003) noted how some individuals who engage in the qualitative versus quantitative paradigm debate appear to confuse the *logic of justification* with research methods. There is a tendency among some researchers to treat epistemology and method as being synonymous (Bryman, 1984; Howe, 1988). Therefore differences in epistemological beliefs (such as a difference in beliefs about the appropriate logic of justification) should not prevent a qualitative researcher from utilizing data collection methods more typically associated with quantitative research, and vice versa (Johnson & Onwuegbuzie, p.15, 2004).

To emphasise this very point, Johnson and Onwuegbuzie (2004) highlight how

> "…many human (i.e., subjective) decisions are made throughout the research process and that researchers are members of various social groups. A few examples of subjectivism and intersubjectivism in quantitative research include deciding what to study (i.e., what are the important problems?), developing instruments that are believed to measure what the researcher views as being the target construct, choosing the specific tests and items for measurement, making score interpretations…drawing conclusions and interpretations based on the collected data…and deciding what findings are practically significant. Obviously, the conduct of fully objective and value-free research is a myth, even though the regulatory ideal of objectivity can be a useful; and, conversely, some qualitative purists (e.g. Guba, 1990) adopt a strong relativism. However, this stance is neither practical, useful or pertinent in educational research as ones opinion about the quality of research is not equal to that of others – people are different with regard to their training, expertise and interests" (p.15/16).

Maxwell (2010) argued the real distinction between a qualitative-quantitative approach is not number and text, it is the difference in the way an understanding is gained through 'variance' via variables and correlations (quantitative), and/or interactions (qualitative); and noted both are essential. Thus, mixed methods research is able to combine different strands of knowledge, skills and disciplines (Bergman, 2011). Moreover, Maxwell (2010) noted how it is common in mixed methods designs to combine survey and interview data. Results are then analysed independently and findings compared, a process that stops short of full data integration.

3.3 Research Design

3.3.1 Sampling

Non –probability sampling

The aim of non-probability sampling is to construct a sample that gives the researcher insights into the phenomenon under investigation by accessing particular rich sources of data. Consequently, the findings are not necessarily generalizable to a wider population, but do have the potential to generate valuable insights into a given context. Thus, the ethos behind non-probability sampling is to theorize from the particular sample, and generate insights and questions that can be applied and asked within other cases and contexts. In other words, non-probability sampling permits ways of seeing data that may be applicable to other cases, whilst having the potential to give valuable insights, which may not have possible otherwise.

There are no hard and fast rules regarding the required number of participants for a study using non-probability sampling. The focus is on the richness of the data and how it provides answers to the core questions of the research questions. As such, the number of participants is not a measure of the quality of the study. What is of paramount importance is having access to participants and data that allows the researcher to answer the key questions as insightfully as is practicable. In simple terms, and something that aligns with the pragmatist/instrumentalist ethos (Sections 3.6.1 and 3.6.2), is the emphasis is on answering the questions in a flexible, open-minded way, using whichever methods are deemed the most appropriate for the investigation into the phenomenon of interest.

To obtain participants for this study, the author used a combination of convenience and purposive sampling as the design and nature of the study did not lend itself to random sampling. Initially, for Phase One of the overarching investigation, convenience sampling was used following consultation between the author and teachers who were undertaking a mandatory postgraduate teaching course. Subsequent phases (Two, Three and Four), required a purposive sample. Crucially, the researcher was mindful that the selected samples represented the population being investigated – students drawn from a variety of different disciplines, who had already experienced their chosen field of study via the successful completion of at least one year of undergraduate study; and as a result had begun the process of becoming immersed in their subject.

This type of non-probability sampling provided the author with the most useful data upon which to investigate personal epistemology by providing data for two separate case studies drawn from two undergraduate programmes – Sports, Health and Exercise Science (SHES), and Psychology. This purposive non-probability sampling (MacNealy, 1999) was selected by the author as a result of a decision-making process captured by Babbie (1990) who stated such decisions are made "on the basis of your knowledge of the population, its elements, and the nature of your research aims". In other words, non-random selection based on particular characteristics (Frey et al., 2000).

Thus, non-probability sampling was both appropriate and advantageous for this study because: (1) the researcher required teacher and student participants where comparisons could be made both within and between disciplinary fields of study, (2) there were a limited number of courses the author had access to, (3) the research questions called for an intensive investigation of specific populations of students, and (4) the case studies were preliminary and exploratory. In total there were eleven student groups of research participants and six teachers recruited across the four phases of the investigation (Table 3.1).

3.3.2 Data collection and analysis

This descriptive study used both qualitative and quantitative data collection and analysis techniques. The methods adopted included: questionnaires, interviews and a focus group. The analysis included: thematic analysis from the interpretivist paradigm; and Factor Analysis, T-tests, Kruskal-Wallis H tests, Wilcoxon Signed Rank Tests, analysis of variance (ANOVA), and multiple analysis of variance (MANOVA) from the positivist paradigm. Phase 1 discussed in Chapter Four used factor analysis to test the utility of the Discipline-focused Epistemological Beliefs Questionnaire (DEBQ) within the context of the current study. This laid the foundations for multiple analyses of variance (MANOVA), which investigated the personal epistemologies of students across 11 modules of study. Subsequent chapters also used the DEBQ to collect and analyse data that contributed to the case studies drawn from Psychology and Sports Health and Exercise Science (SHES) undergraduate degree programmes of study. Phase 2, Chapter Five discussed the SHES case study, which used Kruskal-Wallis H tests, Wilcoxon Signed Rank Tests, and analysis of variance (ANOVA) to: explore (1) potential differences between the personal epistemologies of groups of students in different teaching and learning contexts, and (2) changes in personal epistemologies of groups of students over the duration of a semester of study. Phase 3, Chapter Six, discussed the core of the Psychology case study, which used quantitative analysis (T-tests and descriptive measures of central tendency i.e. mean scores), and thematic analysis from the qualitative paradigm to explore and investigate further the concept of a 'Socialised Habitus of Academic Personal Epistemologies' (SHAPE). Phase 4, Chapter Seven formed part of the Psychology case study, and was the final phase of data collection and analyses for the thesis. This phase explored further the issues addressed in Chapter Six, using only qualitative data collected from a focus group with psychology students who had been interviewed in Phase 3.

Across the four phases, this combination and integration permitted the adoption of a mixed method, mixed model research design; one which according to Cresswell and Plano Clark (2007), would be labelled as an *explanatory design* where the use of qualitative data helps explain or build upon initial quantitative results. For example, the Psychology case study where the results from quantitative data collected for Chapter Four were complemented by the qualitative data in Chapters Six and Seven.

Descriptive research and the methods used, focus on ways to "describe, observe, and document a naturally occurring phenomenon which cannot be readily be ascribed an objective value" (Polit, Beck & Hungler, 2001, p.180). The emphasis of this investigation was therefore the explanation of how things appeared and the relationships therein. There was no attempt made to predict the relationships between variables or the direction of these relationships. Descriptive research can be concrete or abstract depending on the focus of the research and the subsequent description. For this particular descriptive study, a combination of the two were considered to be appropriate because of the complex nature of the phenomenon being investigated – personal epistemology and its influence on teaching and learning in a higher education context. A case study approach was adopted as a "case study is a research approach, situated between concrete data taking techniques and methodological paradigms" (Lamnek (2005, p.180).

3.3.3 Ethics

All the interviews (Appendix 3.1) took place during a one month period. The student interviews were conducted in a private office with only the author (researcher) and student present. Teacher interviews were conducted in their respective offices; with complete anonymity assured for both teacher and student participants. Before the interviews commenced, each participant was provided with an information sheet explaining the purpose of the interview (Appendix 3.2) and a participant consent form to sign (Appendix 3.3). Any participant questions or queries regarding the research project were addressed prior to the commencement of the interview. Consent from each student and teacher was gained before each interview including permission to audio record the interview for the purpose of subsequent transcription by the author. Transcripts of the interview were given to each participant for 'member checking' to clarify it was a true reflection of their thoughts and opinions. The students had previously given their informed consent to participate in the questionnaire survey conducted using the DEBQ, and which is discussed in Chapter Four of this thesis.

The audio recorded interviews lasted between 50 and 90 minutes. To maintain consistency, all the interviews were conducted by the author on a one-to-one basis. All the taped interviews were transcribed by the author, which ranged between 7 and 15 single spaced pages when completed. The information from the verbatim transcripts was manually analysed by the author.

3.4 Methods

This section describes the quantitative and qualitative methods used to 'triangulate' the data. A brief description of the data collection methods used for the teachers and students participating in each of the studies contained within this thesis will follow. Some of the studies relied solely on quantitative data, some on qualitative data, whilst others used a combination of the two. Therefore, a combination of method and data triangulation is the methodological conduit which provides a framework for the research within this thesis. The three primary data sources included questionnaires, interviews and a focus group.

3.4.1 The quantitative questionnaires

Approaches to Study Skills Inventory for Students (Entwistle, Tait & McCune, 2000).

Research has demonstrated the influence personal epistemology (e.g. Chan & Elliott, 2004; Zhu, Valcke & Schellens, 2008) and conceptions of learning (e.g. Burnett, Pillay & Dart, 2003; Chan & Elliot, 2004; Marton et al., 1993;Vermunt & Vermetten, 2004) have on the approaches to study adopted by students. The Approaches and Study Skills Inventory for Students (ASSIST) consists of a number of different sections. These contribute to an overall measure of student perceptions of what learning in higher education is, how they approach learning, and their preferences for different types of courses and teaching.

The '*conceptions of learning'* section measures the extent to which students see learning as reproducing, or learning as transforming. The '*approaches to studying'* section highlights a preference towards a deep, surface or strategic approach to learning. A deep approach subsumes seeking meaning, relating ideas, use of evidence, and an interest in ideas; whereas a surface apathetic approach is made up of a lack of understanding, lack of purpose, syllabus boundness, and a fear of failure. A strategic approach is characterised by organised studying, time management, monitoring effectiveness, and achievement motivation. The preferences for teaching section measures the extent to which students prefer either teaching that encourages understanding or transmits information.

The ASSIST evolved from the *Approaches to Studying Inventory* (ASI) which comprised of 64 items within 16 subscales. Nearly forty years ago in the early 1970s Ference Marton and colleagues in Sweden developed new ways of investigating the way in which students approached reading tasks. From this, using a relational approach, two qualitatively different student approaches to learning were identified. A ‘deep’ approach is characterised by greater engagement in learning than students who adopt a ‘surface’ approach to learning. Such approaches are evoked by students’ perceptions of the teaching and learning environment and therefore are changeable from context to context (Entwistle and Ramsden, 1983). A deep approach is associated with an intention to understand ideas and seek meaning, whereby students have an intrinsic motivation and expectancy that the learning task will be an enjoyable one (Trigwell, 2006).

The Discipline-focused Epistemological Belief Questionnaire DEBQ (Hofer, 2000)

The Discipline-focused Epistemological Belief Questionnaire (DEBQ) (Hofer, 2000) contains items adapted from instruments developed by Perry (Checklist of Educational Values) and Schommer (Epistemological Beliefs Questionnaire), with additional items extrapolated from the work of Perry (1970), King and Kitchener (1994), Kuhn (1991), Baxter Magolda (1992), and Belenky et al. (1986). The questionnaire was developed by a team of researchers as a way of measuring domain-specific knowledge. Analysis of the 27-item questionnaire resulted in four factors (certainty, justification: personal, source authority, and attainment of truth), emerging with 18 of the 27 items accounting for 46% (psychology) and 53% (science) of the variance.

The Approaches to Teaching Inventory (ATI) (Trigwell & Prosser, 2004)

The ATI was developed to explore the relationship between students’ approaches to learning, and approaches to teaching (Prosser & Trigwell, 2006). The ATI is now being used as an instrument for formally monitoring approaches to teaching (Trigwell, Prosser, & Ginns, 2005). The ATI measures the response of a group in a particular context, rather than more general characteristics of individuals in that group, and focuses on the qualitative variation in two key dimensions of teaching – conceptual change/student focused (CCSF) and information transfer/teacher-focused approach (ITTF). The ATI is not intended for use in gathering a full, rich self-report of teaching, or in non-relational contexts (Prosser & Trigwell, 2006).

However, research using the ATI has shown systematic variation in both student and teacher focused dimensions of approaches to teaching across disciplines and teaching contexts (Lindblom-Ylanne et al. 2006). It is therefore a useful measure as part of a ‘suite’ of instruments and methods. In this way, the ATI can be used to contribute toward an overall understanding of the teaching and learning context by permitting comparisons and associations with other measures. This allows an overview and insight into teachers’ practice to inform the ‘triangulation’ process.

3.4.2 Qualitative interviews

Interview Schedule (Ho et al., 2001; Schraw & Olafson, 2002)

The interview schedule was based on questions from studies conducted by Ho et al. (2001), and Schraw and Olafson (2002) with additions made by the author to supplement these. The semi-structured interview therefore covered perceptions of teacher and learner roles; assessment; demands of the module; knowledge, learning; and understanding.

The interview questions from Ho et al. (2001) are derived from work they conducted on a continuing staff development programme. These questions were used to evaluate the utility of the programme in bringing about conceptual change in the participants over the period of the programme. The areas covered include: conceptions of teaching, the impact of teaching practice, and the consequential effects of teaching practice on student learning. Schraw and Olafson’s (2002) work captured the epistemological world views of teachers and their teaching practices, and established whether they were teacher or student-centred.

3.4.3 Focus Group

As part of the ‘triangulation’ process within the psychology case study a focus group was deemed appropriate to investigate further the perceptions, feelings, attitudes, and ideas participants had about teaching and learning in psychology (see; Gibbs, 1997; Kitzinger, 1995; Vaughn et al., 1996; Wilde et al. 2006). The setting for a focus group is an interactive group where participants are free to converse with other group members. The discussion is loosely structured with the moderator encouraging the 'free flow' of ideas.

Focus groups can be used as both a self-contained method and in combination with surveys and other research methods, most notably individual, in-depth interviews. As such, focus groups concentrate on the role of the group in producing interaction and the role of the moderator is one that involves guiding this interaction (Morgan, 1996).

3.5 The case studies conducted

Sports Health and Exercise Science (SHES) case study (Phase 2)

The Sports, Health and Exercise Science (SHES) case study involved the collection of quantitative data from four Year Two modules. This data was gathered via the DEBQ from a total of 174 students across the four modules, which was initially part of the Phase 1 data collection discussed in Chapter Four. As there appeared to be differences in the personal epistemologies at the group level between the four SHES modules drawn from the same year of study in the undergraduate degree programme, the decision was made to explore and investigate potential reasons for these differences. Additional data was therefore collected from the four teachers of the modules via the ATI, DEBQ, and course outlines for each of the modules. A second round of data collection for the same modules provided a pre-post measure using the DEBQ resulted in data for 95 students across three of the four SHES modules.

It was envisaged that having access to this information, would permit the author to explore the potential influence the teacher in addition to other aspects of the teaching and learning context had on the personal epistemologies of students at the group level of analysis. By collecting data in the initial and final stages of the semester of study, it would be possible to track any changes that occurred. The data collected via the ATI and DEBQ for the teachers of the four SHES modules in conjunction with the course outlines provided a variety of information about the different teaching and learning contexts within the SHES undergraduate degree including: the teachers' espoused approach to teaching, their espoused beliefs about knowledge, the mode of delivery and assessment, and the subject matter itself; all of which could have an influence on the personal epistemologies of students.

Psychology case study (Phase 3)

The participants were drawn from two second year psychology modules. Semi-structured interviews were conducted with a total of 14 students and two teachers. The interview questions were based on previous work by Ho et al. (2001) and Schraw and Olafsen (2002), with the addition of questions devised by the author. The questions covered different aspects of teaching, learning and assessment, as well as specific questions about perceptions of knowledge, learning, and understanding within a particular teaching and learning context – Research Methods and Statistics and/or Memory and Perception modules of study.

More specifically, the semi-structured interview focussed on:

- Role of teacher
- Role of student
- Teacher aims
- Assessment
- What students need to know or do in order to be successful
- Best way to learn
- What knowledge is
- What understanding is
- What learning is

It was envisaged this questioning would give more clarity to the domain-general, domain-specific debate, whilst adding to the evidence for the concept of a 'socialised habitus of academic personal epistemology' (SHAPE) from Chapters Four and Five. Analyses of data from interviews and the DEBQ afforded a greater insight into personal epistemology from context to context.

The main themes of the interviews were then used to investigate and evaluate the personal epistemologies of students and their teachers and are discussed in Chapter Six. Four of the psychology students who were interviewed for Phase Three agreed to take part in the Phase Four focus group interview. The open ended questions for the focus group were intended to access student perceptions of different aspects of teaching and learning, and their accompanying personal epistemologies by providing a different dynamic than individual interviews.

In addition to the interview data, the completion of questionnaires including the Discipline-focused Epistemological Belief Questionnaire (DEBQ), the Approaches to Study Skills Inventory for Students (ASSIST), and the Approaches to Teaching Inventory (ATI) provided quantitative data in the form of subsamples of students drawn from the two undergraduate year two modules. This included student data from Phase One (N = 111) and Phase Three (N =13); and teacher data from Phase Three (N = 2).

3.5.1 Case Studies

Stake (1994) highlighted three types of case study – an *intrinsic case study* where the researcher wants a better understanding of a particular case; an *instrumental case study* that provides insight into an issue or to redraw a generalization whereby the case may be seen as typical of other cases or not; and a *collective case study* which is an instrumental case study extended to several cases. Here the individual cases do not necessarily (in advance of the research), manifest common characteristics. Case studies are chosen because of the ethos that understanding a particular case will lead to better theorizing about a larger collection of case (Stake, 2000, p.437). Moreover, Benbaset et al. (1987) suggested:

> "Case studies are more suitable for the exploration, classification and hypothesis development stages of the knowledge building process, the investigator should have a receptive attitude towards exploration" and that, "In case studies the researcher is an observer/investigator rather than a participant" (p.371).

Stake (1994, p.244) stated the major conceptual responsibilities of the qualitative case researcher are:

- Bounding the case, conceptualising the object of study;
- Selecting phenomena, themes or issues;
- Seeking patterns of data to develop the issues;
- Triangulating key observations and bases for interpretation;
- Selecting alternative interpretations to pursue; and
- Developing assertions or generalizations about the case.

As such, case studies are not a methodological choice (Stake, 1994). Rather, they are a choice of what is to be studied, by whatever methods are deemed appropriate; something which resonates with Dewey's instrumental ethos, and which informs the research conducted by the author for this thesis. That is, a pragmatist/instrumentalist credo (see Sections 3.6.1 and 3.6.2). The case in question may be simple or complex with students drawn from a number of different contexts, in this particular case, modules of study. Although a case is singular, it may have subsections, (i.e. students and teachers) as the links and dynamics therein are so complex, and as a consequence, only excerpts of the 'reality' are evident and thus reported.

Thus, the cases in this thesis provide an overarching picture of teaching and learning in higher education in specific contexts. Each case can therefore be seen as part of a 'jigsaw' puzzle that contributes to an 'understanding' of the complexities of teaching and learning in higher education. However, this understanding is contingent on the context, a context including the participants, the researcher, and the subject matter amongst other things. Consequently, the jigsaw is never complete, it is left to the researcher, the participants and indeed the reader to fill in the gaps; gaps which differ with our differing perspectives.

It is for this reason a number of methods and procedures are utilised in order to minimize the likelihood of misinterpretation. This process of 'triangulation' (Denzin, 1989) permits qualitative casework to [sometimes] clarify meaning, by verifying the repeatability of the interpretation. In other words, the case study is effective for generalising using the type of test Karl Popper (1959) called ‘falsification’ and which forms part of critical reflexivity. However, as Popper suggests, as did other post positivists such as Feyerabend, (1993), and Kuhn, (1970), exemplars of particular phenomenon are always open to question as the ‘knowledge’ is fallible.

Thus, case studies can be used for creation of new theory in social sciences where case methods are not restrictive and can consist of:

- Documentation (written material)
- Interviews (open-ended or focused)

These case methods allow the researcher to obtain a rich set of data surrounding the specific research issue, as well as capturing the contextual complexity (Benbaset et al. 1987).

Case studies have a path that is understandable to the reader and explain a process through which the researcher goes (Benbaset et al., 1987). This process involves the participants and researcher in a systematic reflective dialogue on critical events and incidents within the context. As such, the progress toward an ‘understanding’ is iterative, involving a revisiting of the data at regular intervals. Each phase contributes to the ‘big picture’ the overarching global view. To optimise the process within this particular collective case study each phase though separate informed the subsequent phase. The subsequent synopsis from the triangulation process permitted evaluation of congruence or conflict within the data, which lead the author to an understanding of the context and the drawing of conclusions.

Whilst the author recognises the danger of this strategy – the data from a previous stream influencing expectations and framing of the following stream/phase; the author also sees this as inevitable and unavoidable whatever strategy is adopted. The researcher has to find the right balance between informing later stages and thus exploring emerging issues in greater depth, or risk missing or overlooking data through preconceived ideas; or treating the phases as totally separate entities until the final analysis and regretting the decision because of missed opportunities. There is no ideal way to proceed, and one has to decide what is considered to be appropriate at the time, and what the consequences of that approach might be.

3.5.2 Mixed Methods

Johnson & Turners' (2003) text entitled *fundamental principle of mixed research* argues for the collection of multiple data, using different strategies, approaches, and methods in a way that results in complementary strengths and non-overlapping weaknesses (see also Brewer & Hunter, 1989). This way the method becomes superior to mono-method studies. Furthermore, Johnson and Onwuegbuzi (2004) report:

> "The majority of mixed methods research designs can be developed from the two major types of mixed methods research: *mixed-model* (mixing qualitative and quantitative approaches within or across the *stages* of the research process) and *mixed-method* (the inclusion of a quantitative *phase* and a qualitative *phase* in an overall research study)" (p.20).

According to Johnson & Onwuegbuzie (2004) mixed methods research can be viewed as the 'third paradigm', a bridge between qualitative and quantitative research. As such, Johnson and Onwuegbuzie (2004) mixed-methods are not a means of replacing either the quantitative or qualitative approach. Rather, the aim of mixed methods is to draw on the strengths and reduce the weaknesses in single method studies, whilst recognising there are important differences between quantitative and qualitative research paradigms, commonalities also exist. For example, both use empirical observations to address research questions and both:

> "…describe their data, construct explanatory arguments from their data, and speculate about why the outcomes they observed happened as they did" (Sechrest & Sidani, p.78, 1995).

By utilising a variety of methods drawn from quantitative and qualitative paradigms, researchers give themselves the best opportunity to answer their particular research question(s). The myth that the quantitative and qualitative paradigms are linked to particular research methods is misleading, and is neither sacrosanct nor necessary (e.g. Howe, 1988).

Mixed methods research includes the use of induction (e.g. discovery of patterns), deduction (e.g. testing of theories and hypotheses), and abduction (e.g. uncovering and relying on the best of a set of explanations for understanding ones results) (e.g., de Waal, 2001; Johnson & Onwuegbuzie, 2004). As such, mixed methods research is an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research. What is most fundamental is the research question – research methods should *follow* research questions in a way that offers the best chance to obtain useful answers (Johnson & Onwuegbuzi, 2004).

It is this ethos that led Johnson, Onwuegbuzie, and Turner (2004) to state:

> "Mixed methods research is the type of research in which a researcher or teams of researchers combines elements of qualitative and quantitative research approaches […] for the broad purposes of breadth and depth of understanding and corroboration" (p.123)

Leech and Onwuegbuzie (2009) highlight that "a myriad of mixed method research designs have been conceptualized" and how "selecting from these designs often is a challenging task" (p.272). They note as a consequence, a number of typologies of mixed method research designs have emerged. However, Leech and Onwuegbuzie (2009) "believe the following three criteria capture most mixed methods designs: level of mixing, time orientation and emphasis of approaches" (p.272). According to these criteria, the current study is a partial mixed methods, equal status sequential, quantitative-qualitative design. That is, the quantitative and qualitative elements were conducted sequentially in their entirety prior to 'mixing' at the data interpretation stage (Leech and Onwuegbuzie, 2009).

3.5.3 Triangulation

Wolf (2010) highlighted the considerable disagreement with regard to the meaning of triangulation. It has often been the case that the term triangulation has been used to describe the process of combining multiple qualitative methods (e.g. Denzin, 2010, Flick, 2010). However, a combination of quantitative and qualitative approaches has also been labelled triangulation (e.g. Erzberger & Kelle, 2003; Denzin, 2010). Torrance (2012) argued triangulation is an important component of mixed methods research design, its origins being found in attempts to validate research findings through a process of combining different types of data and, and different respondents' perspectives. Torrance (2012) goes further by stating "...the core principle underpinning mixed methods is triangulation" (p.113).

However, some researchers would argue triangulation is different from mixed methods in that triangulation seeks convergence, whereas a mixed methods approach is open to divergence. However, it is somewhat naive to presume that because one combines methods and aggregates data, this leads to an overall "truth" or a more complete picture; or that such processes increase validity (Silverman, 2005 cited in Denzin 2010). Moreover, Fielding (2012) noted confusion in the use of the term triangulation (Gorard & Taylor, 2004), and argued mixed methods research can be complementary rather than for validation purposes (Woolley, 2009). A different concept of triangulation emerged in the 1980's (Flick et al., 2012). Referring to Mathison (1988) and Patton (1980), Torrance (2012) notes how discrepant accounts should be regarded as interesting whilst at the same time puzzling. Moreover, the author would argue, such discrepancies are an indicator that original or initial understandings of the phenomenon under investigation are inadequate and require further study via increased data collection and analyses. A shift therefore took place whereby triangulation was seen as a way of extending knowledge as opposed to a means of confirming results. As such, triangulation is seen as a way of increasing the scope, depth, complexity, richness and rigour of research (Denzin, 2012, 2010; Denzin & Lincoln, 1998; Fielding & Fielding, 1986; Flick, 2007, 2002).

3.5.4 Integration

Yin (2006) highlighted the value of integration in all stages of mixed methods research including: research questions, unit of analysis, sampling, measures used, data collected and the analytic strategies used. Moreover, Greene (2007) stated integration can take many forms including: iteration, blending, nesting, embedding; or through holistic and transformative processes. This being said, effective data integration needs careful consideration. The researcher has to decide when to synthesise findings and when to respect and investigate contradictory findings; as contradiction can be a reflection of epistemologically based differences that can only be resolved conceptually but not empirically (Johnson, 2008).

Yin (2006) provides a framework for integration whereby the process involves integrated sampling, specifying the same unit of analysis for each method adopted, and developing the instrumentation of each method to measure overlapping variables. Others however, argue integration can occur at various stages of, or throughout the research process (Bryman, 2007; O'Cathain et al., 2007; Yin, 2006 cited in Woolley 2009, p.7). Indeed, there is suggestion that qualitative and quantitative methods can be linked in parallel, sequentially or in an embedded design (Cresswell & Plano Clark, 2011). This permits mutual illumination where the findings in the often misquoted and misunderstood Gestalt tradition of

> "The whole is other than the sum of the parts" (Koffka, 1935 cited in Tuck 2010)

In essence this means the whole has an independent existence in the perceptual system

3.6 Epistemology of the current investigation

3.6.1 Pragmatism

One of the main tenets of pragmatism is the attempt to explain how the relationship between the knower and known operates in the world. Here terms 'real' and 'true' are functional labels in inquiry and cannot be understood outside of this context; with self a concept derived from our interaction with the external world (De Waal, 2005). Thus, pragmatism adheres to the principle of methodological pluralism and the philosophy that there is more than one way to conceptualize the world and its context. For example, Peirce (1955) argued against using a "single thread of inference" commonly found in Cartesian philosophy. Instead, Pierce put forward a pluralist argumentation as a central tenet of pragmatism (Scott & Briggs, 2009). In essence, pragmatic pluralism integrates empiricist and rationalist philosophies with regard to ways of knowing. That is, knowledge comes primarily from sensory experience (empiricism), or from reason as the chief source and test of knowledge (rationalism). Feilzer (2010) noted how a pragmatist view of the world as measurable relates closely to "existential reality" (Dewey, 1925). From this perspective, the world is an experiential place comprised of different elements or layers, some subjective, some objective, and some a mixture of the two. Moreover, Fielzer (2010, p.258) stated there are three main characteristics of the pragmatist habit of mind:

- Willingness to accept doubt and uncertainty
- Openness to change
- Recognition of a wide plurality of perspectives

Prior to this, Hanson (2008) captured the essence of pragmatism when stating:

> "Pragmatism does not require a particular method or methods mix and does not exclude others. It does not expect to find unvarying causal links or truths but aims to interrogate a particular question, theory, or phenomenon with the most appropriate research method (Hanson, 2008, p.107)" (p.12).

Pragmatism therefore aims to solve problems in the "real world" (Cresswell & Plano Clark, 2007; Dewey, 1925; Rorty, 1999). It accepts all inquiry is situated and therefore has a practical rather than theoretical starting point for research (Scott & Briggs, 2009). Pragmatism is generally regarded as the philosophical partner for mixed methods approaches to investigation (Denscombe, 2008; Teddlie & Tashakorri, 2009) as its ethos is good research questions require both qualitative and quantitative research in order to provide adequate answers (e.g. Greene et al. 2001, 2005; Rocco et al., 2003 cited in Denscombe, 2008). This fusion of approaches recognises that there is not one set of methods appropriate to any investigation. Researchers are therefore not prisoners of particular research methods or techniques (Robson, 1993 cited in Feilzer 2009); they have methodological freedom of choice (Cresswell, 2007), and use what works (Howe, 1988). Thus, pragmatism ultimately brushes aside the quantitative-qualitative divide arguing the most important question is whether research has helped "...to find out what (the researcher) want(s) to know" (Hanson, 2008, p.109).

One of the main proponents of pragmatism was Dewey (1938) who argued no knowledge claim provides the "truth". Rather, different knowledge claims result from the ways we engage with the social world. Dewey's philosophical roots can be found in *transactional realism*, a perspective which suggests the mind and world constantly interact, an ethos that moves away from the traditional dualistic view of objectivity and subjectivity. Consequently, pragmatism focuses on what data and analyses are required in order to meet the goals of researching and answering questions (Bazeley, 2009). It is for this reason Scott and Briggs (2009) argue one of the key achievement of pragmatism was overcoming the incompatibility thesis. This is evident in the soft pragmatic paradigm whereby quantitative and qualitative approaches became compatible (Teddlie & Tashakorri, 2003 cited in Denzin 2010).

Pragmatism focuses on interactions, the contextual and dynamic nature of knowledge, and the intertwining values with inquiry and how these are manifest in methodology. Moreover, pragmatism posits "truth" is what works at the time, and that research is always situated (Scott & Briggs, 2009). Thus, inquiry (from a Deweyian perspective) is not about establishing universal or absolute truths as "truth, like knowledge, is temporal and embedded in and generated through our experiential transactions" (Hall, 2013, p.17). Social realities are therefore internally provisional and approximate; the credo on which the concept of SHAPE is based (Chapter Two) and its consequent utility as a framework for investigating the complex nature of teaching and learning in a higher education context. More specifically, a pragmatist approach believes knowledge is not simply "given" from sense data. Rather, perception is interpretive and thus full of inference through interaction with, and participation in, the practical effect of ideas (Dewey, 1916, 1917; Houser et al., 1998; Jensen et al., 2003 cited in Scott and Briggs 2009, p.226). Moreover, Rescher (2005) discusses from a pragmatic idealist stance the human mind and external world are essential to the construction of knowledge; and argued the mind furnishes interpretive mechanisms with which we conceive objects and their relations. Thus, “truths” feature in both the cognitive and social world under investigation (Scott & Briggs, 2009).

3.6.2 Instrumentalism

A branch of pragmatism (it has several) used to inform this thesis is that of ‘instrumentalism’ (Dewey, 1930), as it fits well with a mixed methods research design. One of the main tenets of instrumentalism is that a concept or theory should be evaluated in a way that establishes how effectively it predicts phenomena, rather than how accurately it describes objective reality. Thus, the focus of analysis is on whether the results and evaluation fit with the observed phenomena – whether the ‘model’ professed is a suitable fit. From this perspective there is no external reality, just a version of events that are time constrained and contextual. A successful strategy from an instrumentalist perspective therefore is to acknowledge the beliefs of the people involved within these contexts.

Instrumentalism sees human thinking as a social endeavour, and emphasises the use of knowledge and intelligence (which is used interchangeably with consciousness in instrumentalism) in ones interaction with the environment. Knowledge for Dewey was a product of inquiry based on experience, and thought as a result, exists as an adjustment to the environment, especially the terms of thought and meaning which are relative to the function they perform. Thus, the value of an idea is judged in relation to its practical consequences, rather than being a transcendent truth.

From an instrumentalist perspective the research process involves the investigator introducing specific variations to determine what differences occur in related processes. Thus, the researcher measures how a given event changes in relation to variations in associated events (e.g. how students become better learners when they are exposed to particular methods of teaching (Gouinlock, 1993). With regard to the concept of SHAPE, these variations take the form of different teachers and the syllabus, and these are the interventions that create the variation therein. Continuing with the theme of education, instrumentalism views learning as an active process where the learner is an explorer, maker, and creator. The emphasis is on face-to-face interaction, which is viewed as essential to the experience of education. As Dewey argued:

> "Immediate contiguity, face to face relationships, have consequences which generate a community of interests, a sharing of values" (1927, p.39 cited in Saltmarsh, 1996).

It is these common interests and values that are the crux of the concept of SHAPE. Moreover, from an instrumentalist perspective, ideas are instruments or tools that humans use to make sense of the world, where Dewey argued intelligence is "the purposive reorganization, through action, of the material of experience" (1916, pp.332-333 cited in Saltmarsh, 1996).

These ideas empower people to direct natural events - including social processes and institutions - toward human benefit. In the case of this thesis the benefit from the perspective of the teacher would be the benefits they can bring about for their students through induction and inculcation into their world.

3.7 The research

To summarise, the research strategy which lays the foundations for the investigations discussed in subsequent pages of this *collective case study*. The methods adopted aimed to collect data using a number of tools and techniques from a number of sources by utilising a mixed methods, mixed design approach; an approach that takes on board the suggestion of Crotty (1998) who stated:

> "We should accept that, whatever research we engage in it is possible for either qualitative methods or quantitative methods, or both, to serve our purposes" (p.15)

This research and its accompanying complexities require the rigour of a mixed methods approach. By collecting data from several 'experts' (participants) within particular contexts it is envisaged the process will investigate the phenomenon of teaching and learning in higher education, and capture some of its nuances, values, attitudes and beliefs. In order to achieve this, the case study will utilise both quantitative and qualitative evidence, with the aim of exploring the landscape of higher education through the lens of personal epistemology. As the topic is complex, it is suggested that this holistic approach will allow a broad picture of the social context and the individual experience of it to emerge (Kayrooz & Trevitt, 2004). As a consequence, the approach taken and the philosophy underpinning this investigation is such, that a number of studies are embedded within a collective case study.

Case studies like other research have a conceptual structure, with both the researcher and the reader bringing their own structures to bear. These predispositions which form personal meaning of events and their relationships are passed along, whilst others are not (Stake, 1994). For example, a focus group is influenced by respondent selection, the questions asked, how they are phrased, how they are posed, in what setting, by whom, and so on, and this affects the answers obtained from respondents. However, as Vissak (2010) points out, case studies do help to capture new layers of reality, helping the development of new, testable and empirically valid theoretical and practical insights (e.g. Eisenhardt & Graebner, 2007; Ghauri, 2004; Glaser & Strauss, 1967; Voss et al., 2002). As such, one of the particular strengths of case studies is that they provide an avenue for discovery, description, mapping and relationship building (e.g. Gummesson, 2005; Woodside & Wilson, 2003). It is this that leads to the identification of further research needs (Halinen & Törnroos, 2005; Siggelkow, 2007).

With this in mind, the research discussed in the following chapters aims to extend knowledge in the field of teaching and learning in higher education. At the same time it is envisaged the research will encourage debate, discussion, and collaboration toward a better understanding of the complexities involved. This will be achieved by creating a thick description and rich understanding of the phenomena in its natural setting (e.g. Dubois & Gadde, 2002; Perren & Ram, 2004; Patton & Applebaum, 2003); that is, personal epistemology in relation to teaching and learning in a higher education context.

The distinction between qualitative and quantitative research is at the ‘methods’ level (a distinction that is far from justified), and *not* at the epistemological or theoretical level. There are many who now blend the two traditions, gleaning advantages from both. This investigation has attempted to do just that. By using a multi-modal methodology, utilising a combination of qualitative (interview, focus group), and quantitative (questionnaires) research methods, the series of studies described contribute to the ‘big picture’ of personal epistemology and teaching and learning in a higher education context. Because of its complexities one could never hope to find the ‘holy grail’ the complete ‘solution’ to enhancing the processes and practices of teachers and learners. However, what can be achieved is a greater understanding of the perceptions individuals and groups have within particular teaching and learning contexts; pieces of the ‘jigsaw’ that contribute to experiences within higher education.

The ethos behind the selection of the methods used in the series of studies was to explore, investigate, test out, and enhance and evolve the knowledge base in relation to previous findings of personal epistemology investigations. Quantitative measures were used for the initial phase of the research, as the aim was to discover if indeed there were differences in personal epistemology in different contexts as the literature suggests. However, as the research also aimed to discover reasons for these differences, there was a need to obtain a more complete, detailed description. Therefore qualitative techniques (e.g. interviews, focus group) were utilised to investigate in greater depth, lines of inquiry emerging from the quantitative analysis.

This pluralistic approach has a number of distinct advantages. First, one approach is used to inform the other; Second, different data sources increase validity; and third, there is the potential to create new lines of thinking through the emergence of fresh perspectives and contradictions. In other words, the quantitative element permits summarising of large amounts of data and the qualitative element helps to “tell the story” from the participants’ viewpoint, giving rich descriptive detail that puts the quantitative results into their human context.

3.8 Personal Reflections

Throughout the pages of this chapter I have attempted to bear in mind what Kayrooz and Trevitt (2004) highlighted:

> "Much of the quality and acceptability of your research will be determined by the extent to which you take account of the various competing theoretical perspectives represented in your context, and craft a methodology accordingly" (p.279).

And Denzin & Lincoln (1998) who stated researchers need to be:

> "…adept at performing a large number of diverse tasks, ranging from interviewing to observing, to interpreting personal and historical documents [but also motivated and capable of] intensive self-reflection and introspection" (p.4).

From a personal point of view, whilst compiling this chapter I grappled with my thoughts and ideas and the questions around what my philosophy might be. What approach was I to take? I would say my philosophy and its accompanying strategy and approach is one of an instrumentalist/pragmatist with an empathetic view of social constructivist/social constructionist values and beliefs, in that I am convinced that there is a knowable world, but we can only partially understand it. Schwandt (1989) argued we are all constructivists if we believe the mind is active in the construction of knowledge. That is, we as human beings do not find or discover knowledge, we construct or make it. We invent concepts, models, and schemas to make sense of experience. Furthermore, we construct our interpretations against a backdrop of shared understandings, practices, language, and so forth (Schwandt, 1989, p.197). From a constructionist point of view, all knowledge is contingent upon human practices developed and transmitted in a social context. That is, meanings are constructed by individuals as they engage with and interpret the world.

Glesne and Peshkin (1992) highlighted the predispositions of quantitative and qualitative inquiry. I would place myself in the qualitative tradition as the assumptions I make are bounded in a belief that reality is socially constructed; and variables are complex, interwoven and difficult to measure. My role is therefore personally involved, whilst at the same time attempting to understand and be empathetic. The purpose of my research is contextualisation; interpretation; and understanding participants' perspectives. My approach is to understand; to look for emergent themes and patterns and portray these to the reader. I see myself ultimately as the research instrument; and my role to write up the findings of my research in a descriptive manner. Thus, I am coming from a naturalist paradigm (qualitative) whereby realities are multiple, constructed and holistic, and where all inquiry is 'value bound' (Lincoln & Guba, 1985). I look toward informants (participants in my research) and want to discover their culture, and the accompanying concepts they use to describe their experiences. The task in hand is from my perspective, to translate the cultural knowledge of my informants into a format easily understood by the reader (Spradley, 1979).

3.9 Summary

To summarise, the purpose of this investigation is to discover how the personal epistemologies of groups of students and their teachers in different teaching and learning contexts, influence their interpretations and understandings therein. The research will analyse, describe, and gain an 'understanding' of the processes, beliefs, and strategies adopted within these differing contexts, whilst accepting the influence of my own processes, beliefs and strategies within the research process.

Chapter Four discusses the first in a series of studies that contributed to my 'understanding' of personal epistemology and teaching and learning practices and processes in a higher education context. Data were collected using a quantitative measure of personal epistemology, the Discipline-focused Epistemological Belief Questionnaire (DEBQ - Hofer, 2000). This study included 500 students drawn from eleven second year undergraduate modules. An exploratory and confirmatory factor analysis was completed to corroborate (or otherwise) the dimensions of personal epistemology from Hofer (2000) in a different context, with a different sample to discover if these dimensions were evident. As there is an on-going debate regarding whether personal epistemology is domain-specific or domain-general. Analyses were conducted utilising the modified dimensions from the current study to explore any potential patterns of differences and similarities in the undergraduate modules. The findings from Chapter Four were then used to inform the studies reported in the subsequent chapters (Chapters Five, Six and Seven).

Chapter 4 – Examining Hofer's Discipline-focused Epistemological Belief Questionnaire: Different sample, different dimensions?

4.1 Introduction

This chapter discusses the process of selecting an appropriate measure that could be used in an exploration and investigation of how personal epistemology influences aspects of teaching, learning, and assessment in a higher education context.

The objectives were twofold: to clarify the structure of the 'Discipline-focused Epistemological Beliefs Questionnaire' DEBQ (Appendix 4.1) when used in a United Kingdom context as the original DEBQ (Hofer, 2000) was used with students in the United States. After establishing the structure, the DEBQ was utilized as a way of differentiating between teaching and learning contexts (i.e. modules of study).

Thus, the author sought to provide a methodologically rigorous investigation of the construct validity of the DEBQ (Hofer, 2000) by investigating the model put forward by Hofer in a different context (the UK rather than US) and with a more eclectic sample. The current study will extend the research of Hofer (2000) by utilising a larger sample in a different cultural context and which investigates a wider range of disciplines utilising a between-subject design rather than a within-subject design.

Hofer (2000) found that students had different epistemological perceptions of the disciplines of science and psychology, differences that were statistically significant for each of the four dimensions of personal epistemology. As Hofer (2000) stated

> "The same factor structure appears in both disciplines and similar factors correlate across disciplines, but the mean responses by discipline differ significantly" (p.400).

Ultimately, the purpose of the studies discussed in this thesis was to investigate the personal epistemologies of students and their teachers drawn from a mid-sized university in the UK. The first phase of the investigation described and discussed in this chapter, focused on exploring the context in which the research was embedded and provide the basis for further in-depth study in subsequent phases and chapters.

The DEBQ was selected as the measure of personal epistemologies as its focus is on specific teaching and learning contexts and beliefs about knowledge therein. The only other contextual measure available at the time was the Discipline Specific Beliefs Questionnaire (DSBQ – Buehl et al., 2002) which at the time was still "being tested and validated" (personal correspondence with Michelle Buehl, 2003). The analyses will clarify whether the dimensions proposed by Hofer (2000) are evident with a different sample of students, and whether particular dimensions are more prevalent than others in different teaching and learning contexts. This chapter therefore describes the use of the DEBQ and addresses 2 important questions:

- Do the theorized dimensions of personal epistemology emerge in this UK sample and support Hofer (2000)?

- Do students differ on the dimensions of personal epistemology across different fields of study?

4.2 Methodology

It was envisaged that by addressing the two important questions above, subsequent chapters could focus on the four key questions posed on page 17 in Chapter One:

1. What personal epistemologies do teachers bring to the teaching and learning context, and how does this influence how they perceive different aspects of teaching and learning?

2. How do teachers perceive knowledge and how does this influence their conceptions of and approaches to teaching?

3. What academic epistemologies do teachers have and does this influence the academic epistemologies of their students?

4. How do these academic epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

The DEBQ was administered to students drawn from eleven modules, which included a variety of disciplinary fields. The students were drawn from 10 second year undergraduate modules and one diploma course to establish which factors of personal epistemology emerged. The decision was made to select students who have potentially become more immersed in their field of study, as opposed to students in their first year of undergraduate degree programmes who may well have been encountering the subject matter for the first time. This would therefore increase the possibility of any potential differences emerging when comparing personal epistemologies across different academic contexts.

Hofer (2000) in a previous study had argued for four dimensions – certain knowledge, attainment of truth, justification: personal, and source: authority. The current study will test whether these dimensions are evident in this sample of students.

4.3 Principal components analysis (PCA)

4.3.1 Participants

A total of 500 students (Table 4.1) from a mid-sized UK university participated in part one (factor analysis), and part two (comparison of personal epistemology dimensions across modules of study). The majority of which were second year undergraduate students, with the exception of a relatively small number drawn from a Diploma in Social Work module. As there were 2 modules drawn from Psychology and 4 modules from Sports Health and Exercise Science (SHES) undergraduate programmes, the author was careful not to include the same students across multiple contexts as this would potentially be a confounding variable that influenced results from comparisons between these particular modules. The breakdown of the student sample can be seen below in Table 4.1.

Table 4.1 – Distribution of participants

Module	**Number of Participants**
Economics	78
Physiology (Sport, Health & Exercise Science)	27
Memory and Perception (Psychology)	89
Research Methods and Statistics (Psychology)	22
Education	54
Sporting Identity (Sport, Health & Exercise Science)	40
Biomechanics (Sport, Health & Exercise Science)	39
Diploma in Social Work	19
Informatics	40
Sports and Exercise Physiology (Sport, Health & Exercise Science)	69
Sociology	23
Total	500

4.3.2 Materials

The Discipline-focused Epistemological Belief Questionnaire (DEBQ)

The Discipline-focused Epistemological Beliefs Questionnaire (DEBQ; Hofer 2000) is a 27-item self-report measure of personal epistemology. The DEBQ includes four core components that account for each of the four dimensions of personal epistemology which include *certainty of knowledge, justification:personal, source:authority, and attainment of truth*. Participants are requested to rate their level of agreement or disagreement on a five-point Likert scale ranging from strongly disagree (1), to strongly agree (5).

The DEBQ has components adapted from Perry's Checklist of Educational Values and Schommer's Epistemological Belief Questionnaire plus additional items (see Hofer 2000). The questions contained within the DEBQ emphasise particular fields of study or subject matter and are thus, more sensitive to contextual differences. A modified version (minimal word change) of Hofer's DEBQ was selected for use (see Appendix 4.1). The minor word changes place a greater emphasis on a particular module of study they were undertaking. For example, the DEBQ modified by the author asked "If scholars try hard enough, they can find the answers to almost anything in this subject" (item 13) and "All experts in this field would probably come up with the same answers to questions in this course".

The author envisaged that by asking students to focus on a particular module of study, it would help them to focus on domain-specific beliefs within very specific contexts (i.e. modules of study), rather than a general subject area or discipline. By doing this, a finer grained analysis would be possible, permitting module comparisons to be made both within and between disciplines; and allow the question of domain-generality or domain-specificity to be addressed.

4.3.3 Procedure

Participants were informed of the nature of the study being undertaken by the author. Each participant's involvement in the research was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample.

A brief explanation of the objectives and design of the study was given to the students as was a participant consent form. The DEBQ was then distributed personally to the students at the end of each respective lecture or seminar where a 20 minute time slot was allocated for its completion. The students completed the DEBQ and then handed it back when fully completed.

4.3.4 Results

The principal components analysis (PCA) for the current study replicated the procedure used by Hofer (2000), a procedure that 'forced' four factors using a principal components procedure and varimax rotation with loadings above 0.40 (Hofer 2000 solution items were all above 0.40, except for one item that loaded 0.32). The Hofer (2000) solution resulted in 18 items explaining 53% of the variance for science and 46% of the variance for psychology.

PCA like exploratory factor analysis (EFA) is a variable reduction technique with many similarities to EFA. They both have the purpose of reducing a set of variables to a smaller set (principal components) that account for the majority of variance captured in the original set of variables. Although PCA is conceptually different to EFA, the terms are often used interchangeably; and PCA is included within the factor procedure within SPSS.

For the current study a number of iterations were required to arrive at an acceptable solution. This was due to items cross-loading on more than one factor, not having a sufficient loading, or not loading at all on any of the factors. This process resulted in 12 items contained within four factors which explained 59% of the variance. Factor 1 *certain knowledge* contains 5 items (0.561 or above). Factor 2 *subjective knowledge* 3 items (0.717 or above). Factor 3 *experience of knowing* 2 items (0.820 or above). Factor 4 *evolving knowledge* also contains 2 items (0.859 or above) (see Table 4.2). The Kaiser-Meyer-Olkin test of sampling adequacy (KMO) measure was .716, and Bartlett's test of sphericity $p < .0005$, indicated a satisfactory solution.

Examples of the 12 items include: "Truth is unchanging in this subject" (*certain knowledge*); "There is really no way to determine whether someone has the right answer in this subject" (*subjective knowledge*); "Answers to questions in this subject change as experts gather more information" (*evolving knowledge*)*;* and "First-hand experience is the best way of knowing something in this subject" (*experience of knowing*).

Table 4.2 - Rotated factor analysis matrix

	Factor 1 – Certain knowledge	**Factor 2 – Subjective knowledge**	**Factor 3 – Experience of knowing**	**Factor 4 – Evolving knowledge**
Item 1	.696			
Item 14	.695			
Item 5	.688			
Item 24	.566			
Item 9	.561			
Item 6		.748		
Item 12		.730		
Item 21		.717		
Item 25			.848	
Item 27			.820	
Item 11				.868
Item 23				.859

These four factors and a high score by respondents on the items within these reflect a belief about:

Factor 1 - *Certain Knowledge*: there is a right or wrong answer, that one acquires knowledge from authority, regardless of whether that is a teacher or a text book for example.

Factor 2 - *Subjective Knowledge*: there is no such thing as a right or wrong answer, and knowledge is more a matter of opinion than 'fact'.

Factor 3 - *Experience of Knowing*: individuals use their own experiences or those of others to justify their knowledge claims.

Factor 4 - *Evolving Knowledge*: knowledge is constantly changing and is therefore tentative.

The inconsistency for the factor analytic findings in relation to those of Hofer (2000) may be largely attributable to the use of PCA procedures. PCA like exploratory factor analysis (EFA) is a method that allows for the reduction of a large body of data; however, it does not allow for the falsification of a particular model. There are no objective statistical criteria to determine the solution with the optimal number of factors. In addition, due to the minor word changes to the original DEBQ (Hofer, 2000) there was the need to compare the models to establish the best fit for the data collected for the current study.

Confirmatory factor analysis (CFA) is a theoretical plausible model deemed to describe the underlying structure of a particular measure (see Bollen 1989). To date, as far as the author is aware only EFA has been conducted on data collected using the DEBQ in different cultural contexts. These have met with mixed results that fail to clarify the four-factor solution suggested by Hofer (2000) with any level of confidence (e.g. Cazon, 2013; Choi & Kwon, 2012).

4.4 Confirmatory Factor Analysis (CFA)

To further develop, test and corroborate the findings from the initial PCA and to clarify the mixed results in other studies, Confirmatory Factor Analysis (CFA) was undertaken to compare the current study with the previous Hofer (2000) investigation.

4.4.1 Results

The two specified alternative four-factor models (i.e. Hofer 2000 and the current study) were compared using standard CFA techniques. Table 4.3 reports the fit indices and comparative fit indices of the two models.

Table 4.3 - Comparison of goodness-of-fit indices for Hofer (2000) and current study model of personal epistemology using the DEBQ.

	X	DF	TLI	CFI	RMSEA	CMIN/DF	AIC
Current	146.537	55	.868	.907	.058	2.664	216.537
Hofer (2000)	594.385	129	.718	.787	.085	4.608	714.385

**X- Chi-square goodness of fit; DF – degrees of freedom; TLI – Tucker Lewis Index; CFI – Comparative Fit Index; RMSEA - Root Mean Square Error of Approximation; AIC – Akaike Information Criterion.*

As can be observed, all fit indices (i.e. absolute and relative) for the current model showed improvements when compared with Hofer's (2000) four-factor solution within this participant sample. Moreover, the fit indices for the Hofer (2000) four-factor solution did not achieve the recommended thresholds, and in most cases equated to levels that goodness of fit indices that would result in rejection of the model. The only exception being the X^2-to-df ratio that was just within the acceptable parameter of between 1.0 to 5.0 with a score of 4.608.

4.4.2 Discussion – factor analysis

The current study has developed and validated a psychometrically sound abbreviated version of the DEBQ that will be refined in the future for further research endeavours. The four-factor model produced the lowest x^2 result, and its X^2-to-df ratio was less than 3:1 (i.e. 2.2664, $p < .000$), suggesting an acceptable model according to Kline's (1994) indications. The RMSEA result also suggests an adequate fit as does the CFI result; however, the TLI value is below the recommended level for adequate model fit. On the basis of the X^2-to-df ratio, RMSEA, CFI and AIC results however, the four-factor model could be said to represent an adequate representation of the underlying structure of the DEBQ. The results did suggest that the author proposed four-factor model was the best approximation of the population covariance matrix when compared with that of Hofer (2000). The majority of the indicators exceeded Hair et al.'s (1998) strict cut off criteria of 0.60, and those few indicators that did not still exhibited statistically significant factor loading above 0.50.

In conclusion, the CFA has provided the most comprehensive and methodologically rigorous investigation of the psychometric properties the DEBQ. An original and previously un-suggested four-factor solution that is consistent with contemporary personal epistemology theory was demonstrated to provide satisfactory fit of the obtained data. The abbreviated version of the DEBQ, which can be used for both students and their teachers, provides a practical, theoretically consistent, and psychometrically validated measure of personal epistemology.

4.5 Differences by module of study

Having established an abbreviated version of the DEBQ, the four 'new' dimensions of personal epistemology were used to test the domain-general, domain-specific hypothesis.

4.5.1 Results

Preliminary analyses

Before conducting the main analysis, checks for normality within the data were calculated. Preliminary assumption checking revealed there were multivariate outliers, as assessed by Mahalanobis distance (p > .001); and there was a violation of the homogeneity of variance-covariances indices, as assessed by Levene's Test of Equality of Variances. There was no multicollinearity as assessed by Pearson correlations (Table 4.4).

Table 4.4 – Pearson test of multicollinearity

	Certain Knowledge	Evolving Knowledge	Subjective Knowledge	Experience of Knowing
Certain Knowledge	1	.128**	-.100*	-.106*
Evolving Knowledge	.128**	1	-.202**	-.169**
Subjective Knowledge	-.100*	-.202**	1	.173**
Experience of Knowing	-.106*	-.169**	.173**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Six multivariate outliers were removed that exceeded the critical value of 18.47 for 4 dependent variables. A one-way MANOVA was then run as it is fairly robust to deviations from normality, with the proviso that Pillai's Trace be used rather than other multivariate criteria test used for MANOVA (i.e. Lawley-Hotellings Trace, Roy's Largest Root, or Wilks' Lambada). Pillai's Trace is considered to be a powerful and robust statistic, and is sensitive to deviations from normality. In addition, Games-Howell post-hoc tests were used as a consequence of unequal variances and group sizes.

Multivariate analysis of variance (MANOVA)

A one-way multivariate analysis of variance (MANOVA) was used to determine the effect of module of study on each of the four dimensions of personal epistemology: *certain knowledge, subjective knowledge, evolving knowledge, and experience of knowing*. The sample was drawn from the same 11 modules and participants who completed the DEBQ for the factor analysis discussed in previous pages of this chapter.

There was a statistically significant difference among the groups (modules of study) for the combined dependent variables and a large effect size according to Cohen's (1988) criteria, $F(40, 1932) = 19.234$, $p < .0005$; Pillai's Trace = 1.139; partial $\eta^2 = .285$

There was also a statistically significantly differences among the groups (modules of study) on each of the dependent variables (the four dimensions of personal epistemology) when considered separately. A large effect size was evident for three of the four dimensions of personal epistemology (*Certain knowledge, Subjective knowledge and Evolving knowledge*), and an intermediate effect size for *Experience of knowing*:

Certainty of knowledge $F(10, 483) = 26.799$, $p < .0005$; partial $\eta^2 = .357$

Subjective knowledge $F(10, 483) = 13.862$, $p < .0005$; partial $\eta^2 = .223$

Evolving knowledge $F(10, 483) = 57.372$, $p < .0005$; partial $\eta^2 = .543$

Experience of knowing $F(10, 483) = 7.262$, $p < .0005$; partial $\eta^2 = .131$

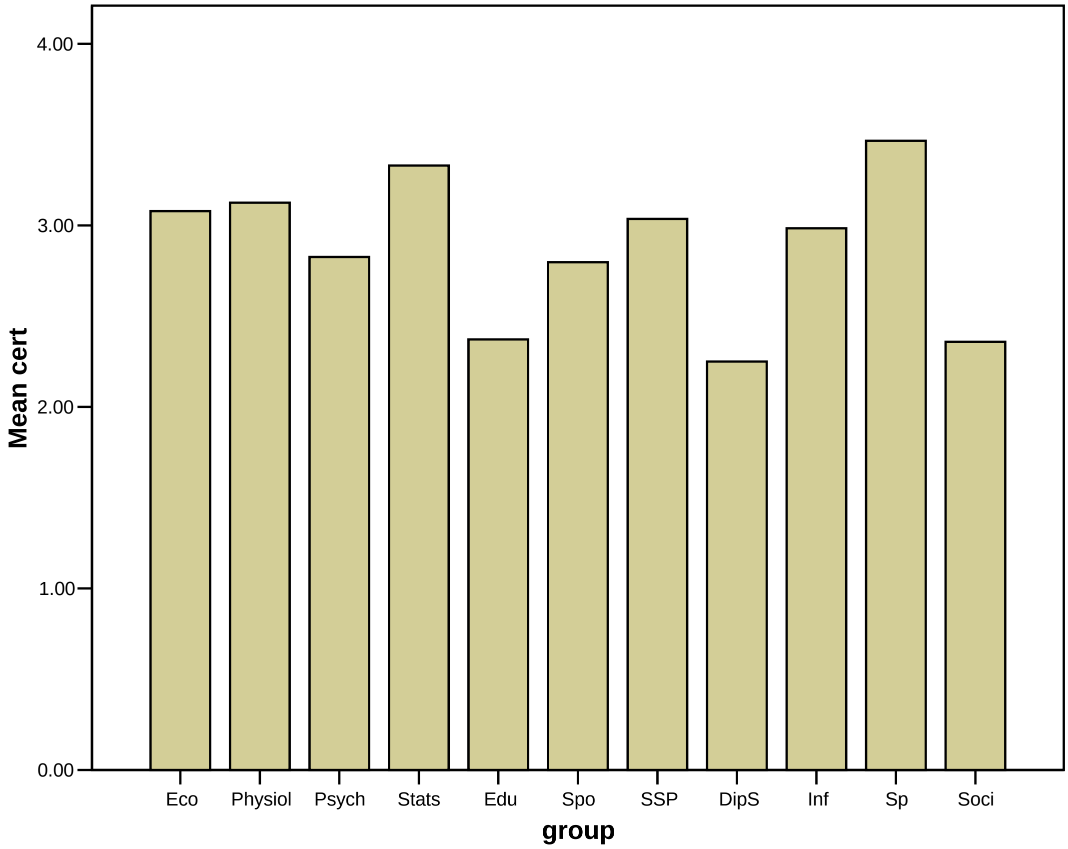
These effect sizes emphasise the contextual nature of personal epistemology and suggest support for the domain-specificity of the different dimensions and initial support for the concept of SHAPE.

Games- Howell post-hoc tests

To identify where the differences lay between the groups of students drawn from these modules, Games-Howell post-hoc tests were conducted for each of the four dimensions of personal epistemology.

4.5.2 Certain knowledge

Fig. 2 - Group means for certain knowledge.



*The abbreviations used for group and the corresponding modules for Figures 1-4 are as follows: Economics (Eco); SHES - Physiology (Physiol); Psychology – Memory and Perception (Psych); Education (Edu); SHES – Sporting Identity (Spo); SHES – Sports and Exercise Physiology (SSP); Diploma in Social Work (Dips); Informatics (Inf); SHES – Biomechanics (Sp); and Sociology (Soci).

Certain knowledge

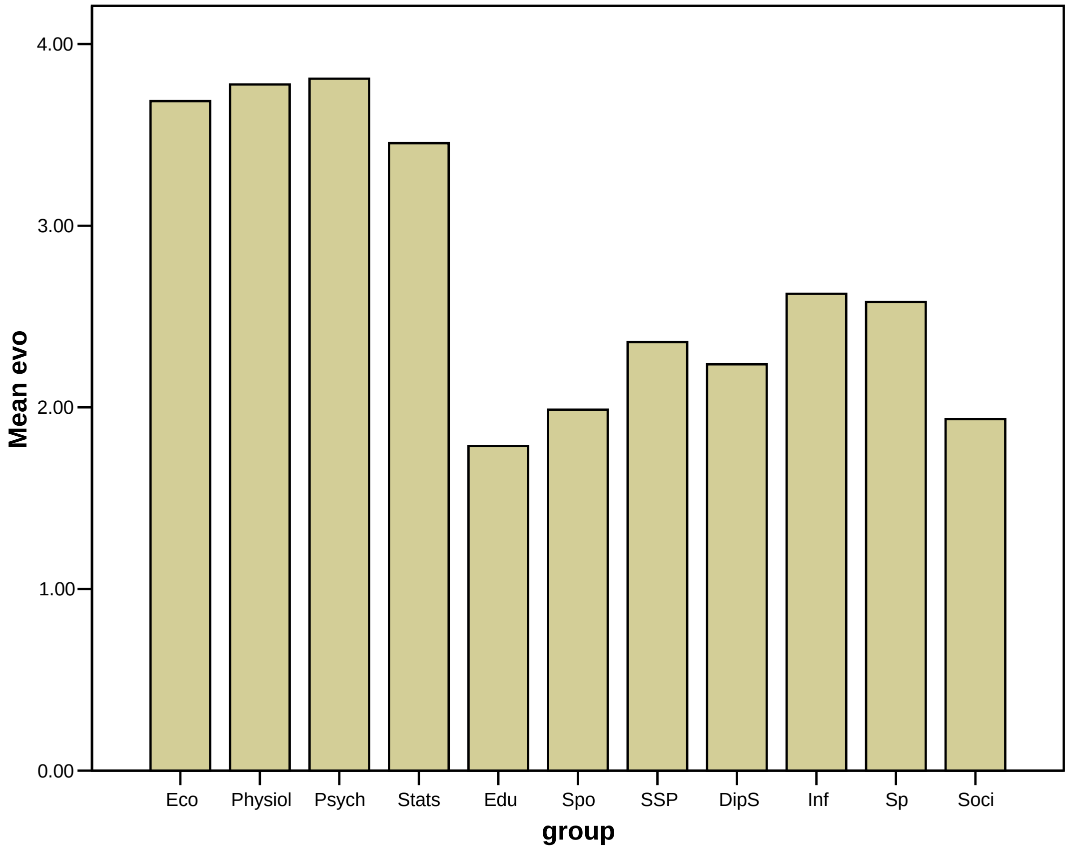
Diploma in Social Work students scored lowest of all the student groups and significantly lower than students from Informatics (mean difference = -.7344, std error = .12804, p = < .000) and Sports and Exercise Physiology (mean difference = -.7853, std error = .13895, p = < .000), Biomechanics (mean difference = - 1.2518, std. error = 12182, p = < .000), Psychology (research methods and statistics) (mean difference = - 1.0795, std. error = 15956, p = < .000), Psychology (memory and perception) (mean difference = - .5758, std. error =

.11774, p = < .002), Physiology (mean difference = - .87501, std. error = 13989, p = < .000), Economics (mean difference = - .8377, std. error = .11575, p = < 000), and Sporting Identity (mean difference = - .5469, std. error = .12329, p = < 005).

Biomechanics students scored highest of all the student cohorts and significantly higher than all students from Sociology (mean difference = 1.1431, std. error = .11806, p = < .000), Diploma in Social Work (mean difference = 1.2518, std. error = 12182, p = < .000), Education (mean difference = 1.0181, std. error = .08599, p = < .000), Psychology (memory and perception) (mean difference = .6760, std. error = .07655, p = < .000), Economics (mean difference = .4142, std. error = .07345, p = < .000), Physiology (mean difference = .3768, std. error = .10754, p = < .000), Sporting Identity (mean difference = .7050, std. error = .08485, p = < .000), Sports and Exercise Physiology (mean difference = .4666, std. error = .10632, p = < .002), and Informatics (mean difference = .5175, std. error = .09160, p = < .000).

4.5.3 Evolving knowledge

Fig. 3 - Group means for evolving knowledge.



*The abbreviations used for group and the corresponding modules for Figures 1-4 are as follows: Economics (Eco); SHES - Physiology (Physiol); Psychology – Memory and Perception (Psych); Education (Edu); SHES – Sporting Identity (Spo); SHES – Sports and Exercise Physiology (SSP); Diploma in Social Work (Dips); Informatics (Inf); SHES – Biomechanics (Sp); and Sociology (Soci).

Evolving knowledge

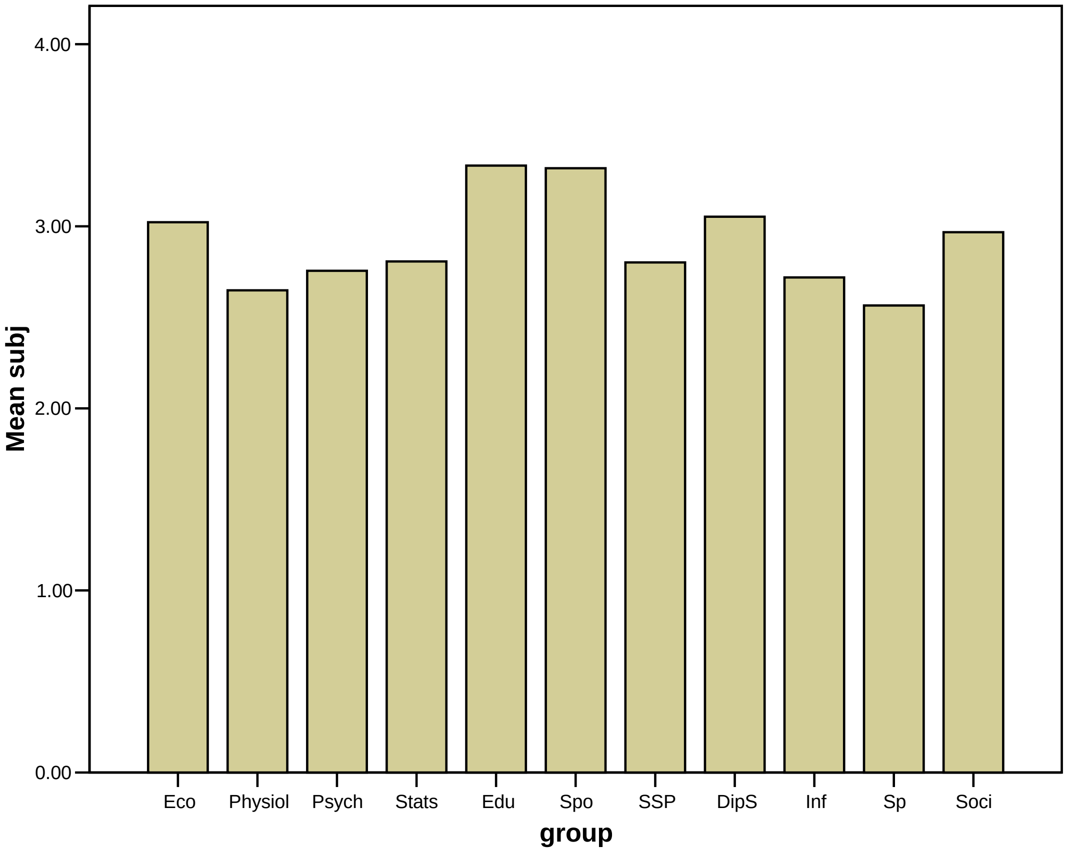
Psychology (memory and perception) students scored higher than all other student groups and significantly higher than most including students from Education (mean difference = 1.8990, std error = .1888, p = < .000), Sporting Identity (mean difference = 1.8215, std error = .11620, p = < .000), Biomechanics (mean difference = 1.2649, std error = .11107, p = < .000), Diploma in Social Work (mean difference = 1.5722, std error = .23194, p = < .000), Informatics (mean difference = 1.1840, std error = .14027, p = < .000), Sports and Exercise

Physiology (mean difference = 1.4500, std error = .13473, p = < .000) and Sociology (mean difference = 1.8742, std error = .16447, p = < .000).

Education students scored lowest of all the student groups and significantly lower than students from Informatics (mean difference = -.7150, std error = -.15422, p = < .001), Biomechanics (mean difference = -.6341, std error = .12824, p = < .000), Economics (mean difference = - 1.7978, std error = .12508, p = < .000), Physiology (mean difference = - 1.8678, std error = .13644, p = < .000), Psychology (memory and perception) (mean difference = - 1.8990, std. error = .11888, p = < .000), and Psychology (research methods and statistics) (mean difference = - 1.5445, std. error = .21905, p = < .000).

4.5.4 Subjective knowledge

Fig. 4 - Group means for subjective knowledge.



*The abbreviations used for group and the corresponding modules for Figures 1-4 are as follows: Economics (Eco); SHES - Physiology (Physiol); Psychology – Memory and Perception (Psych); Education (Edu); SHES – Sporting Identity (Spo); SHES – Sports and Exercise Physiology (SSP); Diploma in Social Work (Dips); Informatics (Inf); SHES – Biomechanics (Sp); and Sociology (Soci).

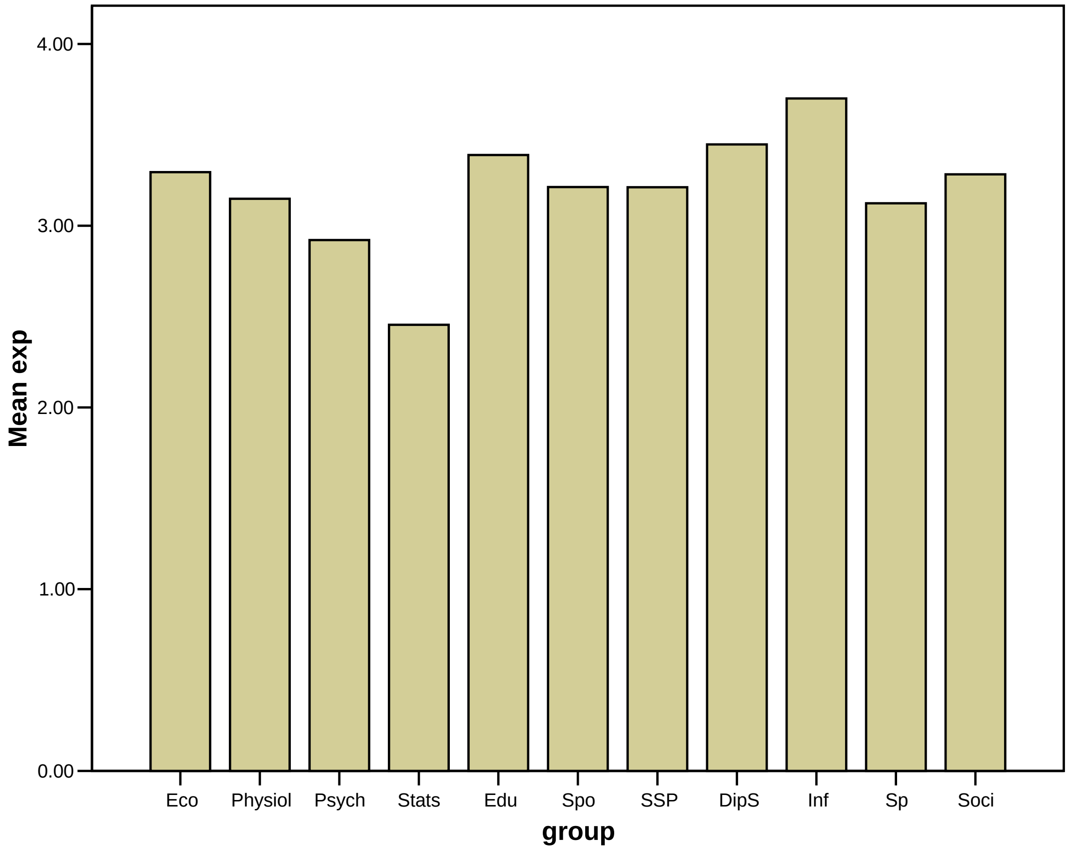
Subjective knowledge

Education students scored higher than all other student groups and significantly higher than students from Informatics (mean difference =.8462, std error = .10551, p = < .000) and Sports and Exercise Physiology (mean difference =.7637, std error = .11406, p = < .000), Psychology (memory and perception) (mean difference =.8094, std error = .09548, p = < .000), Physiology (mean difference =.9169, std error = .11818, p = < .000), Sociology (mean difference =.5976, std error = .17233, p = < .048), Economics (mean difference =.5228, std error = .09988, p = < .000), Psychology (research methods and statistics) (mean difference =.7582, std error = .14506, p = < .000), and Biomechanics (mean difference =.9768, std error = .10298, p = < .000).

Biomechanics students scored the lowest of all student groups and significantly lower than students from Economics (mean difference = -.4540, std. error = .09355, p = < .000), Education (mean difference = - .9768, std. error = .10293, p = < .000), and Sporting Identity (mean difference = -.7305, std error = .10759, p = < .000).

4.5.5 Experience of knowing

Fig. 5 - Group means for experience of knowing.



*The abbreviations used for group and the corresponding modules for Figures 1-4 are as follows: Economics (Eco); SHES - Physiology (Physiol); Psychology – Memory and Perception (Psych); Education (Edu); SHES – Sporting Identity (Spo); SHES – Sports and Exercise Physiology (SSP); Diploma in Social Work (Dips); Informatics (Inf); SHES – Biomechanics (Sp); and Sociology (Soci).

Experience of knowing

Psychology (stats) students scored lowest of all the student groups and significantly lower than Education (mean difference = -1.2055, std error = .17596, p = < .000), Informatics (mean difference =-1.2455, std error = .17961, p = < .000), Economics (mean difference = -.8831, std error = .16790, p = < .000), Sports and Exercise Physiology (mean difference = -.7570, std error = .17259, p = < .004), Diploma in Social Work (mean difference = -.9928, std error = .22260, p = < .003), and Sociology (mean difference = -.8281, std error = .20741, p = < .010).

Informatics students scored the highest of all the student groups and significantly higher than students from Psychology (memory and perception) (mean difference = .7787, std. error = .13433, p = < .000), Psychology (research methods and statistics) (mean difference = 1.2455, std. error = .17961, p = < .000), Sports and Exercise Physiology (mean difference =.4885, std error = .14532, p = < .044), and Biomechanics (mean difference =.5456, std error = .15458, p = < .025).

4.6 Discussion

The analysis from the current study suggests it may be possible to measure personal epistemology with fewer items (12), and which explain a greater amount of the variance: 59% compared to 53% and 46% respectively in the Hofer (2000) study, which arrived at an 18-item solution. As with Hofer (2000) differences were apparent when looking at different disciplinary areas. It should however be noted, that the Hofer study was a within-subject design whereas the current study utilised a between-subject design.

The findings of the investigation contained within this chapter extend the disciplinary differences debate further and reiterate what Hofer (2000) argued:

> "…there is an underlying set of epistemological beliefs , but that students, at least by the 1st year of college, discriminate as to how these beliefs differ by discipline" (p.400).

Furthermore, she noted:

> "The findings of this study are probably consistent with broader conceptualizations of the disciplines as having underlying epistemological distinctions (Becher, 1989; Donald, 1986, 1990, 1995; Schwab, 1964, 1978) and suggest that 1st year college students are capable of making these distinctions" (Hofer, 2000, p.400).

The results discussed in the previous pages of this chapter 'tie in' with Donald (2002) who discussed in her text how professors from nine different disciplines, wanted their students to think, how students actually thought, and the approaches to teaching likely to promote student learning. Donald pointed to professors' and students' perceptions of the thinking required in different disciplines (they differed); how thinking develops in various disciplines; and the processes that help or hinder that development. Donald highlighted how:

> "The different validation processes used in the disciplines show a trend in where authority resides – from objective empirical to peers. In more structured disciplines (i.e. physics, engineering, chemistry, and biology), evidence is matched to theory. Psychology occupies a middle position, where empirical testing and interpreter reliability are both used as proof. Further into the human sciences, proof rests in evidence that will convince an authority in law, or test results in Education, or in internal consistency rendering work plausible in English Literature" (Donald, 2002, p.282).

This view about disciplinary differences however, is neither unique nor original. Biglan (1973) developed a taxonomy which categorised academic disciplines into either "hard" or "soft", "pure" or "applied", "non-life" or "life". Biglan (1973a) stated:

> "Increasing emphasis is being given to the way in which both the content and methods are linked to the cognitive and perceptual processes of its members" (p.202).

More recently, Becher and Trowler (2001) authored a book entitled "Academic Tribes and Territories" which described in great detail numerous differences between different faculties and departments within higher Education in the United Kingdom.

Furthermore, Biglan (1973a) argued:

> "The most prominent dimension (in terms of the variance it accounts for) distinguishes hard sciences, engineering, and agriculture from social sciences, education and humanities. A good shorthand label for the dimension is "hard-soft". The dimension appears to provide one kind of empirical support for Kuhn's (1962) analysis of the paradigm. By "paradigm" Kuhn refers to a body of theory which is subscribed to by all members of the field. The paradigm serves an important organising function; it provides a consistent account of most of the phenomenon of interest in the area and, at the same time, serves to define those problems which require further research. Thus, fields that have a single paradigm will be characterised by greater consensus about content and methods than with fields lacking a paradigm" (p.202).

The findings from the current study are similar to those of Paulson and Wells (1998) who also used a between-subject design, and found "hard" students scored higher than "soft" students for certain knowledge; and Jehng et al. (1993), who also used a between-subject design, and found "soft" students scored lower than "hard" students for certain knowledge. Conversely, in the current study, "soft" students scored higher for subjective knowledge than their "hard' counterparts.

Bauersfield (1988) discussed how teacher and student practices and social norms are constructed in the micro culture of classroom interactions. Furthermore, discussing the work of Barbara Hofer, Muis et al. (2006) argued that:

> "…it appears that dominant epistemologies of each educational domain influence instructional practices, which in turn influence students' domain-specific epistemic beliefs. This finding corroborates our embedded, multi-layered contextual framework in that larger sociocultural contexts influence smaller academic contexts, which influence instructional contexts" (p.41).

There is evidence that academics in what are regarded as 'hard' areas of study require more 'convergent' memorisation and application of course material (Neumann, 2001, p.138) whilst 'soft' disciplines are more likely to pursue analysis and synthesis of the course context and accept more 'divergent' thinking (Braxton, 1995; Smart & Ethington, 1995). This is also reflected in underlying assumptions and practices in assessment. In a large-scale study conducted by Warren Piper et al. (1996), it was found that hard pure and hard applied disciplines gave greater credence to examinations than soft pure disciplines, which had a preference for continuous assessment in the form of essays, short answer papers and project reports.

Variation in student's epistemological beliefs has been found to be closely linked to their major area of study (Jehng et al., 1993; Lonka & Lindblom-Ylanne, 1996; Paulsen & Wells, 1998). The study conducted by Jehng et al (1993) involved 386 college students drawn from different disciplines. The findings suggested that students in 'soft' fields believed less in the certainty of knowledge and relied more on their own reasoning abilities, viewing learning as not being an orderly process. A view corroborated by Paulsen and Wells (1998) and Lonka et al. (1996).

Roth (2001) stated the way in which students adapt to particular conditions is by:

> "…developing structured dispositions which Bourdieu (1997) calls 'habitus'. Habitus are systems of structured dispositions that generate patterned (i.e. structured) perceptions and with it the field of possible (material, discourse, etc.) patterned actions, that is, the practice characteristics of a field. However, it is the field which simultaneously structures the habitus. Because the structuring during encultration goes unnoticed, acquiring habitus is associated with acquiring blind spots, ideologies and prejudices of the field" (p.6).

Furthermore, Dḗsautels & Roth (1999) pointed out that:

> "…education does not include a reflexive component which allows students critically evaluate the knowledge claims of a particular field, they will always be subject to some form of indoctrination"

Thus,

> "Encultration is coextensive with the formulation of a specific habitus, a set of dispositions that structure perceptions and actions toward the world, but are themselves structured by their experience of the world…students come face to face with particular ways of structuring the world" (Roth, 2001, p.20); and "Encultration into the authentic practices of a field operates not just on the mind, but on a social and material body by means of which we are grounded in the world (Bourdieu, 1992, 1997)" (Roth, 2001, p.21) (see also Marton & Fazey, 2002).

This process is continuous throughout the lifespan, but recognition of this level of analysis is often lacking in the reductionist paradigms by which many of our own personal epistemologies have been shaped.

Prior to this, Stodolsky (1988) and Stodolsky and Glaessner (1991) suggested that students' knowledge is indicative of the instruction they receive. However, Buehl and Alexander (2001) argued that little is known about the influence classroom instruction exerts on students' beliefs (p.416). A view underscored by Schraw (2001), who stated:

> "…from an applied perspective, previous research has done little to link the empirical and philosophical research on epistemological beliefs to Educational practice" (p.452).

Buehl and Alexander (2001) proposed a 'multi-layered' model of epistemological beliefs that included domain-specific epistemological beliefs, academic epistemological beliefs, and general epistemological beliefs. They argued that:

> "There is evidence that individuals' domain-specific beliefs vary as a function of the domain structure. For example, students tend to view knowledge in more well-structured domains (e.g. mathematics) as better defined and integrated than knowledge in more ill-structured domains (e.g. Social Work studies, Stodolsky & Glaessner, 1991, or history, Buehl et al. 2001)" (p.414).

However, Buehl and Alexander (2001) concede there is a potential point of contention here as it might be argued that whatever the area of study there is an element of ill-structured content thus implying differences in beliefs may reflect pedagogical differences (Pickering, 1995). Further, Buehl and Alexander (2001) stated:

> "It is not presently possible to determine if the emerging differences are attributable to the inherent nature of domains, the way they are taught, or some combination thereof" (p.414).

It can be argued that all domains subsume both well-structured and ill-structured problems. However, domains can be classified on how often each type occurs within a particular domain. A well-structured domain deals more with problems or tasks where there are:

> “…agreed upon solutions from algorithm procedures, as is commonplace in mathematics or physics (Frederiksen, 1984; Stewart, 1987” (Buehl & Alexander, 2001, p.401).

On the other hand, ill-structured domains encounter problems and issues that are:

> “…generally solved through more heuristic procedures (Spiro et al.; Wineburg, 1996)” (Buehl & Alexander, 2001, p.401/402).

Furthermore:

> “It would seem probable therefore, that individuals’ beliefs about knowledge would similarly vary in accordance with the degree of structuredness presumed to exist among domains” (Buehl & Alexander, p.402).

A number of studies have been conducted to investigate the issue of the domain-specificity or domain-generality of epistemological beliefs. These studies can be categorised as either ‘between-subject’ or within-subject’ research designs.

4.6.1 Between-subject studies

Jehng et al. (1993) using a modified version of Schommer’s SEQ with 386 college students majoring in ‘soft’ (e.g. Social Work sciences, arts, humanities) or ‘hard’ (e.g. business, engineering) subject areas; concluded that students who were majoring in ‘soft’ fields of study believed less in the ‘certainty of knowledge’ and relied more on their own reasoning abilities, and were less likely to perceive learning as an ‘orderly process’ than students majoring in ‘hard’ subject areas.

Later, Lonka and Lindblom-Ylänne (1996) using Perry’s (1970) dualist/relativist classification, tested medical and psychology students and found the majority of students expressed relativistic views of knowledge. However, there were more ‘dualistic’ medical students and more ‘relativistic’ psychology students.

Subsequent research conducted by Paulsen and Wells (1998) utilised an unmodified version of Schommer's SEQ with 290 students majoring in a variety of fields of study. They categorised students using Biglan's (1973) taxonomy of 'soft' versus 'hard' (e.g. Humanities versus Engineering) and 'applied' versus 'pure' (e.g. Education versus Natural Sciences). Paulsen and Wells concluded that 'hard' students perceived knowledge as more certain than 'soft' students, and 'applied' students more likely to believe in the simplicity and certainty of knowledge, and quickness of learning when compared with 'pure' students.

However, it is difficult to make comparisons between the studies as different taxonomies were used to classify students. Differences in how the studies identified and assessed students' epistemological beliefs also present problems as the studies mentioned used a general measure of epistemological beliefs rather than one specific to a particular context or domain.

4.6.2 Within-subject studies

Stodolsky and Glaessner (1991) investigated the epistemologies of schoolchildren via interviews, and concluded that there was a greater consensus in students' definitions of mathematics than in definitions of social studies. Moreover, children defined mathematics in terms of arithmetic operations (e.g. addition or subtraction) and numbers. They also believed they could learn social studies on their own by reading books, but needed someone to teach them mathematics because of the need for the 'right' techniques and to correct 'wrong' answers. The research was not without criticism, with concerns being raised that (a) the study did not address epistemological beliefs specifically, so they had to be inferred from broad questions; and (b) the differences could have been due to students' lack of clarity about social studies.

Concerns about broad questions to 'tap into' someone's personal epistemology may be unfounded. It may be necessary to ask questions that some may deem as more general in nature but which are essential in exploring and highlighting individual beliefs about knowledge and knowing (see Baxter Magolda, 1992 and Chapters Three and Eight for a discussion of this).

Schommer and Walker (1995) investigated student beliefs about mathematics and social science and concluded that epistemological beliefs are predominantly domain-independent. There were however problems with this study as (a) the domains of study were not parallel (e.g. maths & social science) as social science can subsume a number of different subject areas such as economics, history, geography and (b) the SEQ is a general measure of epistemological beliefs and therefore does not focus on academic knowledge beliefs per se.

4.7 Conclusion

The theorized dimensions of Hofer (2000) were not evident in the current sample. Moreover, a confirmatory factor analysis suggested the model proposed by the author was a better fit than that of Hofer (2000) for this particular dataset. The results from the current study suggest a 12-item abbreviated version of the DEBQ that explains 59% variance, which compares favourably with the 18-item Hofer (2000) model that explained 53% and 46% variance when students were asked about the disciplines of science and psychology.

The 12-item abbreviated model was used to test for differences between 11 modules drawn from a variety of disciplines. The findings suggest differences both within and between disciplinary fields of study. This appears to corroborate the contextual theories of personal epistemology (e.g. Hammer & Elby, 2002; Hofer and Pintrich, 1997); and extends previous work linking variation in student personal epistemologies to the major area of study (e.g. Buehl & Alexander, 2001; Jehng et al., 1993; Lonka & Lindblom-Ylänne, 1996; Paulson & Wells, 1998).

The findings and discussion in this chapter form the basis for a more in-depth study of personal epistemology in different academic contexts. The idea is that in teaching and learning contexts a *socialised habitus of academic personal epistemologies* (SHAPE) is formed whereby students have a number of epistemological resources (Hammer & Elby, 2002), or epistemological theories (Hofer & Pintrich, 1997), that are utilised and evolve in response to the particular demands of differing academic contexts. That is, personal epistemologies are not trait-like but are more flexible and malleable, and this ‘plasticity’ permits them to be moulded then accessed as and when required.

A prime example of this process is captured in the work of Vygotsky (1978) and Dewey (1916) who argued that knowledge is socially constructed. Vygotsky noted the role of speech in thinking and Dewey emphasising the important role of community in learning. Furthermore, Habermas (1987) highlighted the importance of language in his text “Theory of Communicative Action” whereby social knowledge is governed by binding consensual norms which define the reciprocal expectations about behaviour between individuals. Moreover, Linton and colleagues (1994) highlighted how:

> “Disciplinary styles are not just frames or shells into which content can be cast, but habits of thought and communication grounded in the objectives, values and “world view” of each discipline” (p.6).

The results from this chapter appear to corroborate previous research into disciplinary differences (e.g. Biglan, 1973; Donald, 1995, 2002; Becher & Trowler, 2001). That is, differences are apparent when comparing the disciplines with regard to teaching, learning and assessment, and how knowledge is viewed and validated between disciplinary fields of study. Differences in the context of this chapter being the personal epistemologies of groups of students

However, the results also suggest disciplinary differences may be too broad a ‘brush stroke’ to capture the nuances and idiosyncrasies within disciplinary fields of scholarship. The results from this chapter raise the question: If indeed differences are disciplinary, why did two Psychology modules and four modules from Sports Health and Exercise Science (SHES) differ significantly on dimensions of personal epistemology as they are from the same ‘discipline’? Perhaps the answer lies in the contextual nature of different areas of study within a disciplinary field, be this the subject matter, students, their teacher or a combination thereof.

It is plausible to argue that, based on the results discussed on previous pages, the differences occur at a different level than the disciplines themselves. It may well be there are intra-disciplinary as well as inter-disciplinary differences. This leads to another pertinent question: Do personal epistemologies within a particular context change as a result of extended and varied experience in the discipline or subject?

The subsequent chapters in this thesis describe and discuss a series of in-depth studies into these disciplinary fields of Psychology and SHES in order to identify potential reasons for such differences. This takes the analysis to a deeper level than has been discussed in previous research studies into personal epistemology, and thus takes a more rigorous approach to personal epistemology in context than has been previously achieved. For example, Buehl and Alexander (2001) highlighted how at the time it had not been possible to determine which aspects of particular domains were more influential than other with regard to the different elements of personal epistemology. The findings from the analyses conducted and discussed in the pages of this chapter suggest a tentative and partial answer to question 3 of the 4 key questions posed that form the basis for this thesis:

- What academic epistemologies do teachers have and does this influence the academic epistemologies of their students?

Chapter Five discusses the exploration of these ideas further by measuring the personal epistemologies of students at the beginning and end of a semester of study. Groups of students drawn from different modules of study within a Sports, Health and Exercise Science (SHES) undergraduate programme were the focus of this study. Using a pre-post measure it was possible to see if there is a ‘shift’ in emphasis on particular dimensions, and whether this is more prevalent in some modules than others. Teachers’ epistemologies were also measured at the beginning of each respective module to indicate whether their personal epistemologies potentially influence the personal epistemologies of their students. In addition, Chapter Five also discusses a comparison of four modules drawn from a Sports Health and Exercise Science (SHES) undergraduate degree using analysis of variance (ANOVA) techniques.

Chapter 5 –Teacher and Students Personal Epistemologies in a Sports Health and Exercise Science Degree

5.1 Introduction

The purpose of the research contained within the following pages of this chapter was to investigate, and indeed inform the domain-specific domain-independent debate about personal epistemology. Data drawn from four level two modules, within a Sports, Health and Exercise Science (SHES) undergraduate degree, are analysed for the four dimensions of personal epistemology measured by the Discipline-focused Epistemological Beliefs Questionnaire (DEBQ – Hofer, 2000). These modules formed part of the analyses in Chapter Four, which revealed not only differences in the group mean score between different modules of study drawn from different disciplinary fields, but also differences in the group mean score within four SHES modules, and two psychology modules for dimensions of personal epistemology. To investigate these differences, further data collection (post measure) and analyses for the same SHES modules and students was undertaken.

The aim of this chapter is to investigate the influence teachers have on their students in specific teaching and learning environments within a higher education context. More specifically, how teachers influence the personal epistemologies of their students whether this is consciously or inadvertently. This addresses the four key questions put forward in the introduction to this thesis.

The objectives are to measure the personal epistemologies of groups of students and their teacher to investigate 'epistemological congruence' (Fruge & Ropers-Huilman, 2008); a term used to describe a phenomenon whereby the personal epistemologies of students converged with those of their teacher. This analysis will therefore contribute to the overarching theme of whether the concept of SHAPE is evident. That is, if there are differences or commonalities in the personal epistemologies of teachers and their students in four modules drawn from the second year of a Sports Health and Exercise Science (SHES) undergraduate programme. The inference is that it is the teachers' personal epistemologies and their associated practice that places a greater amount of influence on students than the subject matter itself and other elements in the teaching and learning context.

If this is indeed the case, there is the argument that such an influence will encourage students to think about, and engage with knowledge in particular ways. Moreover, research has demonstrated personal epistemologies have been shown to influence a number of different aspects of student learning (e.g. Andre & Windshitl, 2003; Brownlee et al., 2002; Buehl & Alexander, 2001; Hofer, 2001; Hofer & Pintrich, 2002; Schraw, 2001; Tolhurst & Debus, 2002;). For example, personal epistemologies have been used to predict different elements of academic performance including: comprehension, cognition in different academic domains, motivation, approaches to learning, and self-regulated learning (e.g. Bräten & Stromso, 2004, 2005; Paulsen & Feldman, 2005, 2007; Schommer-Aikins & Easter, 2006; Schraw & Sinatra, 2004).

Consequently, this can result in very different student learning outcomes regardless of whether this is reflected in the grade obtained by the student within that context of study. One might suggest, if there is congruence between the personal epistemology of the teacher and learner, the student has an increased opportunity to be 'successful' in that particular teaching and learning context. For example, Greene (2009) found that teachers who were asked to give grades to hypothetical students, awarded higher grades to those students they deemed to have more sophisticated personal epistemologies.

Indeed, Hofer (2001) suggested teachers can have a profound effect on the learning outcome of their students. The following pages describe an investigation into whether teachers' personal epistemologies influence the personal epistemologies of their students. This is an important issue, as the suggestion and theme throughout this thesis is that personal epistemologies influence individual conceptions of the teaching and learning environment, and this in turn influences how teachers and learners respond to differing contexts in the way they approach teaching and learning therein.

Quantitative data were collected at two points to see if a ‘shift’ occurred within student beliefs over a semester of study. Additional quantitative data were collected from the teachers of these students. Initially the student data were analysed to see if any differences were apparent between personal epistemologies for groups of students drawn from four second year modules within a Sports, Health and Exercise Science (SHES) undergraduate programme of study. Further analyses investigated if shifts occurred in the personal epistemologies of the student group in three SHES modules over the duration of a semester of study. It was envisaged that this would provide data that tests the concept of epistemological congruence as part of the overarching of SHAPE.

5.2 Methods

The participants were drawn from four second year SHES undergraduate modules – Sporting Identity, Sports and Exercise Physiology, Biomechanics, and Physiology. Initially a total of 175 students and four teachers completed a modified version of the Discipline-focused Epistemological Beliefs Questionnaire (DEBQ) (Hofer, 2000) in week two of the semester of study. This modified version of the DEBQ measures four dimensions (i.e. certain knowledge, subjective knowledge, evolving knowledge, experience of knowing) of personal epistemology. These dimensions are measured on a 12 item Likert-type scale (where 1 = strongly agree and 5 = strongly disagree). A more detailed account of the scale can be found in Chapter Four. The DEBQ was completed a second time by 95 of the 175 students at the end of the semester to give a repeated measure pre-post analysis for 3 SHES modules. This enabled any shifts in the personal epistemologies of students within the 12-week period to be identified. The four teachers from the SHES modules also completed the Approaches to Teaching Inventory (ATI) (Trigwell & Prosser, 2004) in addition to the DEBQ.

5.3 Results

Preliminary analyses

Before conducting the main analysis, checks for normality within the data were calculated. Preliminary assumption checking revealed that data were not normally distributed for some segments of the data, as assessed by Shaprio-Wilk test ($p > .05$) (Appendix 5.1); there were outliers for segments of the data, as assessed by inspection of Boxplots (Appendix 5.2); and there was violation of homogeneity of variance for segments of the data, as assessed by Levene's Test of Equality of Variances (Appendix 5.3). Details of these anomalies and how they were addressed is discussed in the following pages.

As stated, the Shapiro-Wilk test revealed violations of normality in the data. When this occurs there are 4 options available:

- Transform the data
- Use a non-parametric alternative (i.e. Kruskal-Wallis)
- Run the analyses anyway
- Test comparisons

Transform the data

One option is to transform the data so that, hopefully, it is normally distributed. It is then possible to run the one-way ANOVA on the transformed data. However, this is a somewhat complex process that relies on data satisfying a number of criteria. For example, transformations will generally only work when the distribution of scores in all groups are the same shape (e.g., if all distributions are skewed to the left). Even then, some distributions that need transforming do not have an available transformation to 'turn' them to normality. This is particularly the case when the distributions have different shapes, such as opposite skews, where there is not likely to be an available transformation. Another potential problem with this method is that it is generally much harder to interpret the transformed data, which no longer represents the original values.

Use a non-parametric test

A further option is to run a non-parametric test such as the Kruskal-Wallis H test. Although this can be a popular alternative as it is viewed by many as the non-parametric equivalent of the one-way ANOVA. This however, depends on the distribution of data in the test samples. Consequently, the Kruskal-Wallis H test can be used in two ways, which depends if the distributions of the data have the same or a different shape. If distributions have a different shape the test is used to determine whether there are differences in the distributions of groups.

However, if the two distributions are the same shape, the test can be used to determine whether there are differences in the medians of groups. This was the case with the SHES data, and was an option utilised in the analyses. This is more in keeping with the Kruskal-Wallis H test being used as an alternative to the one-way ANOVA (i.e. both would use a measure of central tendency: the ‘mean’ for the one-way ANOVA and the ‘median’ for the Kruskal-Wallis H test).

Run the analyses

It is possible to run the test regardless because the one-way ANOVA is fairly robust to deviations from normality (e.g. Maxwell & Delaney, 2004), particularly if the sample sizes for each group are equal, or nearly equal, but less so for unequal (unbalanced) group sizes (Liz, Keselman & Keselman, 1996). However, the sample sizes for each SHES student group was not considered to be large, nor were the groups equal in size.

Test comparisons

A more advanced approach is test comparisons. Here one transforms the data (if that is possible) and runs a one-way ANOVA on the transformed data and on the original data. After making comparisons and the conclusions reached are the same, it is then acceptable to choose the one-way ANOVA on the untransformed, original data for analysis.

Outliers - Boxplots

Initial exploration of the data in SPSS version 20 revealed outliers as assessed by inspection of Boxplots for greater values than 1.5 box-lengths from the edge of the box for each of the dimensions of personal epistemology. Closer inspection revealed the outliers were different for each dimensions of personal epistemology, and for the different modules.

For *certain knowledge* Sporting Identity had four outliers, Biomechanics two, and Physiology one. For *evolving knowledge* the Physiology and Biomechanics modules had one outlier each. For *subjective knowledge* Sporting Identity had seven outliers and Biomechanics three. And finally, for *experience of knowing* the Biomechanics module had sixteen outliers.

Outliers can be the reason for non-normality in the distribution of data and violation of homogeneity of variance. However, when comparing results from the Shapiro-Wilk Test and Levene's Test with and without the outliers present in the dataset, the statistics suggested the outliers would not materially affect the results of any subsequent analysis. A decision was therefore made to include the outliers whilst using statistical tests that were reliable when normal statistical assumptions are not met.

Phase 1 analysis – comparison of 4 SHES modules

Taking into account the findings from the preliminary analysis of the data, a modified version of the ANOVA was required. In this particular case this was the Welch ANOVA a form of ANOVA that does not assume equal variances. The results for this test were statistically significant for three of the four dimensions of personal epistemology.

More specifically, Welch's ANOVA revealed significant differences between the four SHES modules for three of the four dimensions of personal epistemology – *certain knowledge* (F (3, 80.315) = 14.802, p < .0005; est. ω^2 = .191), *subjective knowledge* (F (3, 81.075) = 50.590, p < .0005; est. ω^2 = .464), and *evolving knowledge (F* (3, 83.453) = 63.130, p < .0005; est. ω^2 = .520). The only exception was the *experience of knowing* dimension (F (3, 79.992) = .153, p = .928; est. ω^2 = .003). The large effect sizes for certain knowledge, subjective knowledge, and evolving knowledge based on the benchmarks of Cohen (1988) highlight the influence the teaching and learning context has on the personal epistemology of groups of students. In the subsequent pages of this chapter, analyses and evaluation of data will investigate what the potential influences are within the SHES modules that explain these significant differences.

Games-Howell post hoc analyses revealed the group means were statistically significantly different for *certain knowle*dge with Sporting Identity module significantly lower than the three other SHES modules; and the Biomechanics module significantly higher than the Sports and Exercise Physiology module (see Table 5.1). Statistically significant differences were also apparent for *subjective knowledge* where the Sporting Identity module scored significantly higher than the three other SHES modules (see Table 5.2). For *evolving* *knowledge* statistically significant differences were found. The Physiology module scored significantly higher than the other SHES modules; and the Sporting Identity scored significantly lower than the Biomechanics module (see Table 5.3). No statistically significant differences were found between the four SHES modules for *experience of knowing* (see Table 4)

Table 5.1 - Games-Howell post-hoc analysis: Certain Knowledge (N =175)

Module	Modules for comparison	Mean Differences	Standard Error	Significance
Physiology	Sporting Identity	.37241*	.12829	.028
	Sports & Exercise Physiology	.09972	.15652	.920
	Biomechanics	-.35491	.13432	.050
Sporting Identity	Physiology	-.37241*	.12829	.028
	Sports & Exercise Physiology	-.27629*	.13522	.193
	Biomechanics	-.72732*	.10876	.000
Sports & Exercise Physiology	Physiology	-.09972	.15652	.920
	Sporting Identity	.27269	.13522	.193
	Biomechanics	-.45463	.14096	.010
Biomechanics	Physiology	.35491	.13432	.050
	Sporting Identity	.72732*	.10876	.000
	Sports & Exercise Physiology	.45463*	.14096	.010

Table 5.2 - Games-Howell post-hoc analysis: Subjective Knowledge (N =175)

Module	Modules for comparison	Mean Differences	Standard Error	Significance
Physiology	**Sporting Identity**	-1.16605*	.14021	.000
	Sports & Exercise Physiology	-.08357	.16867	.960
	Biomechanics	.25013	.14651	.329
Sporting Identity	**Physiology**	1.16605*	.14021	.000
	Sports & Exercise Physiology	1.08248*	.14946	.000
	Biomechanics	1.41618*	.12391	.000
Sports & Exercise Physiology.	**Physiology**	.08357	.16867	.960
	Sporting Identity	-1.08248*	.14946	.000
	Biomechanics	.33370	.15538	.147
Biomechanics	**Physiology**	-.25013	.14651	.329
	Sporting Identity	-1.41608*	.12391	.000
	Sports & Exercise Physiology	-.33370	.15538	.147

Table 5.3 - Games-Howell post-hoc analysis: Evolving Knowledge (N =175)

Module	Modules for comparison	Mean Differences	Standard Error	Significance
Physiology	**Sporting Identity**	1.79028*	.13411	.000
	Sports & Exercise Physiology	1.41880*	.15046	.000
	Biomechanics	1.19807*	.13370	.000
Sporting Identity	**Physiology**	-1.79028*	.13411	.000
	Sports & Exercise Physiology	-.37147	.14707	.064
	Biomechanics	-.59221*	.12988	.000
Sports & Exercise Physiology	**Physiology**	-1.41880	.15046	.000
	Sporting Identity	.37147	.14707	.064
	Biomechanics	-.22074	.14669	.439
Biomechanics	**Physiology**	-1.19807*	.13370	.000
	Sporting Identity	.59221*	.12988	.000
	Sports & Exercise Physiology	.22704	.14669	.439

Table 5.4 - Games-Howell post-hoc analysis: Experience of Knowing (N =175)

Module	Modules for comparison	Mean Differences	Standard Error	Significance
Physiology	**Sporting Identity**	-.06435	.20371	.989
	Sports & Exercise Physiology	-.06339	.18663	.986
	Biomechanics	.02496	.19553	.999
Sporting Identity	**Physiology**	.06435	.20371	.989
	Sports & Exercise Physiology	.00096	.15910	1.000
	Biomechanics	.08931	.16945	.952
Sports & Exercise Physiology	**Physiology**	.06339	.18663	.986
	Sporting Identity	-.00096	.15910	1.000
	Biomechanics	.08835	.14849	.933
Biomechanics	**Physiology**	-.02496	.19553	.999
	Sporting Identity	-.08931	.16945	.952
	Sports & Exercise Physiology	-.08835	.14849	.933

In addition to the Welch ANOVA and in light of the findings from the preliminary analysis of data, the decision was made to run a Kruskal-Wallis test, which is viewed as the non-parametric equivalent of the ANOVA. The reason for this was the Welch ANOVA assumes few or no outliers in the data. As there were a number of outliers present in the data (N = 32), the author wanted further confirmation of the differences between the four SHES modules for the dimensions of personal epistemology. For this reason the Kruskal-Wallis test was run.

As one can see, the results from the Kruskal-Wallis test reflect those of the Welch ANOVA results. This was the case whether the assumption was made that the distributions have a different shape (Table 5a), or whether the distributions are the same shape (Table 5b). Significant differences were apparent for *certain knowledge, evolving knowledge, and subjective knowledge*, but not for *experience of knowing*.

Table 5.5a - Kruskal Wallis Test for all 4 SHES modules (based on comparison of mean rank) (N =175)

	Certain knowledge	Evolving knowledge	Subjective knowledge	Experience of knowing
Chi-Square Statistic	36.146	65.450	67.691	.232
Degrees of freedom	3	3	3	3
Significance	.000	.000	.000	.972

Table 5.5b - Kruskal Wallis Test for all 4 SHES modules (based on comparison of median scores) (N =175)

	Certain knowledge	Evolving knowledge	Subjective knowledge	Experience of knowing
Median	3.2000	2.5000	2.3333	3.0000
Chi-Square	23.316	64.752	66.608	.402
Degrees of freedom (Df)	3	3	3	3
Significance	.000	.000	.000	.940

Phase 2 analysis: Pre-Post tests for epistemological congruence across 3 SHES modules (Sporting Identity, Biomechanics, Sports and Exercise Physiology)

Having established differences between the perceptions of personal epistemologies of groups of students drawn from four modules within a SHES undergraduate programme of study, a further analysis was undertaken to investigate potential reasons for the differences, and also explore if these personal epistemologies were stable over the duration of a semester of study. This would establish if the phenomenon of *epistemological congruence* (Fruge & Ropers-Huilman, 2008) had taken place, and would go some way to establishing the influence the personal epistemologies of teachers have on the personal epistemologies of their students. This is important as evidence from previous suggests personal epistemology impact on student approaches to learning and consequent learning outcomes (Tolhurst, 2007).
Due to violations of normality and relatively small sample sizes for each of the three SHES modules, a Wilcoxon Signed Rank Test was used as a pre-post measure to establish if any shifts in the personal epistemologies of groups of students had occurred. This non-parametric paired differences test is used when comparing two related samples, matched samples, or repeated measurements on a single sample. In this context, the test measured group scores at two different data points to establish if there was a significant difference between scores. Thus, the Wilcoxon Signed Rank Test was used as a pre-post measure to highlight any potential differences after an intervention has taken place – in this case a module of study and aspects of teaching, learning and assessment therein.

Overall, when taking into account the personal epistemologies of the students drawn from three of the SHES modules (N = 95), significant increases for evolving knowledge and subjective knowledge were evident (see Tables 5.6 and 5.7 below).

Table 5.6 - DEBQ Wilcoxon Signed Ranks Test pre-post significance levels and Z scores for all 3 SHES modules combined (N = 95)

	Certain knowledge	Evolving knowledge	Experience of knowing	Subjective knowledge
Z score	-.506[b]	-6.453[c]	-1.132[b]	-4.449[c]
Significance	.613	.000	.258	.000

b. Based on positive ranks
c. Based on negative ranks

Table 5.7 – Pre-post mean scores for all 3 SHES modules combined (N = 95)

PE Dimension	Pre Score Mean	Post Score Mean	Difference
Certain Knowledge	**3.305**	**3.268**	**-.037**
Subjective Knowledge	**2.453**	**2.845**	**.392**
Evolving Knowledge	**2.295**	**3.111**	**.816**
Experience of Knowing	**3.166**	**3.058**	**-.108**

A result that suggests the modules in question encourage the perception that knowledge is subjective and continually evolving as students become immersed in their studies.

The results from these analyses raise two questions:

- What factors within the modules influence the shifts?
- Are there differences or commonalities between the modules of study?

The answer to these two questions will help to identify whether it is the teacher, subject matter, assessment methods, mode of delivery, or a combination therein that influences a shift in the personal epistemologies of students. Thus, further analysis of individual modules was undertaken, again using the Wilcoxon Signed Rank Test.

5.3.1 Results – Sporting Identity module

Student scores (N = 23) for evolving knowledge increased significantly in the Sporting Identity Module over the duration of a semester of study (Table 5.8). However, this was the only significant change when looking at the four dimensions of personal epistemology. A fact displayed in the pre-post group mean scores (Table 5.9).

Table 5.8 - DEBQ Wilcoxon Signed Ranks Test pre-post significance levels and Z scores for the Sporting Identity Module (N = 23)

	Certain knowledge	**Evolving knowledge**	**Experience of knowing**	**Subjective knowledge**
Z score	-1.285[b]	-2.474[c]	-.612[c]	-1.058[b]
Significance	.199	.013	.540	.290

b. Based on positive ranks
c. Based on negative ranks

Table 5.9 – Pre-post group mean scores for Sporting Identity (N = 23)

PE Dimension	**Pre Score Mean**	**Post Score Mean**	**Difference**
Certain Knowledge	**2.788**	**2.663**	**.125**
Subjective Knowledge	**3.435**	**3.337**	**-.098**
Evolving Knowledge	**1.891**	**2.391**	**.500**
Experience of Knowing	**3.326**	**3.413**	**.087**

The significant increase in this group of students for evolving knowledge appeared to reflect the maximum score for evolving knowledge by the teacher for this module. One could posit this shift can be attributed to the influence of the teachers' personal epistemology on those of their students; and that *epistemological congruence* (Fruge & Ropers-Huilman, 2008) had taken place. If such a 'shift' can occur over a relatively short period, the potential for shifts over a longer period of study is extensive. Particularly as there was no explicit personal epistemology intervention implemented during the semester for the Sporting Identity module.

It could also be argued the subject matter itself (Appendix 5.4) influences the teacher beliefs about knowledge and knowing which then in turn influences the perceptions students hold about knowledge and knowing. However, further evidence suggesting the teacher was the major influence on students was provided by the teachers' responses to a measure of their approach to teaching (ATI). The teacher in this particular module espoused an approach that encouraged students to interact, to restructure their existing knowledge through debate and discussion, and which encouraged students to question ideas and develop new ways of thinking in the subject.

Moreover, the analysis revealed the teacher scored higher for a conceptual change student focused approach (3.63) than for an information transfer teacher focused approach (2.25). This suggests an approach to teaching ethos conducive to encouraging a perception that knowledge is indeed evolving. Furthermore, when one looks at the outline for this particular module, the structure provides formative assessment throughout the duration of the module, with an assessment that did not contribute to the overall grade for the module. Whilst not contributing to the overall grade, these assessments do provide feedback to students and the message that they are in a teaching and learning environment where they are given the opportunity to explore their own perceptions and those of their peers and teacher; and which encourages reflection and interpretation. One could suggest it is these assessment methods that encourage student engagement, as they are assessed by both their peers and their tutor. The examination at the end of the semester which subsumed pre-released questions could also be viewed as allowing students to prepare by reflecting on their learning.

When taking all this into account, the findings should not be surprising. Formative assessment has a beneficial effect on student learning (e.g. Black & William, 1998; Pelligrino, Chudowsky & Glaser, 2001). Furthermore, a social constructivist perspective emphasises students have a responsibility for their own learning. Thus, peer assessment with students taking an active role (van Gennip, Segers & Tillema, 2009), encourages and involves collaboration and active engagement by students in the appraisal of learning outcomes. Moreover, peer assessment in addition to the appraisal of learning (the outcomes), also involves assessment of the processes involved (Vermetten, Daniels & Ruijs, 2004).

Beneficial effects of peer assessment therefore, include the development of a number of skills including communication, self-evaluation, observation, and self-criticism (Dochy & McDowell, 1997). However, problems may arise if the context in which the peer assessment is set is not deemed to be conducive to a positive experience, both in terms of lack of trust in self and others and "friendship marking". A phenomenon characterised by, as the term suggests, favourable and positive marks being given to ones friends. Thus, a shared understanding of the procedures and criteria involved are paramount toward its success (Dochy et al., 1999). As van Gennip et al (2009) emphasises:

> "…effective peer assessment requires attention to the social factors influencing the interactional process" (p.42).

Studies have emphasised the important role interaction has on group and teamwork (e.g. Cohen & Bailey, 1997). It is this interaction and shared cognitions that the concept of SHAPE exemplifies. Moreover, one could posit that it is SHAPE that sets the scene and lays the foundations for the activities within particular teaching and learning contexts. The social context is important in encouraging members of a group to engage in a collaborative way in order to build and maintain a "mutually shared cognition" (Barron, 2003; Crook, 1998). Four interpersonal variables have been identified as particularly relevant to this process: *psychological safety; valuing diversity; interdependence; and trust* (Edmondson, 1999; Lingard et al., 2002; Van den Bossche et al., 2006).

- Psychological safety is a belief that it is safe to take interpersonal risks in a group of people (Edmondson, 1999). This prevents perceived differences in viewpoints as disagreements and promotes collaborative learning (van Gennip, 2009), and helps students to avoid such things as "friendship marking".

- Valuing diversity describes the potential difference in opinion a group may have with regard to what a groups task goal or mission should be, and needs to be low for teams to be effective (Jehn et al. 1999). This results in a shared understanding needed for peer assessment.

- Interdependence can come in two forms, *outcome interdependence* and *task interdependence*. Outcome interdependence describes the extent to which group members believe that their personal benefits and costs depend on successful goal attainment by other group members (Van der Vegt et al., 1998). Task interdependence describes the interconnections between tasks whereby the performance of one specific piece of work depends on the completion of one or more other tasks (Van der Vegt at al., 1998). Peer assessment is successful when there is a positive interdependence between peers. That is, when peers perceive they are connected to each other, as the assessment task cannot be completed successfully without responsible participation by everyone.

- Trust is an important aspect of peer assessment as students often express concerns about their ability to provide constructive feedback and mark fairly. A number of studies have shown that students feel uncomfortable criticizing another's work, or find it difficult to rate their peers (Topping et al., 2000)

(Source van Gennip et al., 2009)

There is evidence to suggest that the interplay between these four variables influences collaborative learning activities (e.g. peer assessment) (van Gennip et al., 2009, p.42).

5.3.2 Results - Biomechanics

An epistemological shift occurred for three of the four dimensions of personal epistemology in the group of students (N =20) from the Biomechanics module (See Table 5.10 below).

Table 5.10 - DEBQ Wilcoxon Signed Ranks Test pre-post significance levels and Z scores for the Biomechanics Module (N = 20)

	Certain knowledge	Evolving knowledge	Experience of knowing	Subjective knowledge
Z score	-2.972^{b}	-2.709^{b}	-2.156^{c}	$-.890^{b}$
Significance	.003	.007	.031	.373

b. Based on negative ranks.
c. Based on positive ranks

Table 5.11 – Pre-post group mean scores Biomechanics (N = 20)

PE Dimension	Pre Score Mean	Post Score Mean	Difference
Certain Knowledge	**3.081**	**3.419**	**.338**
Subjective Knowledge	**2.825**	**2.900**	**.075**
Evolving Knowledge	**2.250**	**3.225**	**.975**
Experience of Knowing	**3.338**	**2.950**	**-.388**

Like the Sporting Identity module, students from the Biomechanics module showed a significant increase for evolving knowledge. However, this group of students also showed a significant increase for certain knowledge; and a significant decrease for experience of knowing.

These results suggest that the structure of this particular module had some impact and contributed toward the results. For example, when looking at the course content, and the intended learning outcomes, it appears that study within this particular module involves nomothetic principles subsuming theories and applications of mechanics and scientific skills, including the writing of laboratory reports (Appendix 5.4). Indeed the structure of the module is such that it includes as part of the weekly schedule, laboratory and/or practical sessions. In addition, the assessment methods are an end of semester written examination, the only feedback being the score in the examination. It can be argued that this particular format is not conducive to students feeling confident enough to explore their thought processes through discussion and reflection. However, one has to take into account the results are something of a ‘mixed bag’ as evolving knowledge in addition to certain knowledge increased for this group of students.

Interestingly, the teacher in the Biomechanics module also had what could be construed as a somewhat mixed bag, with no apparent high score for any of the dimensions of personal epistemology (see Table 5.14). Again, the data suggests the teacher had an influence on their students. The teacher for this particular module scored relatively high for both the information transfer/teacher focused (ITTF – mean score 3.25), and conceptual change/student focused (CCSF – mean score 3.62) measures on the approaches to teaching inventory (ATI) (Prosser & Trigwell, 2004). It may be that the teacher thought they could change the conceptions of their students by providing them with information. That is, using an approach to teaching which emphasises information transmission, whereby the role of the student is a passive one. This seems plausible, as the students’ experience of knowing score decreased over the duration of the semester. The suggestion being, students perceived that using personal experience was not valued in this particular module.

An increase in certain knowledge seems to corroborate this. However, a similar increase for evolving knowledge was also evident which suggests students are very adept at ‘picking up signals’ about what is required within a particular teaching and learning context. They adopted a passive role relying on the teacher to transmit information whilst at the same time perceiving their ‘knowledge’ would evolve as they accumulated more information from their teacher.

5.3.3 Results – Sports and Exercise Physiology

For the Sports and Exercise Physiology module there was a significant increase in student scores (N = 52) for the evolving knowledge dimension of personal epistemology (See Table 5.12 and 5.13 below). Again, this could have been a consequence of the teacher predisposition and the approach they adopt and/or the subject matter itself.

Table 5.12 - DEBQ Wilcoxon Signed Ranks Test pre-post significance levels and Z scores for the Sports and Exercise Physiology Module (N =52)

	Certain knowledge	Evolving knowledge	Experience of knowing	Subjective knowledge
Z score	-.141[b]	-5.316[c]	-.746[b]	-.678[c]
Significance	.888	.000	.456	.498

b. Based on positive ranks.
c. Based on negative ranks.

Table 5.13 - Pre-post group mean scores Sports and Exercise Physiology (N = 52)

PE Dimension	Pre Score Mean	Post Score Mean	Difference
Certain Knowledge	**3.483**	**3.477**	**-.006**
Subjective Knowledge	**2.587**	**2.606**	**.019**
Evolving Knowledge	**2.490**	**3.385**	**.895**
Experience of Knowing	**3.029**	**2.942**	**-.087**

One has to recognise that it may also have been the framework of this module that may have contributed toward this significant shift (Appendix 5.4). As with the Sporting Identity module the aims were to develop students understanding through discussion. However, the Sports and Exercise Physiology module differed from the Sporting Identity module as the content was more 'scientifically' based (like Biomechanics), subsuming laboratory practical sessions and written reports. One could argue therefore, that students would have to acquire some fundamental knowledge a sort of 'recipe for success' so to speak, in order to progress further. The similarities with the Biomechanics module are also evident in the summative examination at the end of the semester. However, unlike the Biomechanics module that relied solely on an examination, the Sports and Exercise Physiology module did not. One could therefore hypothesise the combination of assessment methods permitted a somewhat different learning experience as was the case with Sporting Identity module. That is, students may have perceived they had the opportunity to explore and take an active role in their learning because of the formative assessment aspect of the course which provided timely and appropriate feedback.

Taking this into account, there is also the suggestion that the teacher influenced the personal epistemologies of their students. As previously mentioned, students displayed a significant increase for evolving knowledge over the duration of this module, an increase which could also be explained by a convergence of beliefs with those of their teacher, as the teacher for this module scored very high (mean score 4.50) for evolving knowledge as measured by the DEBQ. This suggests the teacher had somehow influenced the personal epistemologies of the students by imparting (intentionally or not), their beliefs on their students.

5.4 - The Approaches to Teaching Inventory (ATI)

To investigate further, potential reasons for the differences between the personal epistemologies of students in different modules drawn from the same discipline; an analysis and evaluation of the responses by the teachers from these modules to questions on the ATI was conducted. The ATI is a designed to explore how academics go about teaching in a specific context or subject or course (see Chapter Three for a more detailed explanation).

5.4.1 Physiology (ITTF 2.88; CCSF 2.25)

The responses to the ATI by the teacher in the Physiology module suggested an assumption that students in this particular module had no prior or very little knowledge of the topics to be covered. This may have been the reason why the teacher felt it important to present a lot of facts in class so students knew what they had to learn. A consequence of this was the teacher felt they should know the answers to any questions posed by students. This appeared to be reflected in this teachers mean score for *certain knowledge* (3.17), which was the highest score of the four dimensions of personal epistemology as measured by the DEBQ (Table 5.14). On the other hand, in classes and tutorials the teacher intimated that they tried to develop a conversation with students about the topics being studied, preferring students to generate their own notes rather than copy theirs. Thus, the teacher had the intention of presenting students with fundamental and essential knowledge, whilst giving opportunities for discussion and to questions ideas and concepts.

5.4.2 Sports and Exercise Physiology (ITTF 3.63; CCSF 3.25)

The teacher responses to the ATI in this module emphasised how students should focus on what was provided for them. They deemed it important that the subject area should be completely described in terms of specific objectives that related to formal assessment items, and thus had the intention of providing students with the information required to pass formal assessments. To this end, the teacher deemed it important to present a lot of facts so students knew what they had to learn for this subject, and concentrated on covering information available from key text and readings. The emphasis therefore, was on good presentation of information to students, the aim of which was to enable them to build up an information base in the subject. Conversely, the teacher intimated they set aside some teaching time for students to discuss amongst themselves, key concepts and ideas in the subject; that teaching should help students question their own understanding of the subject matter; and that the teaching in this particular module was about helping students develop new ways of thinking in the subject.

As with the Physiology module, the teacher in the Sports and Exercise Physiology module felt students should be provided with information, whilst having opportunities for discussion and to question ideas. There appears to be a tension between an information transfer and conceptual change model in the espoused practice of the teacher. This was evident in their responses in their responses on the DEBQ where they had relatively high mean scores for three of the four dimensions of personal epistemology – *certain knowledge* (3.33), *evolving knowledge* (4.50) *and experience of knowing* (3.50). One may infer from this, that a 'mixed epistemology' had influenced the teachers' intention within this module.

5.4.3 Sporting Identity (ITTF 2.25; CCSF 3.63)

The teacher in the Sporting Identity module responded to the ATI items in a way that suggested they tried to develop a conversation with and between students about the topics being studied and deliberately provoked debate and discussion. They set aside some teaching time so students discussed between themselves, key concepts and ideas in the subject. Teaching is focused on students being given the opportunity to question ideas, to discuss their changing understanding, the aim of which was to help students develop new ways of thinking in the subject by questioning their own understandings within the field of study. Looking at the responses on the DEBQ, this particular teacher had a maximum mean score for *evolving knowledge* (5.00) and a very high mean score for *subjective knowledge* (4.50). Again this appears to be associated with their intention to give students opportunities to discuss their changing understandings within the field of study.

5.4.4 Biomechanics (ITTF 3.25; CCSF 3.63)

The responses to the ATI from the teacher in the Biomechanics module suggested they designed their teaching with the assumption that most of their students had very little knowledge of the topics to be covered. They felt it important that the subject should be completely described in terms of the specific objectives relating to what students had to know for the formal assessment requirements. A consequence of this was the teacher felt it was important to present a lot of facts in classes so students were aware of what they had to learn. Thus, the teacher structured the subject to help students pass the formal assessments, feeling they should know answers to questions that students may ask. However, the teacher did try to develop a conversation with their students about the topics being studied; and also allowed time for students to discuss amongst themselves, difficulties encountered whilst studying the subject. The teacher also intimated the assessment in the module should allow students to reveal their changed conceptual understanding of the subject, and that students are better off generating their own notes rather than copying those of the teacher.

This 'duality' in the teachers' intention within the Biomechanics module is evident in their scores on the ATI – they scored relatively high for both CCSF (3.63) and ITTF (3.25). One could infer that the teacher had the perception and thus intention, that in order to encourage conceptual change, one has to aid the process by providing students with what is deemed relevant and appropriate information. Is it the influence of the teachers' personal epistemology that is responsible for this apparent 'tension'? Looking at Table 5.14, it is evident the teacher responses for the DEBQ can be construed as being somewhat mixed. That is, when compared with the teachers from the Sporting Identity and Sports and Exercise Physiology modules, the teacher in the Biomechanics module does not have a high mean score that particularly stands out for any of the dimensions of personal epistemology.

Table 5.14 - Teacher scores for the DEBQ and Approaches to Teaching Inventory

	Certain knowledge	**Subjective knowledge**	**Evolving knowledge**	**Experience of knowing**	**CCSF**	**ITTF**
Module						
Sporting Identity	1.17	4.50	5.00	3.00	3.63	2.25
Biomechanics	2.17	1.75	3.00	3.00	3.63	3.25
Sports and Exercise Physiology	3.33	2.50	4.50	3.50	3.25	3.63
Physiology	3.17	2.50	2.00	2.50	2.25	2.88

(CCSF – Conceptual Change/Student-Focused; ITTF – Information Transfer/Teacher-Focused)

5.5 Discussion

In Chapter Two the discussion highlighted the domain-specific, domain-general debate about personal epistemology that has taken place over the past twenty years. The findings for research conducted within this period have been both mixed and contradictory. It does appear that if a general measure of personal epistemology is used, the domain-general hypothesis is supported. On the other hand, if a domain-specific measure is used, the domain-specific argument is corroborated. To elucidate the debate, Buehl and Alexander

(2001, 2006) have put forward a model that argues for both domain-general and domain-specific personal epistemologies set within a wider sociocultural context. Buehl and Alexander however, at the same time acknowledge the literature suggests that academic domains do differ in structure and content (e.g. Alexander, 1992; Frederikson, 1984; Spiro and Jehng, 1990). The duality of domain general and specific personal epistemologies has subsequently been adopted by other researchers (e.g. Baxter Magolda, 2004).

However, the author argues the results from the analysis of the four SHES modules suggest domain-specific personal epistemologies. This corroborates the findings of a number of previous studies. For example, studies utilising a within-subject design and analysis provide evidence that beliefs about knowledge vary by domain (Buehl & Alexander, 2001). These studies looked at students' personal epistemologies about mathematics and social studies (Stodolsky & Glaessner, 1991); mathematics and social science (Schommer & Walker, 1995); science and psychology (Hofer, 2000); mathematics and history (Buehl, Alexander & Murphy, 2001); and mathematics, social sciences, and business (Schommer-Aikins et al., 2003).

Studies utilising a between-subject design and analysis have also added weight to the argument for the domain-specificity of personal epistemology. These studies have also used a variety of domains, including: humanities, engineering, education, and natural sciences (Paulsen & Wells, 1998); medicine and psychology (Lonka & Lindblom-Ylanne, 1996); and social science, arts, humanities, business, and engineering (Jehng et al., 1993). All of these studies suggest evidence of differences between domains.

A phenomenon, Buehl and Alexander (2006) recognised when stating students' beliefs become more differentiated and domain-specific as they gain more experience within different domains and that:

> "We hold that the context of a specific situation may increase the salience or relevance of certain aspects of students' epistemological beliefs" (p.33).

The studies referred to above have focused on academic discipline as domain and have often used these terms interchangeably. This may however, be too broad a brush stroke to capture the complexity of personal epistemology. By using a module-specific questionnaire it was possible to analyse the data at a level that provides a more rigorous and insightful look into the domain-specificity of personal epistemology.

Based on these results from this chapter, one could argue that not only are there interdisciplinary differences, but intradisciplinary differences too. This is something that obviously requires further in-depth research, to both clarify and corroborate these findings. Nonetheless, research and analyses at a more contextual level can only serve to enhance our knowledge and thus practice in teaching and learning activities in higher education.

This is not to deny the existence of domain-general epistemological beliefs. Limón (2006) citing previous research (Buehl et al., 2002; Hofer & Pintrich, 1997, 2002; Louca et al., 2004) stated domain-general and domain-specific personal epistemologies may coexist, and are situated and activated by context. This could be explained by the epistemological resources (e.g. Hammer & Elby, 2002) and epistemological theories (e.g. Hofer, 2000, 2001, 2004) explanations of personal epistemology, which argue it is the context that encourages particular personal epistemologies to show themselves as a result of the demands of the situation. In this case, the 'situation' would be the teaching-learning environment and its accompanying practice and process.

Over the last decade, research into changes in personal epistemology over the duration of a period of study has burgeoned (Bendixen & Rule, 2004; Conley et al., 2004; Gregiore et al., 2004; Mason & Boscolo, 2004; Sinatra & Kardash, 2004; Valanides & Angeli, 2005). Some studies have purposely targeted a change through interventions where the subject matter has included critical thinking or personal epistemologies themselves; others have been teacher education courses. What these have in common is a significant change between the scores on pre and post measures of personal epistemology.

The results discussed in the previous pages of this chapter add to the evidence that 'shifts' do occur in the personal epistemologies of participants in courses of education. The author would like to point out the 'intervention' in the case of the SHES modules was not directly aimed at changing the personal epistemologies of students. The changes that occurred were a result of students' exposure to a combination of the teacher, subject matter, and the general teaching-learning environment within particular contexts – this was the 'intervention' as is the case in every module of study in higher education. The important point is there was no conscious intention to change the personal epistemologies of students. It was the practices and processes within these different contexts that resulted in these significant shifts.

The implications of this are far reaching. As Schommer-Aikins et al. (2003) point out:

> "If there is a large epistemological belief discrepancy between the faculty member and students, academic performance can be affected" (p.363).

Moreover, the study conducted by Greene (2009) highlighted how the perceptions and expectations of faculty with regard to hypothetical students influenced the grades apportioned to these students. That is, hypothetical students who were deemed to have more "sophisticated" personal epistemologies were given higher grades by faculty members. Thus, the importance of 'epistemological congruence' (Fruge & Ropers-Huilman, 2008) whereby student personal epistemologies converge with those of their teacher appears to be essential if students are to be deemed 'successful' in their studies. This epistemological congruence is akin to the personal and target understanding highlighted by Entwistle and Smith (2002), and the research conducted by Donald (2002), which both emphasised how the intention of the teacher has a profound influence on what their students learn and the ways in which they learn it. The author would posit however, this phenomenon may occur without explicit teacher intention, as students are very adept at picking up and sensitive to 'signals' from the teacher with regard to what the perceived requirements of the teaching-learning environment are.

If changes in personal epistemology can occur over a relatively short period of time without explicit intention, there is the potential to identify practice that encourages what would be regarded as desirable personal epistemologies within each context of teaching and learning depending on the demands and needs of that particular environment. This could be achieved by promoting epistemologies that adhere to the ethos of particular courses and more specifically modules of study. One would hope this would be manifest in the development of more 'sophisticated' personal epistemologies suited to each particular context.

Looking at the modules separately, differences were apparent in the personal epistemologies of students and the 'shifts' that occurred over the duration of a semester. That is, different modules of study displayed different shifts for the different dimensions of personal epistemology. As the four modules are drawn from the same undergraduate course of study – Sports Health and Exercise Science, these findings appear to support Hofer (2000), who argued that although disciplinary personal epistemology research is useful, we need to look at personal epistemology at a more contextual level

Taken together, one could suggest the teachers in the modules investigated had a significant influence on the personal epistemology of their student groups. Looking at Table 5.14 it is evident the teachers for Sporting Identity and Sports and Exercise Physiology modules have a belief in evolving knowledge. Interestingly, a significant increase occurred for student scores within these modules for this dimension over the duration of a semester of study. Furthermore, the teacher from the Biomechanics had more of a 'spread' in their scores on the dimensions of personal epistemology, and this was evident for student group scores on the DEBQ who showed a significant increase for *certain knowledge* and *evolving knowledge*; and a significant decrease for *experience of knowing*.

The dimension of personal epistemology that showed the most significant change on a consistent basis was evolving knowledge. All three modules (data was not available for the Physiology module), showed a significant increase for this dimension. This suggests teachers' personal epistemologies influence the personal epistemologies of their students. How this occurs is not clear as the teachers did not intentionally highlight personal epistemology within the structure of their particular module, nor did they profess or convey their own personal epistemologies directly. However, it does seem students are very sensitive to the personal epistemology of the teacher, and are also very adept at addressing the demands of the particular context, including how knowledge is perceived and valued.

5.6 Conclusions

In the introduction to this chapter it was inferred that it is the teacher and their accompanying practice that exerts the greatest influence within particular teaching and learning contexts. When taking into account the comparative study and the pre and post studies of the modules drawn from the Sports, Health and Exercise Science (SHES) undergraduate degree, one could justifiably draw the conclusion that the personal epistemologies of the teacher influence those of their students. Why else would the particular shifts have occurred? It could be argued the shifts were due in some way to the subject matter.

However, if this had been the case, one would assume the shifts would have been similar for modules that can be deemed similar in content. That is, the Biomechanics and Sports Exercise and Physiology modules, which are both scientifically based. However, the only increase evident for students in both modules was for evolving knowledge. In addition to this shift, the Biomechanics students also showed a shift in certain knowledge and experience of knowing that was not apparent with Sports Exercise and Physiology students. As the teacher for the Biomechanics module scored high for evolving knowledge and experience of knowing (as did their students), the suggestion is a convergence of personal epistemologies or epistemological congruence (Fruge and Ropers-Huilman, 2008) had taken place.

Moreover, the teacher for the Sporting Identity module scored high for evolving knowledge as did the students. This particular module was not as quantitatively based as the Biomechanics and Sports and Exercise Physiology modules, but displayed the same increase for evolving knowledge. This implies that if it was the subject matter that was the main influence, scores on dimensions of personal epistemology would be similar where the subject matter has comparative content, and different for modules whose subject matter differed. This was not the case. This is not to say the subject matter does not have an influence. Rather, the inference is that it is the teacher that is most influential in a teaching and learning context.

Chapter Six will explore further the contextuality of personal epistemology and the influence it has on different aspects of teaching and learning. The qualitative study of two second year undergraduate psychology modules will complement the evidence accumulated in Chapters Four and Five, which suggest support for the concept of SHAPE.

Chapter 6 – Psychology students and teachers personal epistemologies

6.1 Introduction

The aim of this chapter is to address the 4 key questions listed below, and provide further evidence in support of the concept of a ‘socialised habitus of academic personal epistemologies’ (SHAPE).

1. What personal epistemologies do teachers bring to the teaching and learning context, and how does this influence how they perceive different aspects of teaching and learning?

2. How do teachers perceive knowledge and how does this influence their conceptions of and approaches to teaching?

3. What academic epistemologies do teachers have and does this influence the academic epistemologies of their students?

4. How do these academic epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

A deductive thematic analysis was conducted with data derived from interviews with students and their teachers in two psychology modules – Research Methods and Statistics (RMS) and Memory and Perception (MP). The qualitative data and its accompanying analyses were augmented by quantitative data collected for the participants via the Discipline-focused Epistemological Beliefs Questionnaire (DEBQ), and the Approaches and Study Skills Inventory for Students (ASSIST). This permitted cross-referencing and comparison of data to give a more comprehensive picture of how personal epistemology influences different aspects of teaching and learning in higher education.

With this in mind the objectives were to:

- Directly and indirectly access students' and their teacher personal epistemologies in relation to different elements of teaching, learning and assessment;
- 'Triangulate' a number of data sources including interviews and quantitative measures of personal epistemology, approaches to learning, and approaches to teaching, in order to establish the influence personal epistemology (directly or indirectly) has on student and teacher perceptions of teaching and learning; and
- Establish what similarities and differences are evident across two modules drawn from year two of a Psychology undergraduate degree.

To investigate further, the issues highlighted in previous chapters, and add to the data collected, a case study involving the disciplinary area of psychology was conducted. Different forms of data were collected and analysed in order to 'triangulate' the data source and thus render the results and conclusions more robust than simply relying on one data source. Data were collected from students studying in either or both of the two psychology undergraduate level two modules: Research Methods and Statistics (RMS), and Memory and Perception (MP). In addition, data were also collected from the teachers of these two modules. This permitted comparisons of perceptions and conceptions of students and their teachers within these two contexts.

The decision and ideas behind this particular investigation emerged from the literature review, and the analyses in Chapters Four and Five. There has been considerable debate over the last 20 years whether personal epistemology is domain-general or domain-specific, or indeed both (Buehl et al. 2002; Hofer, 2001). Alexander (1992) defined *domain knowledge* as a body of knowledge individuals possess about a specific field of study (see also Alexander & Judy, 1988). An academic domain can be described as a unified paradigm subscribed to by all members, and that is organised by its particular content and methodology (Muis et al., 2006). In the 1950s Royce (1959) argued knowing in the arts was not the same as knowing in the sciences. Research has addressed the issue with results 'fuelling the fire' of the debate (e.g. Becher, 1989; Becher & Trowler, 2001; Biglan, 1973; Donald, 2002).

The author agrees with Schraw (2001) who argued it is important to address whether knowledge is domain-general or domain-specific. This would then give staff developers and teachers an indication of how particular contexts at different levels (e.g. micro, meso, macro), in higher education, including amongst other, lectures, seminars, modules, courses, and indeed at institutional level, influence the learning outcomes of students. Results hitherto have been contradictory, and one could go as far as to say, confusing as discussed previously in Chapter Four and Chapter Five. Domain generality has been advocated by Schommer and Walker (1995) and Schommer-Aikins et al. (2003); domain specificity has been highlighted by Hofer (2000) and Paulsen and Wells (1998). Adding to the confusion, research has also found evidence for both general and specific domain knowledge and interactions between the two (Buehl et al. 2002; Buehl & Alexander, 2001); Hofer, 2000; Op't Eynde & De Corte, 2003). Thus, different epistemologies may apply to different domains of knowledge (Commons, 2004), which is something the results from Chapters Four and Five also suggest.

The research conducted into personal epistemology has not escaped criticism. Concerns about conceptual, methodological, and analytical issues have been raised. It is these issues that have contributed to the conflicting results. With regard to conceptual issues, sceptics have questioned the domains used arguing they have not been comparable. For example, social sciences, a broad area subsuming a number of fields of study being compared with a single well-defined area of study (e.g. Jehng et al., 1993). In addition, the questions used to 'tap into' domain knowledge have also been deemed as too broad.

Methodological issues have also been apparent. All the between-subject studies measured general beliefs with no reference to particular domains. In addition, asking students to contextualise the same items to different domains may bias them to believe there should be differences (Hawthorne effect). Conversely, asking participants the same questions about two domains may inflate the relations between constructs. The use of Likert scales as a means of measuring personal epistemology has also been criticised. To compound the problems, the same data renders different results depending on the analysis used. Observers have commented there is a need to collect qualitative data in order to capture the complexity of personal epistemology. Jehng et al (1993) emphasised this very point, stating personal epistemology is complex and socially constructed and thus involves interactions with the social world (see also Baxter Magolda, 2004; Belenky et el., 1986; Bendixen & Rule, 2004; Hofer & Pintrich, 1997).

There is also the question of whether knowing in one domain or context is the same as knowing in another domain or context, when both are within the same field of study. Hitherto, there is a dearth of studies undertaken to answer this very important question. Evidence from such a study would make a major contribution toward the domain specific-general debate. This case study will complement the data from Chapter Five which went some way to answering this question. The concerns raised about conceptual, methodological, and analytical issues in previous studies will be addressed by collecting qualitative data through interviews (Chapter Six), and a focus group (Chapter Seven). This will allow cross-referencing of data collected in the studies described in Chapters Four and Five.

6.2 Between Module Design (students studying either Research Methods and Statistics or Memory and Perception (MP)

6.2.1 Research Methods and Statistics (RMS) Module Student Interviews

- *Role of the teacher*

When asked about the role of the teacher within the Research Methods and Statistics module, there was variation between the perceptions of students. Some students believed the role of the teacher was to pass on information (Students A and E), whereas others saw the teacher role as one of a guide or advisor (Students B and D). From these perceptions one can deduce that they reflect either an information transfer (Trigwell & Prosser, 2004) or conceptual change (Trigwell & Prosser, 2004) approach to teaching that reflects either a teacher or student-centred approach. This also infers either a surface approach to learning and a belief in the certain knowledge dimension of personal epistemology, where the role of the teacher is to ‘feed’ their students information; or where the teacher encourages student engagement and acts as an advisor and/or facilitator in the learning process, which infers a deep approach to learning and a belief in evolving knowledge. Typical comments by students were:
Student A:

> “In statistics…more or less passing on information…the lectures are very example based”

Student E:

> “In stats they are there to teach you about the statistical package so how to use it what it’s for and when to use it. In the lectures they try to explain the mathematics behind it”

Student B:

> “For statistics I think that they sort of provide more input and more advice”

Student D:

> “…it’s not actually to teach you, but to show you what you need to know…you don’t expect to be taught the material, but you still need to know”

- *Role of student*

Students also differed in their perceptions of their role in the teaching and learning process. A number of students intimated their role was one of reader and that it was not a passive role reflecting an intention to adopt a deep approach to learning and a belief in evolving knowledge whereby students interpret and construct knowledge themselves (Student B and C) . On the other hand, some students perceived their role as one of taking in information and being receptive, which may be construed as reflecting a surface approach to learning and a personal epistemology suggesting a belief in certain knowledge (Student E). However, it could be argued that being receptive could also reflect a deep approach to learning. It is for this reason that terms and phrases used were not used in isolation. Rather, their entire response to the question gave context to the student opinions given and how they should be situated. A strategy used in the analyses of the all the interview data.
Comments made by students included:

Student F:

> "Don't really know. Probably to learn and understand the foundations of research. To prepare myself really for future work".

Student E:

> "To take in the information (both psychology modules) and if I don't understand to ask the lecturer and to pass the exam".

Student B:

> "It's basically going over what's been said in the lectures, and in practical sessions, and trying to interpret the stuff for yourself"

Student C:

> "It's not a passive role. I think that is the most important thing. I've learnt that you can't learn by osmosis, you can't just absorb it…I like to really prepare and find out what the subjects going to be about, read the chapters that have been assigned then go to the lecture"

- *Teachers aims*

When discussing the perceived aims of the teacher, differences were also apparent. Some students thought the teacher's expectation was for students to gain a better understanding and have the wherewithal to know when and how to apply what they have learnt. An alternative view expressed by students, was that the teacher was aiming to pass on information and/or for the students to take on board information. These student conceptions again highlight two differing approaches to learning and personal epistemologies. That is, either a surface approach to learning accompanied by a belief in certain knowledge (Student E), or deep (Student F) approach to learning and belief in evolving knowledge whereby the teacher

introduces the subject matter but the student has the opportunity to take this to another level. A process involving the decision of when and how to apply what has been learnt.
Student F:

> "…to introduce us to the statistics we're going to have to know if you want to go into that kind of field".

Student E:

> "I just think they're trying to get you to pass and to convey a bit of what their subjects is, they seem to know a lot about their subjects and they're just trying to pass on information to the student".

- *Assessment*

Discussing what they thought the teacher was trying to assess, students appeared to have a number of differing views. Some students focussed on particular abilities, and others focussed on methods of assessment.

With regard to abilities students differed in what they thought was being assessed. The majority of students referred to 'application' whether this was the application of numbers, or how and when to apply knowledge, which implies a belief in the experience of knowing dimension of personal epistemology. Other students perceived their 'overall ability' was being assessed.

When discussing the methods of assessment, students differed in their perceptions of what MCQ's assessed. Some students believed multiple choice questionnaires (MCQs) assessed recognition, facts and figures, which reflects a surface approach to learning and a belief in certain knowledge (Student B); whilst others thought MCQs assessed knowledge and application, a more deep approach to learning and a personal epistemology valuing experience of knowing (Student F).

Typical comments were:

Student F:

> "For the maclab reports understanding and demonstration of our skills in SPSS and what we've learnt. Definitely with MCQs it's knowledge based questions and there's also an application question where you'll be given a situation and you'll have to answer questions on it".

Student B:

> "With MCQs it's generally a recognition type thing as you can probably hazard a guess as to what the answer could possibly be"
>
> "With the SAQ it's applying the knowledge. You've got to actually go a little bit further, and it's a case of knowing your stuff as opposed to remembering the stuff"

- *What students need to do or know*

The responses differed and can be grouped into student who adopted a surface approach to learning (Student B, C and E). That is, those who in their own words 'do things that get you noticed' (e.g. attending lectures, and scoring high in tests and examinations). It should also be noted however, that the comments made by Student C may be construed as also having a strategic approach to learning. Students adopting a deep approach to learning (Student A, D, and F), those were more concerned with reading around the subject, demonstrating understanding, and applying knowledge and methods. The students emphasised these beliefs in the following comments:

Student F:

> "I think you'd need to be able to understand everything quite well. You need to understand all the theory about what goes into SPSS, why you do it, and you need to be able to know that because of what you have to put into assignments".

Student C:

> "Turn up to all the lectures (I sit right at the front), and do the reading, take notes, and I guess do quite well at exams. To be enthusiastic as well, which shows I want to learn"

Student B:

> "I think it's based on exams and the results that are achieved, but that's not what how I would like it"

Student A:

> "…because of the different assessment methods you do have to be able to apply it, and to demonstrate that you've got a clear understanding"

Student D:

> "…in statistics you need to I think understand the different tests and when to use them in different situations; and how to interpret the results of those statistics"

Student E:

> "Should be able to score high in the tests, and if you can teach it to someone else then you're doing pretty well"

- *Best way to learn*

Student's responses can be categorised into those who focussed on the practical aspects of the module such as attending lectures and practising techniques. If this process is not accompanied with an intention to understand, it could be construed as reflecting a strategic approach to learning, and one could argue a belief in certain knowledge. Those who demonstrated the intention to adopt a deep approach to learning intimated aspirations to understand (e.g. reading around the subject and summarising frequently) a process which could be viewed as reflecting a belief that knowledge is evolving. These beliefs were characterised by the following comments:

Student F:

> "Definitely to go to all the lectures…Do all the readings that you are given because it goes into more depth".

Student A:

> "I think definitely going to the laboratory sessions and the assignments that follow those are very helpful, because you do get a lot of feedback; and also being able to work through examples during lectures"

Student B:

> "…the best way to learn is attending the lectures because you get given that much information you might not understand it from a textbook"

Student C:

> "To do the reading before the lecture so you know what they're talking about. For example, the 'jargon' they're using; you're not just sitting there thinking I wonder what this means?"

"With the statistics it's more practice the techniques until you understand what you're doing, because that will help you do the assignments; if you understand the assignments you'll do alright in the exam"

Student E:

"Summarise frequently…with the statistics I bought SPSS so I could practice at home"

- *Knowledge*

Some students believed in the certainty of knowledge and the requirement within this particular teaching and learning context for a surface, rote approach to learning (Student F and B). These students professed the belief that knowledge was about facts and not concepts, that it was formal, rule-based, and involved performing equations. Conversely, a student with a deep approach to learning (Student C) believed knowledge was about understanding; with Student A, concerned with the application of different techniques.

Opinions expressed were:

Student F:

"You have to know about a certain amount of equations. And also you have to know how to work the computer programme SPSS quite well".

Student A:

"…with the statistics because it is example based you can go away and look at the different examples and see where you can use that particular technique"

Student B:

> "In statistics knowledge is facts. I think it's more an understanding of the facts as opposed to an understanding of concepts"

Student C:

> "In research foundations it has to be about understanding…It's not difficult, it just needs to be read and understood. So understanding is the key"

Student D:

> "I think with the statistics module it's more traditional, you need to know how the statistics work and when to use them. It's quite formal, you use this and for that. It's quite sort of strict, it's mathematical"

- *Understanding*

Students defined understanding in different ways. Again, students appeared to fall into one of two categories; those that were focussed on the application of techniques and those who focussed on their ability to piece together information (Student B), and be independent (Student F). The student quotes however, gave the impression overall of a perception of understanding to involve a deep approach to learning with Student E and F valuing the personal epistemology dimension of experience of knowing. Typical comments included:

Student F:

> "I'd say understanding is probably, probably being able to do the sums without having to have the lecturer there to guide you. To be able to use SPSS without the lecturer"

Student E:

> "To be able to teach it, if you've understood it you can teach it to someone. To be involved in the lecture in the end and at the beginning. If you've understood it you don't get lost, because once you get lost in a lecture you find it very hard to find the thread of it".

Student A:

> "…being able to use the methods through a better baseline knowledge of all the different methods"

Student B:

> "To be able to piece together all of the, to piece together the information and to be able to apply it to different situations"

Student D:

> "I think with the statistics its understanding how to apply the statistics. I suppose it's quite similar to a mathematical sense, yes knowledge and understanding are quite related in statistics"

- *Learning*

Students defined learning in the module as 'application' (e.g. when and how to apply, application and selection), or taking in information. Students D and E appeared to have a deep approach to learning with Student E also having a belief in evolving knowledge. The comments made by Students C, D and F suggest application and the process involved.

Student F:

> "It's probably learn how to analyse the data, to input it correctly. Just being able to show that you can actually do the equations, you can talk about the ANOVAs and what not; explain to somebody who doesn't know and for them to understand what you're talking about".

Student E:

> "It's the act of taking in information and adding, actually knowing it. There's also methods of learning, in stats you might prefer one method of learning, where teaching assistants help you. In lectures, learning is the, it's more self-….."

Student B:

> "…It's being able to apply it…I guess you kind of need the knowledge and understanding before you can learn it; because to learn something you need to be able to know what's going on really"

Student D

> "I suppose with the statistics it's very much the same as knowledge and understanding. Learning how to use the statistical tests. You don't need to develop an opinion about whether they're good or not, it's just they are what they are"

Student C:

> "…learning is knowing when to apply it…learning is what you've accumulated so far and to apply that to your project"

6.2.2 Summary and conclusions – Research Methods and Statistics

Students' perceptions of their teachers' role in the Research Methods and Statistics module fell into two distinct categories; those who thought the teacher was there to pass on information to the students; and those who thought the teacher role involved being an advisor or facilitator. These views were also evident when students were asked about their own role in the teaching and learning process. They saw themselves as either a 'reader', or there to take in information. The teachers aim (as perceived by the students), was for students to gain an understanding, or for the teacher to pass on information to the students in preparation for the examination at the end of the module.

When asked about assessment, two distinct categories again emerged. Students either focussed on the forms of assessment used, or the abilities being tested by the differing modes of assessment. Success within this particular module was perceived as doing well in the examinations, or being able to apply and understand what was being taught. To this end, the best way to learn within this particular context was to attend lectures, read around the subject area, and practice, or a combination therein.

With regard to knowledge, understanding, and learning within the Research and Statistics module, students differed in their responses for each of these aspects of teaching and learning in higher education. For example, student's expressed knowledge within this particular module was about application (Student A, F), understanding facts and rules (Student B, D, E), or reading and understanding (Student C). Application was again the view of the majority of students (Student A, B, D, F) when asked about 'understanding'; whilst Student B also defined understanding as the ability to link or piece together information, and Student E defining understanding as the process of engagement within this particular context. Finally, when asked to define learning in the module, the majority of student again highlighted application (Student A, B, C, D, F). The exception being Student E who thought learning was about taking in information and adding to it.

Students who saw their role as a 'reader' had a high score on the DEBQ for 'evolving knowledge' and 'experience of knowing'; whereas those students who thought they were there to take in information, scored high for 'certain knowledge' - A pattern also evident when students were questioned about their perceived aims of their teacher. Those who thought the teachers' aim was for them to gain an understanding of the subject scored high on the DEBQ for experience of knowing and evolving knowledge; and those who thought the teachers aim was to pass on information and for them to pass the examination scored high for certain knowledge on the DEBQ (Table 6.1). Students scoring high for certain knowledge also believed that to be successful within this module, one had to do well in examinations, and that the best way to learn was to practice. These students also expressed a belief that knowledge, understanding, and learning involved 'application'.

The findings suggest that one group of students were more discerning, giving more thought to the process of learning and how it involves knowledge and understanding. This group of students when discussing 'application' were concerned with the reasoning behind the application of tests and techniques; why one type or level of analysis was more appropriate for a given situation and the reasons for this. This involved questioning and an intention to understand rather than just an acceptance of what methods and techniques were available to apply to the research they were conducting. Acceptance with a conspicuous absence of questioning was evident in the other group of students. These students had the intention to take in information, and had an accompanying focus on the product of learning, which included application without an apparent concern for the reason why they were using a particular test or technique. Moreover, consideration of the particular strengths and weaknesses of the methods being used seemed to be lacking; and a focus on successfully passing the assessment was a priority.

It is evident from the interview data for this particular module of study, that students had differing conceptions of the different aspects of teaching and learning in higher education. The author would contend that this variation in student perceptions of their experiences can be attributed to their personal epistemologies. These differing conceptions appear to reflect, in part at least, the conceptions of learning put forward by van Rossum and Hamer (2006), which are hierarchical in nature and include: increase of knowledge, memorising, memorising and application, understanding subject matter, understanding reality, and self-realization. These mixed perceptions and views within the same module suggest students within the same context have differing personal epistemologies. Chapter Four and Chapter Five clearly demonstrated that there are differences between groups of students studying different modules regardless of whether these are within or between disciplinary fields of study. This is certainly something that warrants further exploration in the future with regard to why these variations occur and the potential influential factors that are associated with these variations.

It appears that students who believe in certain knowledge use what can be described as a surface approach to learning. Conversely, students who believe in evolving knowledge and experience of knowing appear to favour a deep approach to learning. This suggests an association between the personal epistemology of students and the approach to learning they adopt. However, this is too simplistic a conclusion to capture the complexity of the teaching and learning dynamic. How one influences the other is yet to be established. Is the influence unidirectional or bidirectional? This is certainly an avenue of research worth pursuing, particularly with regard to teacher and student personal epistemologies and their approach to teaching and learning, and how these interact to influence groups of students and also individual students within these groups to form the student learning experience.

6.2.3 Memory and Perception Student Interviews

- *Role of the teacher*

When asked about the role of the teacher, students' responses from students in the Memory and Cognition Module fell into two main categories. One group felt the role of the teacher was to guide or facilitate their learning (Student H, K, L, M); the other to provide and pass on information, which reflected a surface approach to learning and a belief in certain knowledge (Student G, I). Typical comments were:

Student H:

> "Give an outline of the stuff we need to learn although for cognition so far he's helped us more than most lecturers…He's teaching cognition and memory and he puts that into practice with us, rather than just talking about it he involves us".

Student K:

> "Essential, certainly personally I find without going to lectures you miss out huge chunks, it's like a steering…So you need to be steered in the right direction, and also it's like getting feedback and actually having a chat and finding out if you've got a question and you don't understand that's where they come in isn't it".

Student L:

> "To guide us I guess in the directions that, there's like so much information, to focus it down sort of thing otherwise we won't know where to go. So to put across the knowledge in a 'bitesize' format".

Student M:

> "To communicate to us the course, the content of the course but on a sort of one-to-one sort of basis…And to sort of guide us through it".

Whereas comments from students who saw the role of the teacher as a provider, someone who passed on information were:

Student I:

> "You sort of just go in and listen to the material really and take what you want from it and you all do the same exam at the end. So it's not like it's a small based thing where its encouragement or anything like that, it's just a presentation".

Student G:

> "Basically tell us about the module really, that area that he's talking about in detail. To teach us about it".

- *Role of student*

Students when asked about their role in the teaching and learning process, focussed either on taking in information, and doing well in the assessment, which reflects a surface approach to learning (Student G, L, M); or being an independent learner, and someone who participates in the teaching and learning process, through reading around the subject area (Student H I, J, K), which are characteristics of a deep approach to learning.

Students who regarded their role as passive and to take in information commented:

Student M:

> "Well to take what they give me and use the resources that I've got and learn it and do the best I can in my assessment and essays and exams"

Student L:

> "Generally, the whole thing, okay specifically to pass the exam, but then those who are really interested in the subject to do, you want more than just to pass the exam".

Student G:

> "To take in the information and demonstrate that you've actually learnt something".

Students who wanted to be more than passive observers, preferring instead to take an active role in their learning commented:

Student K:

> "I think I've got a responsibility to be there, to sort of attend lectures and I think that's very important…To participate and try and do as much as you can you know to be involved."

Student J:

> "If I've got a question to confront them about the question because then I'll be able to understand more by bringing my own personal experience into the whole spectrum of learning".

Student I:

> "I'm doing it off my own back, so when I go to the lectures, it's when I decide, and if I don't it's my problem. So my, is sort of, it can be a bit independent, I don't know how to describe it really…It is just more sort of independent, more sort of your own ambition that drives you rather than somebody else questioning you".

Student H:

> "It's definitely; you're definitely more involved than you are at school where it's like you have to do it because the teachers tell you what to do. You've got a lot of responsibility to take an interest in what you are doing, like you've chosen to do it so you should be interested in it I think. Like reading around the topic and stuff and I find if you're interested in something you remember it better anyway".

- *Teachers aims*

Student perceptions of their teachers' aims like within the RMS module, could be divided into two distinctive groups within the MP module. One group reported that the teacher wanted them to pass exams and get a good degree, and to take on board the subject matter. This suggests a somewhat surface approach to learning and an information transmission view of teaching (Student G, I J, L). Conversely, other students intimated they thought the teacher was looking for them to display ‘understanding’ in the form of discussion of the subject matter that involves engaging with their peers and the teacher. An approach to learning that was deep, and an approach to teaching that focused on conceptual change (Student H, K, M).

Students who thought the teachers aims were results oriented and based on exam results and who alluded to a surface approach to learning, typically commented:

Student L:

> “Ooh goodness me I haven’t really thought about it. Main aims of the teaching? Well to, it sort of goes in with the first answer really, to fulfil the criteria of what they need to get across to us, make sure they’ve covered everything that they, things like ‘key elements’ to that area. I really haven’t thought about it much at all”.

Student J:

> “I don’t know teach you the module so you understand it fully. The content, the research”.

Student I:

> “His aims are to make sure we’re learning basically in a way that is ‘understandable’ and organised, and he puts them all on ‘Blackboard’ as well so you can go back and refer to them if you miss or anything like that”.

Student G:

> “I think basically, just talk about the area that they’re supposed to teach, basically research, what does this mean for us. At the beginning of the module you usually get an outline of what they’re supposed to teach us, like what they’re going to be going through. They do stick to it”.

However, students who thought the teacher aimed to give them the ‘basics’ and encourage them to read around the subject, were more independent and intrinsically motivated.

Student H:

> “I think it to help us learn the basic stuff and also encourage us to read around the topic and to be interested in it not just to learn it to pass”.

Student K:

> “It’s very kind of proactive, he does sort of experiments but not ‘strict experiments’ but ones where you take part in them so you’re actually experiencing them”.

Student M:

> “Probably, to make it interesting, so it’s not just loads of facts and figures, so it’s concepts we’re learning, and to make us want to learn it, to make it interesting for us to learn and to get the information across as he would like us to see it”.

- *Assessment*

Students in the Memory and Perception module focussed on the assessment methods used rather than specific abilities. Students agreed that multiple choice questionnaires (MCQs) assessed recall, facts, recognition, and that this method encouraged regurgitation, which reflects a surface approach to learning (Student G, I, J, K). However, students did differ in their perceptions of what a short answer question (SAQ) assessed. Some students had the misconception that a SAQ assessed recall and knowledge and its application in novel situations (Student I, L); whilst others thought it assessed in-depth understanding, and the linking together of information (Student G, J, K).

Student K:

"When we're looking at MCQs they're looking at your direct knowledge of things I suppose have you done the reading do you know who did what and when. When we get things like SAQs they're going to be looking for a more in-depth knowledge and how you organise that I suppose, to be concise to be clear, and I suppose you'd be expected to show the extra reading that you've done…I'm very good at exams, I can 'cram' do a 12 hour stint the night before".

Student L:

"MCQ you're mainly testing recognition and recall. SAQ is recall and primary knowledge to novel situations".

Student J:

"Well MCQs is just to see if you know it isn't it really? They try and see if you know it, basically a process of elimination just by looking at the option available. The SAQs is seeing if you understand it, where you are writing your opinion down and trying to answer the question".

Student I:

"I think that especially MCQs are very knowledge based, so very fact, it's not like you have to write an essay on them and give a complete understanding, it is just, you look at the question, it's recognition and recall we talk about it in the module, you know recognition is easier, if you've read something before you might not be able to think of it in an essay, bit if you see it written down you'd know which one it was. (SAQs) They're still not essays, we haven't done them yet but I can imagine the questions will be basically describe the aspects of, describe what so and so found in his research and stuff, rather than critically analyse this (author- so they're quite particular), yes that is right, yes".

Student G:

> "I think with MCQs it's just the basic, it's not really understanding, yes I suppose understanding but not 'in-depth' it more 'shallow' learning like what is memory. With SAQs and essays it's a more 'in-depth' knowledge, it's actually understanding things and linking them to other areas of psychology".

- *What students need to do or know*

Students, when asked what they thought they needed to do or know to be regarded as successful within this particular module, could be partitioned into two themes. Some students seemed to either focus on getting good grades, learning facts, and learning what was taught in the lectures. As with previous questions, these comments suggest a surface approach to learning and a belief in certain knowledge (Students I, L, M). Students who differed in their response emphasised doing a lot of background reading, demonstrating how they understood 'links' rather than viewing the subject as separate pieces of information, which suggests a deep approach to learning and a belief knowledge is evolving as a consequence of the process of applying oneself through, for example, reading around the subject and thus gaining a 'better' understanding (Students H, K).

Students who focussed on learning facts, getting good grades and learning what was taught typically commented:

Student I:

> "Well I don't think I did too badly, I haven't had the results back, but for that MCQ was to write it out over and over again. I think that depends on, it's different for different people (me - so it's rote learning basically and memorising), yes memorising, yes. I have a pad of paper and I use it all basically, there'll be a side that'll have three points on it, so I'll write the three points about ten times, write another three on another side, then go back and test myself. It is 'parrot fashion', to be successful in this particular module I don't think you have to do any more than that, I hope not anyway

(me – is that the opinion of your fellow students?) I think so yes. As far as I know I've spoke to a couple of my friends about revision and stuff because we had a couple of MCQs at the time and I said, and we had an essay due for something else as well and I was saying that this one should be okay because it's a case of facts one after the other and they all pretty much agreed"

Student L:

"You could get a first, but that could be through either just learning specifically what they teach you in the lectures and everything or in the module I mean, you might get a 100% but they might just be testing you on specifically what's in the module, which means you only have to read the lecture notes and stuff".

Student M:

"I suppose to get a good grade, but that's a shame really because I think not everyone can do well".

"Exams well. That's all I think, if you've got ground knowledge and you can do an exam well I think you can pass the module. As long as you've got ground knowledge you can pass it, don't know if you'll be able to pass it well, but you'll be able to pass it".

On the other hand, students who perceived the context required background reading and making links commented:

Student H:

"I think you should understand the different theories of memory and there are quite a few…There is quite a lot to decipher, and it is interesting and I like it".

Student K:

> "A lot of reading. I think you have to look at what the lecturer is looking for at different times"

- *Best way to learn*

Again, it appeared students could be partitioned into two distinctive groups, those whose comments suggested a strategic approach to learning and those that suggested a deep approach to learning. In addition, the comments made alluded to different personal epistemologies. For example, Student M and I appeared to have a strategic approach to learning; with Students L and J a personal epistemology reflecting a belief in subjective knowledge.   The best way to learn in the module according to some students, was either to do things that 'get you noticed'; to 'cram', which reflects a surface approach to learning (Student I, M); whilst others had views reflecting a deep approach to learning and a belief in evolving knowledge including: to review and summarise by undertaking a lot of background reading, asking questions, and questioning ideas (Students J, K, L).

Students who thought the best way to learn in this module was to be strategic and achieve the maximum with the minimum of input commented:

Student M:

> "For me the best thing I could do is do what they see really, go to the lectures and do the reading they recommend and write out your notes".

Student I:

> "If I was honest with them I'd say get your books out two days before and learn them. But you know I suppose to really excel in it to come out with a good understanding of it at the end rather than a good grade, which I suppose is a bit different. If you're after a good grade you could probably do it like I am, but if you're not, if you're after an

> understanding of different aspects of it, different things that integrate with it, like I was saying with neuropsychology you could build an understanding of the different systems and process that are going on in the brain and related research from that point of view. But I don't think you need it to get a good grade".

Other students however, who were focussed on reading around the subject, questioning ideas, and getting actively involved in the teaching and learning process typically commented:

Student K:

> "…do a little reading around the subject. Also to break it up very much like he does with examples" and get "into the habit of reviewing what we've done".

Student L:

> "Well I would say to them go to all the lectures because reading it you can't get a complete feel for it as you do sitting in the lecture. Listening out for what they're saying and think about the opposing views. Question a lot what is said rather than just sit there and accept what is said".

Student J:

> "To sit down and write notes…Rather than just accepting what they're saying as being right and correct because everyone has got their own theory about the world, you can't just take everything for granted".

- *Knowledge*

One group of students expressed that knowledge within this particular module, was pieces of information or facts to be memorised and thus focussed on knowledge as content, which reflects a surface approach to learning (Student I, M), a strategic approach to learning (Student I) a belief in certain knowledge, and teaching that emphasises information transfer (Student I, M). A second group viewed knowledge as based on understanding through interpretations and making sense of ideas and concepts. This group reflected an approach to learning that was deep and a belief in the subjectivity of knowledge (Students H, K, L). The comments of Student J emphasised the 'experience of knowing' dimension of personal epistemology, whilst Student L's comments reflected a belief that knowledge was evolving and somewhat subjective.

Students who perceived knowledge within the particular context of this module to be facts and content based commented:

Student M:

> "I don't know, the stuff that he gives us that we don't already have and we learn".

Student I:

> "…quite systematic if you know what I mean, I'd get the lecture notes and I'd go through them and write them and redo them until I had a thorough understanding, I'd write them out over and over you know, as if I was learning my times table or something like that and that worked as well. The way that its presented its sort of quite – it will have one fact then another fact underneath it".

Students who focussed on gaining an understanding commented:

Student H:

> "To understand the theories and models of cognition and things. Understanding mainly, because it's a lot of it's, I can really explain. Quite a lot of it's biology because it's about the brain. You need to understand things but there's also like studies and things that you can relate to things".

Student K:

> “I would say that knowledge is having a certain overview of the subject, getting to grips with the subject rather than just ‘rote’ learning, having a ‘deeper’ understanding and trying to cover all the different aspects of it and I suppose add a deeper knowledge…I think that we’re given a main text and most of what we’re going to cover is going to be in this text, it’s a bit of a cop out because you can just buy the book and read it chapter by chapter whichever is appropriate or relevant. The knowledge is to really get to grip with it in everything and to do that around your reading and around your subject”.

Student L:

> “It would be interpreting information and applying it to new and novel situations”.

- *Understanding*

Students in the Memory and Perception module generally perceived understanding to be a ‘holistic’ process which involved questioning, seeking meaning, and applying knowledge, characteristics of a deep approach to learning (Student H, J, K, L, M). However, one exception was Student I who suggested this particular module encourages surface and rote learning.

The majority of students emphasised that a deep approach to learning was an essential part of understanding, and that knowledge was subjective and therefore open to question.

Students who viewed understanding as ‘holistic’ and involving questioning and seeking meaning commented:

Student H:

> “A lot of people see it as if you just memorise it you can regurgitate it but I think really you need to, it’s easy to remember something if you understand it. If you don’t understand it in one way, if you can get another book out you can see it in another way, and you can ask your friends if they understand it. It’s definitely easier to talk about things in exams and stuff if you understand rather than learning it ‘off by heart’.

(author – do you tend to discuss things with fellow students?). Well I think in the topic of psychology you do because a lot of it comes up in everyday life such as how do you revise, and that's memory. But I'm not sure if other people do that with other subjects though".

Student K:

"Getting the concepts right, the theories, the research that has been done and to piece them together in a sense. And to go back to why would they try that? Why would they do that? And to see where all these different aspects come together".

Student L:

"It's the ability of using the knowledge, to know when you can use the knowledge and when you can't".

Student M:

"There's a lot of concepts and stuff that the lecturer will put forward to you. If you can comprehend that and sort of apply it, like using the knowledge as well as the rest of the field or module. Like using the knowledge as opposed to having it in front of you or whatever (author – so it's applying it in different contexts?) yes".

Student J:

"Not only being able, no, being able to question it, to ask questions about it. Kind of think of a contrasting idea so you know it and understand the meaning behind it and question it".

However, as stated previously, one student differed in their perception of what understanding was in this particular module and commented:

Student I:

> "There are a few things that you need to take from other areas, there's a bit of background knowledge that you need to be able to know what he's on about basically… I think it's all, you know you can learn it all sort of 'parrot fashion' the understanding is quite a shallow thing you know, a basic understanding a list of facts that you should know, and you need knowledge of psychology in the area to know it". (Student I)

- *Learning*

Similar to their views about knowledge, two particular student groups emerged. Learning was either a *process* whereby an 'understanding' took place that was based on opinion, and which involved how and when to apply learning. This group made comments that alluded toward a deep approach to learning (Student G, M) and a belief in the evolving knowledge dimension of personal epistemology, which however, for Student I was a consequence of accumulating facts, suggesting a surface approach to learning. Learning as a *product* involved taking in information, memorising it, and then regurgitating it. This was reflected in comments made that suggested a passive, surface approach to learning where the onus is on the teacher to transmit information to the student (Student J, K, L), and one could argue a belief in certain knowledge.

Students who saw learning as a product commented:

Student K:

> "Learning is just listening to what is being taught to us, to do the reading and I suppose to be able to use our minds in a way. To take it all in then churn it all back out again isn't it?"

Student L:

> "Learning is picking up the knowledge in the first place".

Student J:

> "I suppose just paying attention and taking in the information and being able to understand it as well".

Student I:

> "I think basic knowledge of the facts, a gradual build-up of facts as you go through each lecture (author: So it's a sort of cumulative process?). Yes, sort of".

Students who saw learning as a *process* commented:

Student G:

> "Understanding, taking in knowledge, demonstrating understanding. I think being able to link the information to like 'real-life' settings like there's no point learning something if you can't relate it to real life".

Student M:

> "Getting your knowledge and your understanding and sort of, you've probably learn it if you can teach it to someone else in the same sort of way that you've had it taught to you. If you know something that well you can be pretty sure you've learnt it I think".

6.2.4 Summary and conclusions Memory and Perception Module

As with the Research Methods and Statistics (RMS) Module, students in the Memory and Perception (MP) Module could be partitioned into two distinctive categories. That is, those who perceived teaching and learning as involving understanding and the linking together of concepts and ideas, suggesting a deep approach to learning (Student, A, B, C, H, I, J, K). Conversely, other students perceived teaching and learning as regurgitation, recall and recognition, suggesting a surface approach to learning (Student D, G, L, M). These two differing categories of students can be defined as having a *product* or *process* orientation toward teaching and learning. In essence, students either perceived their teachers role as an advisory or guiding role, or as a presenter or deliverer of information. This view was also revealed in these students' perceptions of their own role, as they either saw their role as a 'reader' who is independent and seeks to understand the topic; or as a 'receiver' who takes in information and whose main aim is to pass the examination at the end of the semester. When asked what they thought the teachers' aims for the module were, students intimated the teacher was either focussing on the exam and thus content, coverage, whereby passing on information was a priority. Alternatively, the aim was to give the student background knowledge where the emphasis was on the student themselves to start with the 'basics' and from there make links between different concepts.

The majority of student responses when asked about assessment within this particular module focused on the assessment methods themselves. These students stated the MCQ was a 'shallow' representation of their learning; whereas a SAQ was a 'deep' representation of what they had learnt. There was however, one exception where a student stated a MCQ measured 'deep' learning and understanding.

Student views about what they needed to do or know in order to be successful within the module could be divided into one of two categories, emphasising again, what can be described as a 'deep' or 'surface' view of the requirements and demands of this particular module. Students with a surface view focussed on the examination and a 'rote' approach to their learning (Student A, B, L, M, I); whereas students with a deep approach to learning emphasised linking information and reading around the subject area (Student C, D, H, K).

Students were almost unanimous in their view that the best way to learn in the Memory and Perception module was to read around the subject and summarise and review the subject matter at regular intervals (Student A, B, C, D, E, J, K, L). There were only two exceptions. Student I who perceived the best way to learn was to 'cram' suggesting a surface approach to learning; and Student M who stated ‘do what they say’ as the best way to learn suggesting a strategic approach to learning.

With regard to knowledge, understanding and learning students again differed in their viewpoints. Knowledge for the majority of students was a case of understanding and or interpretation within this module, and linking concepts (Student B, D, E, H, K, L); these students (apart from Student E) had a high score for a deep approach to learning, and evolving knowledge. Students who did not express this view expressed that knowledge was something that could be received, suggesting a surface approach to learning and a belief in certain knowledge (Student A, I, M). Interestingly, these students had a mix of a surface or deep approach to learning; and a belief in evolving knowledge or certain knowledge, with no particular pattern evident.

‘Understanding’ was defined in different ways suggesting different approaches to learning characterised by different intentions, expectations and values, which one could argue are a consequence of differing personal epistemologies and approach to learning. For example, some student comments referred to a deep approach to learning involving questioning and the linking together of ideas and information (Student H, J, K), and these students scored high for evolving knowledge and a deep approach to learning on the DEBQ and ASSIST. A second group who also referred to a deep approach to learning and using knowledge in different contexts (Student B, D, E, L, M), scored high for a deep approach to learning and an belief in evolving knowledge, but with the addition of a strategic approach to learning (Student B, D) and a belief in subjective knowledge (Student D, L). One student fell outside of these groups, and suggested understanding was all about the exam at the end of the semester (Student A). This particular student scored high for a deep and strategic approach to learning, and a belief in evolving and subjective knowledge.

The findings suggest student perceptions and their ‘understandings’ are complex and involve multiple, interconnected conceptions. These are susceptible to the demands of the context, a context which is perceived in a different way by each individual. That is, individuals may have similar perceptions and conceptions, but the way in which they experience phenomena will never be the ‘same’. And this may be a result of differing personal epistemologies.

However, the context does have an overarching personal epistemology, which includes its own values and perpetuates particular ‘knowledge’, whilst glossing over, diverting away from, or failing to acknowledge other ‘types’ of knowledge. It is this process which SHAPE attempts to both describe and capture.

For learning the comments made by three students (A, I, L) suggested a surface approach to learning, and these students scored high for evolving knowledge on the DEBQ, but had different approaches to learning as measured by the ASSIST. For example, Student A, scored high for a deep and strategic approach to learning, Student I scored high for a surface approach to learning, and Student L scored high for a deep approach to learning. Other students’ comments suggested a deep approach to learning (Student B, C, D, and E). These students also scored high for evolving knowledge, and high for a deep and strategic approach to learning, apart from Student E who scored high for a surface approach to learning. Again, this emphasises the complexity of the associations between personal epistemology and approach to learning, and how this has the potential to influence perceptions of different elements of teaching and learning environments.

6.3 DEBQ Comparisons: Domain-Specific Variations

6.3.1 Results

In addition to, and as a way of supplementing the interview data, comparisons were made between scores on the DEBQ for students studying in one of the two psychology modules. These analyses therefore contribute to answering how the academic epistemologies of teachers influence the personal epistemologies of their students. A t-test (unrelated) showed a significant difference for three of the four dimensions of personal epistemology (Table 6.1) between the students studying either Research Methods and Statistics or Memory and Perception. That is, groups of students differed significantly for the certain knowledge, experience of knowing and evolving knowledge dimensions of personal epistemology, and according to Cohen (1988) the effect sizes were large for certain knowledge, and for experience of knowing; with a small effect size for evolving knowledge.

Table 6.1: Comparison of psychology students as measured by the DEBQ (between-subject)

		N	Mean	Std. Dev.	T	Df	Sig. (2-tailed)
Cert	**MP**	89	2.8258	.46604	-4.365	109	.000
	RMS	22	3.3295	.55574			
Evo	**MP**	89	3.8090	.66787	2.055	109	.042
	RMS	22	3.4545	.92465			
Subj	**MP**	89	2.7556	.53430	-.396	109	.693
	RMS	22	2.8068	.57700			
Exp	**MP**	89	2.9213	.74582	2.678	109	.009
	RMS	22	2.4545	.67098			

MP – Memory and Perception; RMS – Research methods and Statistics; Certain Knowledge (Cert); Evolving Knowledge (Evo); Experience of Knowing (Exp) Subjective Knowledge (Subj).

Table 6.2: Mean responses on the DEBQ and ASSIST for all psychology students who were interviewed

	Personal Epistemology								Approaches to Learning					
	Subj (MP)	**Subj (RMS)**	**Cert (MP)**	**Cert (RMS)**	**Evo (MP)**	**Evo (RMS)**	**Exp (MP)**	**Exp (RMS)**	**Deep (MP)**	**Deep (RMS)**	**Surf (MP)**	**Surf (RMS)**	**Strat. (MP)**	**Strat. (RMS)**
Participant														
A	3.50	3.75	3.00	2.33	4.00	4.50	3.00	2.00	3.44	3.69	2.69	2.56	3.30	4.00
B	2.25	2.50	3.33	3.33	4.00	2.50	3.50	3.00	4.19	4.19	2.88	2.88	4.35	4.35
C	3.25	2.00	3.00	3.67	4.00	2.50	3.50	2.50	4.75	4.38	1.63	1.94	4.50	4.65
D	3.00	1.75	2.67	3.83	4.00	3.50	2.50	3.00	4.06	3.88	3.56	3.88	3.95	4.40
E*		1.25		4.17		3.00		2.00	3.00		3.56		2.45	
F		2.00		3.50		2.00		2.00	3.94		2.75		4.45	
G	3.50		2.50		4.50		2.00		3.31		2.81		2.30	
H	2.50		2.50		3.00		3.00		3.81		2.19		3.90	
I	2.25		3.33		4.50		2.00		2.94		3.56		2.75	
J*	2.50		2.17		3.50		2.50							
K	3.25		2.00		5.00		2.50		4.13		2.56		1.65	
L	4.25		2.83		4.50		3.50		4.56		2.69		2.85	
M	2.75		3.33		4.00		2.50		3.50		2.50		2.80	
N	2.50		2.50		5.00		4.50		3.69		2.88		3.80	

* Data missing for one or both modules (*MP = Memory and Cognition Module; RMS = Research and Statistics Module)*

A separate, second comparison was made between scores on the DEBQ for student respondents who were studying both the psychology modules. A t test (paired) showed a significant difference for certain knowledge scores between modules (Table 6.3), which again according to Cohen (1988), was a large effect size. Together the analyses from the paired and independent samples t tests suggest support for the domain-specificity of personal epistemology and the concept of SHAPE.

Table 6.3: Comparison of means as measured by the DEBQ for psychology students studying both modules (within-subject) (N =13)

	Mean	**Std. Dev.**	**T**	**Df**	**Sig. (2-tailed)**
Exp MP – RMS	.26923	1.05308	.922	12	.375
Subj MP – RMS	.21154	.86510	.882	12	.395
Evo MP – RMS	.42308	1.09632	1.391	12	.189
Cert MP – RMS	-.48768	.75292	-2.335	12	.038

MP – Memory and Perception; RMS – Research methods and Statistics; Certain Knowledge (Cert); Evolving Knowledge (Evo); Experience of Knowing (Exp) Subjective Knowledge (Subj).

Taken together, these results suggest personal epistemology is indeed domain-specific and that students have different perceptions about knowledge and knowing in different teaching and learning contexts. These findings require further investigation to establish potential explanations for these differences.

Further analyses comparing the dimensions of personal epistemology and approaches to learning for the 13 students studying both modules produced some interesting results. A Pearson Product Moment Correlation revealed a significant correlation for evolving knowledge and a deep approach to learning ($N = 13$, $r = 0.557$, df 12, $p < 0.05$) in the Memory and Perception Module. In the Research Methods and Statistics Module, significant correlations were displayed for experience of knowing and a surface approach to learning ($N = 13$, $r = 0.585$, df 12, $p < 0.05$); evolving knowledge and subjective knowledge ($N = 13$, $r = 0.606$, df 12, $p < 0.05$); and a negative correlation between certain knowledge and subjective knowledge ($N=13$, $r = -0.795$, df 12, $p < 0.01$). According to Cohen (1988), values above 0.5

for the Pearson Product Moment Correlation represent large effect sizes and thus emphasise the importance of these findings.

The association between students' self-reported belief in evolving knowledge and a deep approach to learning within the context of the Memory and Perception Module suggest that within this module, for this particular sample, students have an ethos that leans toward more sophisticated views about learning and knowledge.

One explanation for the association between the dimension of experience of knowing and a surface approach to learning may be that students believe they can rely on both the experience of their teacher and their own personal experiences in relation to the subject matter. This may involve a process whereby students practice techniques in the form of different statistical tests, and the use of dedicated statistical software (i.e. SPSS). This seems a plausible explanation as Research Methods and Statistics can be seen as a subject, that once learned through experience, it is only a matter of utilising the 'tried and tested' ways to come up with the 'correct' solution.

The association between the dimensions of evolving knowledge and subjective knowledge in the Research Methods and Statistics Module suggests as a group, students within this module believe knowledge is constantly changing due to interpretation of information gleaned from a variety of sources including conversations with others.

The negative association between the dimensions of certain knowledge and subjective knowledge suggests these two dimensions are perhaps opposite sides of coin, so to speak. This view is a tentative one however, as this association was only evident in the Memory and Perception Module. Again, this is something that would be worth pursuing in future investigations.

6.4 Teacher Interviews: Memory and Perception (MP) and Research Methods and Statistics (RMS)

To ascertain teacher views about knowledge and teaching and learning interviews were conducted using the same questions asked of students in their interviews. This would permit a comparison to be made between the teacher and their students, and would highlight differences or commonalities in their views.

6.4.1 Memory and perception teacher interview

- *Role of teacher*

In the Memory and Cognition module the teacher saw their role as a guide, facilitator; a ‘shaper’ of the learning environment, or an ‘expositor’, who was there to encourage thinking in new ways about material. The teacher comments suggested an approach to teaching that involved conceptual change within students, and a teacher personal epistemology reflecting a belief in evolving knowledge:

> “I think it’s an opportunity to guide the students in-depth into memory. I think this is my opportunity to sort of lead a tour through the research findings and topics in memory, and also try and bring in applied situations as well…I mean I think, yes, I mean part of my role is simply as an ‘expositor’ trying to explain some of the key concepts. Part of the role is to sort of set up situations where they can think in new ways about this material, and to encourage them to sort of integrate the material as I’m presenting it to them. So I do take time in each lecture for them to sort of do their own short summaries of the material, to get them to think about it in the context I was just talking about before”.

> “I guess sort of a combination of a guide through this literature and ‘shaper’ of this environment where they just don’t receive but ‘engage’ and think about it as much as possible”.

- *Role of student*

The teacher perceived the role of their students as having many different facets including asking questions, questioning ideas, summarising accurately, applying what they were learning to everyday life, linking key ideas, and taking into account different perspectives. These reflect a belief in a deep approach to learning, which involves taking an active role, discussing ideas with their peers, and displaying the ability to explain to others.

> "I do take time in each lecture for them to sort of do their own summaries of the material, to get them to think about it in the context I was just talking about"

> "…big emphasis on being able to make the connections between data from important experiments…I think making links, connections, involvement of different topics both within the module and across modules, which is harder to do, drawing the connections"

> "…provide, understand and explain the key evidence"

- *Teacher aims*

The teacher stated their aim was for their students to gain an in-depth, good grasp, typified by an understanding of the connection between experiments and 'real life'. Again, this typifies an expectation that students should adopt a deep approach to learning.

> "As I say the overall idea is, and I think it's in common with other year 2 modules, is to go in-depth down in to a major topic in psychology (human memory). So the main aim really, by the end of the module they should have a pretty good grasp and understanding of the main themes and concepts and theoretical positions, and particularly experimental findings. I mean I hang everything, almost everything I say is hung around a particular key set of experiments, so I place a big emphasis on being able to make that connection between data from important experiments and the point that's, you know. So after each experiment I sort of say right "So
> what does this tell us about memory?".

- *Assessment*

With regard to assessment the teacher felt restricted by the large number of students. To address this issue, the teacher saw a MCQ as a solution to this problem. They did however, emphasise the structure needed to be good. The MCQ in this case was seen as a good way of probing knowledge as the student has to 'pick out' information. The teacher also expressed a belief that SAQs allowed students to generate information into a coherent argument with 'links' in the explanation. The teacher comments suggested they were looking to test their students 'deep thinking' attributes and abilities, which involved justifying their knowledge claims through understanding and explanation rather than rote learning and memorisation.

> "I guess part of my motivation is the classic breadth-depth thing. So with the MCQ between mid-term and final I feel I can probe knowledge, really of almost every individual concept… I do very much appreciate and enjoy the material I get back from Information Services on those MCQs. We get these spreadsheets and each item has a bar chart or a line chart telling you how well the performance on that or the particular test as a whole. I mean obviously the trick with the MCQ is that you want to write something that's not just from their early judgement basically, which one of these answers is familiar. So that is the trick. I think that takes a few iterations to come up with a 'battery' that really works. But admittedly, having set mine aside for a few days and having come back to them, I sometimes look at the questions and I have to think it out (laughs) and I wrote the test".

> "So then the short answers really give them a chance to explain, well it measures a little bit of depth. It's a bit more depth with fewer topics but they have to generate the information rather than have to pick it out of an MCQ. So they have to generate something coherent and we can see that link again between that data and the concept. And all of my questions, all five of the options say provide in some way or another you've got to give the evidence about your claims – justifying it with the data, then we're really seeing how they understand".

- *What students need to know or do in order to be successful*

To be successful in the MP module, the teacher highlighted how students needed to discuss ideas with peers, make links, and question ideas. This suggested students need to take a deep approach to learning, demonstrating conceptual change, manifest in their evolving knowledge.

> "At the risk of repeating myself, spend the ten minutes I give them in class ruminating about it and then making links and taking to each other. And again the 'star' students, the mature students come up and tell me they talk about it with each other, and I'm sure it's by far one of the most effective methods for encoding is to discuss something. So there's all that…And again this 'leap' that's required to say "well alright what does that mean?" What is the conclusion we can draw from this?"

- *Best way to learn*

A combination of factors contributed toward the best way to learn in this particular module. These included "listening to me", discussing with peers, and that practice aids memory. Thus, the teacher suggested students should passively absorb information whilst also displaying a deep approach to learning. This could be viewed as somewhat contradictory. However, it can also be argued these elements can be complementary as the teacher wanted to give students a basic grounding in the subject with the expectation they would then study in more depth either individually or within self-organised peer study groups.

> "I think it has to be a combination of approaches. Again there are many different ways to learn it robustly right? So listening to me explaining it can save a lot of time, if they were to go and study that topic and talk about it with their friends".

> "It's a fun module to teach because occasionally there are findings that I come across when I am reading preparatory literature for the module that I present to them in classes which are so clearly relevant to their own job as learners in the classroom that I have to stop and say "Look you have to particular think about this, this is an experiment that shows that if you encode something more deeply, you are more likely to remember it

than if you encode it shallowly". So I say if you practice this once a week instead of 8 hours in a row you're going to have a much better chance of remembering it, you know various simple obvious things. So it's a great opportunity to".

- *What knowledge is*

Knowledge within the module was described by the teacher as having more than one layer, and involved understanding key experiments, understanding in an abstract way, and making links between key findings. Layers, which can be viewed as reflecting an evolving knowledge, one that requires a deep approach to learning.

> "Sorry, I'm not sure what you mean? Well I think there's probably more than one layer to that. One layer is sort of understanding as I say of some of the key experiments that have been the most influential the procedure that was done, the results, what happened, those findings for memory. But I think the next level knowledge would be something like more and more abstract understanding of the systems that comprise memory…So as I say again, knowledge really to me, the key knowledge is really making that link between the key findings and, which in the end just come down to a few numbers don't they? This condition versus that, then making a link between key findings which in the end often is a few numbers – 100% correct in this condition versus that, and they probably make the link to say well alright, that's the link I need to make, what does that tell us about.

- *What understanding is*

The teacher expressed understanding as an evolving representation, an accurate and complex description, the linking of ideas, and ability to explain it; reflecting a deep approach to learning and a belief in the personal epistemology dimension of evolving knowledge.

> "Well I think there are many ways you can show understanding. By being able to explain it satisfactorily to somebody else who is new to the area. But to me again I keep coming back to this link about understanding. To me it really means to be able to take the data and say 'What does this mean? What does this tell us? What kind of

statement can I make about life based on this?' That's always a key element of understanding. More generally I guess understanding means, I mean it's hard to talk about it without talking about representation, that having a richer representation of the concept at hand… an evolving representation, and I would assume, I would hope a far more complex description, and it's not just the complexity that it's also accurate…So it's really that kind of representation that's changing".

- *What learning is*

When asked to define what learning was in the context of the MP module, the teacher emphasised a changing of the representation, enrichment and the elaboration of student naïve model. Again, this suggests a belief on the part of the teacher in evolving knowledge and a process of conceptual change for students.

"I mean it's just the process of changing their representation isn't it? I mean it's the process of going from the point where it's a very naïve model of memory in your mind where it's a kind of box to put things in, and probably initially discarding that and replacing it with something more sophisticated based, hopefully based on the evidence, again heavily emphasising….., so it's a change. So it's really an enrichment and sort of elaboration of that naïve model that we're after".

6.4.2 Discussion and conclusions Memory and Perception - Teacher Interview

The teacher in the Memory and perception module perceived their role to be one encouraging news ways of thinking for students. This in their words involved a combination of being "a guide, facilitator, shaper, and expositor". They wanted students to be able to link together ideas, ask questions and discuss these with others (peers and teacher). The teachers aim was for students to have a 'good grasp' of the subject, which this involved an in-depth understanding through making connections in their learning.

When discussing assessment the teacher emphasised how they were restricted by student numbers (they were large, around 300), and described how this had led to the use of MCQ and SAQ rather than essay type assignments. In their eyes the MCQ was about picking out information. However, they commented the MCQ had "…to be good". Meaning in this particular context, the MCQ had to probe for an in-depth knowledge. The SAQ was deemed as a way of testing the students' ability to make links between concepts.

To be successful in the Memory and Perception Module from the viewpoint of the teacher, there was again an emphasis on students discussing ideas with their peers, making links, and questioning ideas. This ethos was evident in the way the teacher stated the best way to learn in the module was through a combination of listening to the teacher, discussing with peers, and practice.

With regard to knowledge, understanding, and learning within this particular module the teacher perceived knowledge to be more than one layer. These layers included understanding key experiments, understanding in an abstract way, and the links between key findings. Understanding was the ability to explain things, and involved a linking of ideas and an accurate and complex description manifest in an evolving representation. Learning involved an elaboration of the student naïve model (teachers' words) whereby an enrichment and changing of the representation takes place. All of which reflect the personal epistemology dimension of evolving knowledge.

A theme that emerged in the Memory and Perception Module was one group of students mentioned the examination at the end of the semester, and these students also mentioned 'memorisation', 'rote' learning, and receiving information, when asked about their teachers' aims; what they considered to be success in the module, and what characterised understanding. Conversely, other students emphasised a need to make links between concepts and seeing the 'big picture'. These particular student perceptions reflected those of their teacher, who in the interview had expressed they wanted their students to 'understand', make connections, question ideas, and have discussions with their peers.

For students who expressed similar beliefs to those of their teacher in the interviews, no particular pattern emerged with regard to dimensions of personal epistemology as measured by the DEBQ. However, students whose beliefs about teaching, learning, and assessment differed from those of their teacher in the interviews, scored high on ‘certain knowledge’ and low on ‘subjective knowledge’ when measured by the DEBQ. Interestingly, the teacher in this module scored relatively high on the DEBQ for ‘certain knowledge’ (2.83) compared with their score on other dimensions. It may well be that some students’ professed personal epistemologies do converge with those professed by their teacher as suggested in Chapter Five, but this process is complex and needs further investigation. It appears that students with what can be regarded as more sophisticated personal epistemologies (as measured by the DEBQ) persist with ‘better’ learning strategies in the form of a deep approach to learning. This is important as there is the suggestion the more sophisticated student personal epistemologies are, the more impervious they are to aspects of the teaching and learning environment that encourage what may be construed as not being conducive to a learning experience that is both enjoyable and rewarding.

6.4.3 Research methods and statistics teacher interview

- *Role of teacher*

In the Research Methods and Statistics module, the teacher expressed how they outlined basic principles, emphasised application rather than theory, and regarded themselves as a ‘coach’ rather than ‘expert’. This suggests the teacher in this module had a belief that student knowledge would evolve as they gained experience, a process involving conceptual change that may be evident after an ‘incubation’ period whereby application of theory is manifest in the practicality of students using the ‘tools’ and techniques in subsequent research they conduct.

> “I suppose my role is to outline the basic principles that they need to know, how to do good research or apply good methods for their research. To give them the chance of having a bit of practice with some techniques…So I’m trying to give them a perspective that is more applied rather than a theoretical one. This is the last research methods module they have before they do their project, so we focus very much on what they are going to need exactly, and whether they are going to succeed or not…So as a general rule I would say it is as more of a ‘coach’ rather than an ‘expert’ I think…I

> mean you can see some attitude changes before and after the module but it's not the most common thing to be honest. I mean I'd love seeing more, yes you always see like two or three who come to me and say "you know I used to hate this but now I'm finding it you know". But it's not until they encounter the problem solving situation in which they have to apply the method, until that point it's very difficult for them to 'click' and that only happens in the 3rd year".

- *Role of student*

The teacher perceived the role of the student to be a creative one where they would use new techniques, and have the confidence and motivation to do so. In addition, the student role also involved understanding why they used particular methods and techniques of inquiry.

> "To explore, if that's a way of learning. Just memorising wouldn't work"

> "To be creative and not to be too afraid of using new techniques"

> "To understand why they are using it"

- *Teacher aims*

The teacher discussed how the module was driven by content, and how they had to show students a range of techniques, and ideally help them to understand why they would use particular methods and techniques. Again, application appears to be at the forefront of this particular teaching and learning context. This could be construed as reflecting a belief in the personal epistemology dimension of certain knowledge as the techniques are well established and offer a 'recipe for success' where the ingredients of differing statistical analysis and research methods are available to allow appropriate application.

> "Ok – of course it is a module driven by content, so I guess that what is I'm describing the module, the list of contents. Techniques, it's not so much about the studies, it's about the range of techniques. So the main goal would be to show them the range of

> techniques. A secondary goal I suppose is how to teach those. So it's a combination of formal lectures and labs because I want them to have both – a broad theoretical, knowing why and the labs in which they apply it. Personally, the ideal would be they understand why they are using it, whether they do or not is a different matter. But that is what I always it's almost my obsession, to try to put them in the point of view of a researcher rather than a statistician. So you are a psychologist you have to, you want to use these to answer a question…I try to emphasise the ethics so just to make it more dynamic, more lively. To step away from statistics and more into the research".

- *Assessment*

When questioned about assessment, the teacher described how the MCQ was tailored toward assessing understanding, which may be construed differently than understanding in the MP module where students had to "pick out information"; whereas understanding in the RMS module was achieved through having students work through practical examples and calculations, where they have to "think". An assessment strategy and teaching ethos aimed at conceptual change and tailored toward encouraging a deep approach to learning.

> "With the MCQ 75% I try to assess understanding I think, comprehension. Only in 20% of the questions or less I ask all these questions. So I always give a few obvious questions based on if they have read the handouts, these are at the beginning of the MCQ. If they know the topic a little bit they will be able to answer these, but for the majority of the questions you need to be able to think about it, something that you've read…The essays I want them to understand the output, the SPSS output, what they get. So I ask them all to give the output, to copy and paste the output and then explain what they see in that output. The way we mark it is the obvious observations get a certain scores, but there are extra marks for more intuitive, creative observations".

- *What students need to know or do in order to be successful*

To be successful in the module, students needed to be able to analyse their own data, and realise statistics was only a tool to be used, a means to an end so to speak. Again, it appears the teacher is looking for appropriate application of the available techniques, typified by an understanding that statistics is a tool to be utilised in the research process and not a determinant of the process itself.

> "To do is easy, they should be able to do the exam (laughs). Outside of the module they should be able to analyse their own data. To understand that this is no more important than to know how to use computers. I'd feel so happy if they would just relax. They need computers to write a paper but it is only something to help, it shouldn't be lost in the complexity of the stats. If they reach that understanding that would be absolutely fantastic".

- *Best way to learn*

The teacher emphasised how from their point of view, the best way to learn in the module was to explore not memorise. Thus, a deep approach to learning is both encouraged and required in order to bring about conceptual change through a personal epistemology involving a belief in the dimensions of experience of knowing and evolving knowledge.

> "To explore, if that's a way of learning. Just memorising wouldn't work, it's not about storing knowledge. Curious people would do well. A bit of structured guidance is good, so they don't get lost when they are exploring"

- *What knowledge is*

Knowledge in the module was the ability to be flexible and skilful in the opinion of the teacher. However, it is not clear whether they meant this in the context of using statistics, the SPSS software package for statistics, the use of different research methods or other elements that are part of this particular course of study.

> "To be flexible and skilful I suppose, it's very technical".

- *What understanding is*

Understanding from the teachers' point of view was to question why one was using a particular method in preference to another, and recognising the strengths and weaknesses of a variety of methods. This opinion suggests a belief in the personal epistemology dimension of experience of knowing, whereby a level of discernment is involved in selecting and applying the tools and techniques most appropriate for the task.

> "To get an understanding when you know why you are using one method, one technique, instead of another. Or if you only have one why you are using it, sometimes you only have one method, I know it seems strange. But to be aware of the limitations of that method. What kind of conclusion you can make or not because you have some limitations in your own techniques – so you cannot claim cause-effect from correlations. So understanding would be to be aware of these limitations, to know why you are choosing them".

- *What learning is*

The teacher described how learning was not at one level and was hierarchical, and involved the ability to be insightful with data, and see the global picture. As was the case with the teacher in the Memory and Perception module, the comments made by the teacher in the Research Methods and Statistics module reflected a belief in evolving knowledge and conceptual change.

> "That's a very good question. I suppose it's a very good question because it's not at one level. So it's almost hierarchical, 'global' learning to know, at least to know the different techniques and what they need to be used for. But then with each one the learning can mean more like an abstract set of rules, or can be more the ability to see how these rules apply to 'real' data, to be more insightful…You start to understand descriptively a little more from the numbers and what you can do with them. But there's something that is not just abstract application of, it's also a way to – what can you call that? It's like 'programmers' who in the beginning just have a set of rules, but after a while you can see all the rules, the 'integration' of a number of rules is the only

real way to apply in a flexible way. After a while you just see the whole 'global' picture, it's like when you drive without thinking. So apart from just acquiring knowledge and a set of rules, I think that learning in this module means to integrate it all these rules".

6.4.4 Discussion and conclusions Research Methods and Statistics teacher interview

The teacher in the Research Methods and Statistics module expressed how their role in the teaching and learning process was to emphasise application rather than theory. They outlined basic principles and saw themselves as a 'coach' rather than an expert. As the module was driven by content, the aim was to show students a range of techniques and help them to understand the reason for using a variety of methods. However, this does not imply the teacher did not intend a deep approach to learning, evolving knowledge, and a conceptual change student focused approached to teaching; as this was clearly evident in the teacher responses to the interview questions. The teacher saw the students' role as one of creatively using new techniques and understanding why they were using particular methods and techniques.

Assessment in the form of a MCQ was a means of measuring student 'understanding'. This was achieved through practical examples involving calculations where students had to 'think' rather than just use recognition and recall. Thus, a deeper type of approach to learning is the requirement.

When asked what students needed to do or know to be successful in the module, the teacher replied that students need to realise that statistics is only a 'tool' and that they should have the ability to analyse their own data. The teacher also emphasised the best way to learn in the module was to explore rather than memorise.

Knowledge according to the teacher involved the ability to be flexible and skilful and understanding was questioning why they were using a particular method. Learning was hierarchical involving being insightful with the data and seeing the 'global picture'. When students were asked the same questions, knowledge was perceived as 'application' (Student A, D, E, F); facts and formal rules (Student B, D, E); and understanding (Student C).

When asked to define understanding within the RMS module, the teacher emphasised that students should be questioning why they were using a particular method. When answering the same question, the majority of student comments emphasised application (A, B, C, D, F), with Student B also mentioning the ability to link ideas and information. These students scored high for 'certain knowledge' as measured by the DEBQ. This suggests students conceived of the demands of the course to be applying the methods and techniques which once learned would cover all eventualities, a perception that differed from that of the teacher. It appears that if individual's have a belief that knowledge is 'certain' they are satisfied with not questioning the conventional wisdom within this particular teaching and learning context. Learning as defined by the teacher was hierarchical and involved being insightful with the data and seeing the big picture. Again, the majority of students when asked to define learning mentioned application and selection (A, B, C, F). Student D also mentioned application without the need for an opinion, whilst Student E emphasised taking in information and adding to it. .

6.5 Within Subject Design – Students who were studying both modules

In order to triangulate the data further, text from interviews with students who were studying both psychology modules was analysed. It was envisaged this would supplement other interview data by providing a 'within' as well as 'between' participant design. This adds further evidence toward addressing key questions three and four, by investigating the stability and/or variation of the personal epistemologies of students as they traverse between two differing teaching and learning contexts.

6.5.1 Interviews with students who were studying both the Memory and Cognition (MP) and Research Methods and Statistics (RMS) modules

When asked about their opinions on a number of different elements of teaching, learning and assessment, students could be separated into two distinct categories; one where student responses appeared to be consistent across both modules of study and the other where student responses differed between modules.

- *Role of teacher*

Student A

Student A, when asked about the role of the teacher gave similar responses for both modules of study. That is, the role of their teacher was to deliver or pass on information. A perception reflecting a surface approach to learning, and where the teacher is valued if they display an information transfer teacher-centred approach to teaching.

> "In the stats one more or less passing on information and examples of, the lectures are very example based".

> "The perception one is more delivering information".

Student B

Student B differed from Student A in their opinion of the role of the teacher in the two modules. For example, in the Research Methods and Statistics (RMS) module the perception of the role of the teacher was that of an advisor who was there to pitch the material at a level appropriate to allow the student knowledge to evolve over a period of time as their proficiency improved. On the other hand, in the Memory and Perception (MP) module, the role of the teacher was to act as a 'filter' to guide students toward appropriate, relevant material. This is different from the RMS module as the knowledge contained within the course material is perceived as more certain and not liable to change as the plethora of literature in the MP module.

> "For stats I think that they sort of provide more input and more advice on what to do because it's not exactly the easiest thing to grasp and you get given all these calculations and just look at them and think what the heck is going on. More through what to do in process-wise as opposed to saying this is what you get go away and look at it because I don't think we can learn a lot that way".

> "But as opposed to the stats you need guidance because there's so much out there, you can go and get articles that go with the lectures, so we need advice with what would go with the lectures and to find a book that's got something about memory. (me – is there a specific core text?) there was one for cognition and that was very useful but he just used everything from it".

Student C

Student C perceived the role of the teacher differing in the two modules. In the RMS module the teacher was to provide student with ideas for them to explore, an approach to teaching that is student-centred and associated with conceptual change. Conversely, in the MP module the teacher role was more teacher-centred and associated with information transfer.

> "Research Foundations (stats) we have two lecturers, one that does the stats labs and one that does more of the lecturing. So they have kind of a dual role. I do a lot of the reading out of the books myself, I like to do the reading before I go to the lectures to give me an idea of what they're talking about".

> "But for the stats it's more of a case you have to read from the book which I do before the lecture".

> "In the perception one it's much more we're just going to sit there and he tells us".

Student D

Like Student A, Student D had similar views about the role of the teacher for both modules. However, Student D (like Student B for the MP module), perceived the role of the teacher for both modules to be that of a 'filter' for the amount of information available. Here, the role of the teacher was therefore to point students in the direction of relevant and appropriate materials in order to encourage deep learning and an evolving knowledge base. This is somewhat different to Student A who had a more surface, teacher-centred, information transfer ethos of what the role of their teacher was.

> "I think for both of them, we've actually got to the stage, it's not actually to teach you but to show you what you need to know. To show you what's important because for those modules there's so much information that you could know it's what sort is important so you can learn so much more about it. I think by the time you get to the degree stage you're a bit more independent you don't expect to be taught the material but you still need to be shown what you need to know".

Student E

Student E had different expectations of their teachers' role in the two modules. In RMS the emphasis was applied with a focus on how to use the software and the application of mathematical principles. In the MP module, the role of the teacher was teacher-centred relying on information transfer.

To give us information, not much involvement, we have a passive role (MP).

> "In Cognition they are there to give you the information you need really and I think they're really passionate about their subject. In stats they are there to teach you about the statistical package so how to use it what it's for and when to sue it. In the lectures they try to explain the mathematics behind it".

- Role of student

Student A

When discussing their role in the teaching and learning process, Student A gave a differing view for each module. In the MP module, their role involved gaining a greater understanding and better knowledge whilst stating the module was tailored toward the examination at the end of the course. The RMS module however, required application of methods and techniques with a view to extending this beyond the module in other areas of study, culminating in their third year dissertation project. These two different opinions suggest for the MP module a deep and strategic approach to learning; and for the RMS module an intention to apply in different contexts the tools and techniques learned, suggesting a deep approach to learning.

> "The perception one really kind of getting a better understanding, a better knowledge of the subject. As I say it does seem to be very streamlined and very focussed on the exam at the end".

> "Whereas the stats one you'll hopefully be able to use for various different things, for the research project I want to do".

Student B

Student B although stating the subject matter in the RMS module was 'factual' used terminology that alluded to a personal epistemology reflecting a belief in the dimensions of experience of knowing and certain knowledge. In the MP module, the impression given was of a deep approach to learning involving a lot of background reading, and an evolving knowledge gained through better understanding.

> "There's not a lot more you can do because it's factual, it's all there. It's just basically going over what's been said in the lectures and in practical sessions and trying to interpret the stuff for yourself as opposed to going up to the lecturer and saying 'I don't understand' (RMS).

> "With the memory aspects or cognition you need to do a lot of the background reading to get a better understanding" (MP).

Student C

For both modules Student C saw their role as a 'reader' suggesting an active rather than passive role, and a deep approach to learning.

> "It's not a passive role. I think that is the most important thing I've learnt that you just can't learn by osmosis. You can't just absorb it. I have to, in the research foundations I like to really prepare and find out what the subject's going to be about, read the chapters that have been assigned then go to the lecture. Quite often there's several books, several text books and I read them and get different perspectives and when the penny finally drops you think 'that's how it works or that's what it means'".

Student D

Contrary to Student C, Student D saw their role in both modules to be a passive one involving a surface approach to learning.

> "I suppose to be receptive in both"

> "You just sort of sit there and think, oh what am I doing"

> "...actually having someone in front of you explaining..."

Student E

For both modules Student A gave mixed messages. They saw their role to be an active one involving questioning ideas, whilst at the same time adopting both a strategic and surface approach to learning whereby the goal was to accumulate information and pass the examination.

> "To take in the information (both) and if I don't understand to ask the lecturer and to pass the exam".

“In stats (Maclabs) to participate in the practical sessions, just being active”.

“The perceptions it’s important to take good notes and take part in the demonstrations (active learning)”.

- Teacher aims

Student A

Student A believed the teacher in the RMS module was looking for students to increase their understanding of statistics, suggesting an emphasis on the personal epistemology dimension of evolving knowledge. In addition, the student would be required to justify their selection of particular statistical test, thus alluding to the personal epistemology dimension of experience of knowing. On the other hand, in the MP module, Student A intimated a teaching strategy encouraging a surface approach to learning where utilisation of lecture notes would suffice in order to be successful in the summative assessment in the form of an examination.

“For the stats one to get a better understanding of the statistical methods and so you can choose which are the better ones to use for your own purposes, it’s working toward the research project (year 3) you’ve got such a range of different methods that you can use you are given the opportunity to pick which one for your study at the end of the day” (RMS).

“The perception one is more done around the lecture notes based on the exam really, it’s not aiming toward a project really, it’s just all for the exam” (MP).

Student B

The teachers’ aims in the opinion of Student B were similar for both modules. There was an emphasis on conceptual understanding, a quality in the learning experience typified by depth as opposed to breadth so to speak.

> “I think they aim to give us a better understanding, but whether they achieve that as such is debatable for some of them. For the stats one I think she aims to enable us to understand where all the calculations come from and stuff, and she’s extremely enthusiastic about her subject which helps very much because it makes us interested in what she’s saying” (RMS).

> “With perception I think what he aims to do is to give us sort of a background to memory without going into a vast amount of detail. He gave us quite a few examples because he wanted us to see the general concepts but he didn’t go into detail as in explaining the specifics of the examples. It was just to give us an idea (me – something to build on?) yes” (MP).

Student C

Again, as with Student A, Student C emphasised how the MP module was tailored toward the summative examination; something which could encourage a surface approach to learning if not managed in the right way. This opinion was echoed in part for the RMS module where the aims of the teacher were perceived to be for students to take on board information. This perception reflects a passive learning subsuming a teacher-centred information transfer approach to teaching.

> “I think certainly in stats the guy wants you to take on board what he’s saying to you, and I like that anyway because I really want to understand what he’s trying to show you” (RMS).

> “Sometimes in perception you kind of get the idea that he just wants to get you through the exam, I don’t know if I should say that really but I’m going to be honest. He’s got set PowerPoint presentations and those are working toward the exam (very structured)” (MP).

Student D

Student D differed from Student C for both modules. Student D perceived the aim of the teacher was to try and help students achieve a good understanding and link ideas, something which reflects a deep approach to learning.

> ”I suppose to give you a good understanding of the module content, and I suppose it’s probably the same for most modules” (RMS)

> “With the perception and cognition...it’s more sort of one large topic with more sort of bits that integrate into it so it’s showing you how stuff is linked together” (MP)

Student E

Student E emphasised that for both modules the teachers aim was to pass on information to students; which involves a passive role for the student and an information transfer, teacher-centred approach to teaching.

> “In both I just think they’re trying to get you to pass and to convey a bit of what their subjects is, they seem to know a lot about their subjects and they’re just trying to pass on information to the student”.

- Assessment

Student A

When asked about the aim of the assessment, Student A differed in their perceptions for the two modules. For the RMS module there was an emphasis on eclectic evaluation which encourages a ‘deeper’ learning. Conversely, for the MP module, Student A believed the assessment encouraged rote memorisation and thus a surface approach to learning.

> "With the stats one because they're using various methods people have the opportunity to excel. You know if somebody doesn't do too well in exams they've got the opportunity to build their mark up with their coursework to demonstrate that they do actually understand it. (me – how is that weighted?) The research project is 50% the exam 25% and lab 25%" (RMS).

> "In perception with it all being exam based if you struggle with exams then it is going to be more difficult. With the MCQ and SAQ that's the part of the exam where I think you can use the lecture notes and repeat what the lecturer has told you. The essay question is I think where the lecturer is going to be able to pick out people who have read around the subject from those who haven't" (MP).

Student B

Student B focused on the types of assessment and what each one was evaluating. For example, the MCQ was deemed to be assessing recognition in the MP module and application and understanding in the RMS module – reflecting a deep or surface approach to learning. The SAQ in the MP module was perceived to be assessing a deeper level of learning, one which required a deep approach to learning where understanding was encouraged.

> "With the cognition one it's related to a general understanding of what being said in the first half of the semester. Whereas the SAQ in the final are applying the knowledge you've got from it. With MCQs it's generally a recognition type thing as in you can probably hazard a guess as to what the answer could possibly be. If not you can probably narrow it down to a couple then just sort of go from there. With the SAQ it's applying the knowledge, you've got to actually go a little bit further and it's a case of knowing your stuff as opposed to remembering the stuff. Knowing you've got to have some level of understanding and being able to apply it. Whereas with the memory you've just got to know it's there. It doesn't really include application" (MP).

"The stats, the lab assignments are getting a little bit tedious, they're basically the same thing and we've just done three which have all been on ANOVA, different sorts of ANOVA but they've all been on ANOVA. But I'm actually doing extra SPSS work for one of the administrators, so I'm a little bit 'SPSSed' out. That might have something to do with it. We don't have a stats MCQ until May but now it's more a case of, again it's applying the numbers to tables, because they're going to be asking us stuff like how, what would the numbers be in these blanks and like calculate it. To be able to do that you need to have understood what's gone on in the lectures and what affects their working out and everything like that. But the hefty weighting of the project stuff I think the, it makes it feel extremely, extremely important and makes everything else take second place" (RMS).

Student C

Student C like Student B focused on the type of assessment and what each particular type was assessing. Student C perceived these to be the same for both modules. That is, the MCQ assessed students at a surface level of recall and recognition, whilst the SAQ assessed students' application of knowledge – a deeper level of learning than the MCQ.

"MCQ is more recognition than recall, you've got to recognise the correct answer which is not always as easy as it sounds. I had to design an MCQ last semester for the research foundations and it's not that easy. I think the lecturers with the SAQs are trying to see what you know as efficiently as possible in a short space of time rather than a long rambling essay, it's succinct like what do you know about this subject or how would you apply this knowledge in this situation".

Student D

Student D, like Students B and C differentiated between the MCQ and SAQ for both modules, reiterating that the MCQ required a surface approach to learning of facts and figures, whereas the SAQ encouraged a deep approach to learning that required opinion-based subjective knowledge.

> "I think the MCQ in both cases is just to make sure, to sort of force you to learn some of the facts, figures and numbers because you have to have them to back up an opinion you give or when you apply stats to something, you have to have some knowledge of the facts".

> "The SAQ is probably to give you the chance to link together the information that you've had to learn with the facts to use the facts as a sort of backup an opinion or to give you a chance to express more knowledge than a MCQ will allow you to".

Student E

Student E did not focus on the type of assessment. Rather, their views on assessment for both modules was the evaluation of applied knowledge.

> "Knowledge, how you apply the knowledge to something".

- What students need to know or do in order to be successful

Student A

When asked what was required to be successful in the two modules, Student A suggested that for the MP module surface learning would suffice in the form of regurgitating information covered in lectures. Conversely, the RMS module required a deeper level of learning whereby application and understanding was required.

> "The perception one if you've got knowledge of all the material covered in the lectures you could be quite successful without having to apply that knowledge to a particular" (MP).

> "The stats one, because of the different assessment methods you do have to be able to apply it and to demonstrate that you've got a clear understanding because that leads to a 3rd year project and that's what you need to do" (RMS).

Student B

Student B however, had the same opinion for both modules. That is, to be successful one had to do well in the examinations. This is something they objected to, preferring to be assessed over a sustained period of time in order to gain a true reflection of students' abilities.

> "I think it's based on exams and the results that are achieved, but that's not how I would like it because there are so many of the lecturers who don't have a clue who we are".

> "I think they do base it on exam results, and they just go through exam results and they think, oh this person did well without actually knowing who this person is".

> "If they want to get an idea of the abilities of students then they're going to have to do it over a period of time, they can't just base it all on one occasion, because someone might have had a really off day or been really ill or something".

Student C

Like Student B, Student C had the same opinion for both modules. However, their opinions differed. Student C emphasised proactive learning involving reading around the subject, attending lectures and generally being enthusiastic about their learning.

> "For both modules - Turn up to all the lectures (I sit right at the front) and I do the reading, I take notes, and I guess I do quite well at exams. To be enthusiastic as well which shows I want to learn".

Student D

For both modules Student D emphasised the need to demonstrate understanding in order to be successful. However, reading the quote below it is evident that ‘understanding’ is regarded differently in the two modules. In the MP module, understanding required the linking together of ideas – reflecting a deep approach to learning. In the RMS module understanding involved the application and discernment of different statistical tests in different situation and for different research projects.

> “With the stats module you need to I think understand the different tests and when to use them in different situations and how you interpret the results of those statistics, so it’s sort of a familiarity with the results” (RMS).

> “With the perception I think you do have to demonstrate you can link together all the areas and that you understand that they are linked and not just separate pieces of research in separate research areas that they all contribute” (MP).

Student E

Student E was very succinct in their response to the question regarding being successful in the two modules. They believed it was a matter of doing well in the assessments. In addition however, there was also the comment about being able to teach the subject to someone else; suggesting a more in-depth intention to learn rather than the ‘cram and dump’ suggested by their comments on achieving good examination results. It may well be that this student has an intention toward ‘deep’ learning, which they assume will help in examinations.

> “Should be able to score high in the tests (both RMS and MP) and if you can teach it to someone else then you’re doing pretty well”.

- Best way to learn

Student A

The impression given by Student A was that the best way to learn in the two modules was somewhat different. In the RMS module the emphasis was on practical skills and working through examples, whereas the MP module required reading around the subject.

> "The stats one I think definitely going to the labs and the assignments that follow the labs are very helpful because you do get a lot of feedback and also being able to work through examples during the lectures" (RMS).

> "The perception one I think you need to read around the subject out of the lecture. Because you do just get an overview" (MP).

Student B

Similar to Student A, the emphasis for Student B was on practical skills, knowledge and clarification of sometimes difficult subject matter. On the other hand, the comments made, again suggested a need to pick up cues from the teacher to guide reading, which involved repeated sessions going over the material and the concepts therein.

> "For stats the best way to learn is attending the lectures would help because you get given that much information you might not understand it from a textbook" (RMS).

> "They cover pretty much everything you need to know at the moment in the stats lectures. The 'practicals' I think helps with learning because again I think through trial-and-error you can find out how to do it" (RMS).

> "For cognition, take note of what he's said somehow. There's so much of it, if you try to learn too much like outside information that you could read, then you're going to get bogged down in it, and not focus on the aspects that he's mentioned and clearly what he

> wants us to know. Sort of go over all the concepts and try to make sense of them with examples and stuff. Read it over and over again and make notes on what he's come up with. Try and organise it in some way so you've got all the encoding stuff together and just focus on that and then go onto the next thing" (MP).

Student C

The strategy adopted by Student C was quite different from Students A, B, D and E. For both of the modules, Student C undertook background reading, which included learning the terminology used in order to familiarise themselves with the subject matter. To supplement and complement this, Student C also studied with peers in a self-formed study group with other 'mature' students.

> "To do the reading before the lecture so you know what they're talking about. For example the 'jargon' they're using, you're not sitting there thinking 'I wonder what that means?"'

> "It's important that the friends they keep as well, the social aspects of learning. Our group is all female mature students".

Student D

Like Students A and B, Student D differentiated between the two modules. That is, for the MP module the best way to learn involved reading around the subject and grasping concepts. For the RMS module the emphasis was on practical skills and applying tools and techniques.

> "I wouldn't say that there's any one way to do it I think you have to combine different things. Boring as it is in some cases do the reading and practice writing exam questions. The modules we do essays in I understand better because you're forced to do the reading for them and then have to write about the reading. The essay may not have any of the lecture content in it but it still contributes to a better understanding of the module" (MP).

> “You do have to, to some degree learn that this study did this but it’s not the most useful thing. I suppose that’s more for perception” (MP).

> “With the stats it’s more practice the techniques until you understand what you’re doing. Because that will help you do the assignments but if you understand the assignments you’ll do alright in the exam, the MCQs are about applying and interpreting stats” (RMS).

Student E

Like Students A, B and D, Student E differentiated between the two modules in the same way when considering the best way to learn. That is for the MP module to:

> “Summarise frequently (after each lecture)”.

And for the RMS module:

> “With the stats I bought SPSS so I could practice at home”.

- What knowledge is

Student A

Student A perceived knowledge differently in the two modules. In the MP module was information that required memorising, which suggests that knowledge is certain and requires rote learning in the form of regurgitation and a surface approach to learning.

> “The perception one is very much being given a piece of information based on memory as in you could get away with just memorising the whole of the lecture notes to be honest rather than an in-depth understanding”.

Whereas, in the RMS module, knowledge involved the selection and application of tools and techniques.

> "But with the stats one because it's example based you can go away and look at the different examples and see where you can use that particular technique".

Student B

Like Student A, Student B viewed knowledge in a different way for each module. In the RMS module, knowledge was understanding facts not concepts, which reflected a view of knowledge as certain and a surface approach to learning.

> "In statistics knowledge is facts. I think it's more an understanding of the facts as opposed to an understanding of concepts because it's basically all it is, is stats and there's not a whole lot else you can do with it".

Conversely, in the MP module, knowledge was concepts, and formulating own view, which suggests a view of knowledge as subjective and requiring experience of knowing in terms of the dimensions of personal epistemology; and a deep approach to learning

> "Whereas in perception I think knowledge is more an idea of concepts because there are so many different areas of it and so many different perspectives that can be taken on it that to be able to take them into account and formulate your own views".

Student C

Interestingly, Student C when asked to define knowledge in the two modules, stated knowledge in the RMS module was about understanding.

> "To me? In research foundations it has to be about understanding…if you don't understand the basics in week one by the time you get to week four you're going to be in trouble. It's not difficult, it just needs to be read and understood. So understanding is the key".

This was different to knowledge in the MP module, which involved practical elements in the form of experiments, rather than conceptual ones.

> “The perception module is a lot more…..it kind of makes sense, if you do something under one condition and you do it under a different condition whether you’d remember it better, and you think well you probably would (me – so is there any practical parts, do you actually do some experiments?) no just lecture”.

Student D

For Student D knowledge in the RMS module was about rules and was therefore quite ‘certain’. Knowledge in this context was how to use, and when to use statistics, and could therefore be seen as involving the personal epistemology dimension of experience of knowing.

> “I think with the stats module it’s more traditional you need to know how the statistics work and when to use them. It’s quite formal, you use this for this and that for that, it’s quite sort of strict, it’s mathematical”.

Knowledge in the MP module was perceived as the linking of ideas and concepts suggesting a deep approach to learning.

> “In perception it’s how to fit things together and make sense of theories, put things together rather than just knowing facts, to be able to understand things”.

Student E

As with Student C, Student E viewed knowledge in the MP module as application in real-life settings. In the RMS module knowledge was manifest in the mathematics and its uses.

> “For perception, knowledge of how the brain perceives things, and just generally what makes us perceive certain things” (MP).

> “In stats knowledge is the methods that, the research methods of psychology. The knowledge of how maths can be a tool and why research is important” (RMS).

- What understanding is

Student A

According to Student A, understanding in the RMS module was about the appropriate application of a variety of tools and methods. In the MP module however, understanding was all about the examination.

> “The stats one understanding is when you can, being able to use the methods through a better baseline knowledge of all the different methods the lecturer shows you and use the appropriate ones and get a better understanding of the ones you actually need” RMS).

> “With the perception one as I say the understanding one is for the exam at the end of the module” (MP).

Student B

Understanding for Student B was the same in both modules and involved the ability to link information and apply it appropriately. This ability to demonstrate the way in which things fit together suggests a deep approach to learning...

> “I think statistics is kind of understanding of statistics which is not an easy thing to do. To be able to piece together all of the (probably for cognition as well), to piece together the information and to be able to apply it to different situations. If you don’t understand it you can’t really do that. Like with the cognition one it’s like apply it to the different theories being proposed. That would give you an understanding of it as a whole as opposed to learning about certain aspects”.

Student C

For Student C understanding in the RMS module was the application of methods and in the MP module the grasp of the topic in a holistic way – something which suggests a deep approach to learning.

> "In the research foundations I think you need to be able to run the experiment or run the analysis" (RMS).

The 'whole topic', a grasp of it.

> "In the perception understanding is getting a grasp on the whole topic, it's more of a grasp on the topic I suppose" (MP).

Student D

As with Students A, B, C understanding in the RMS module from the point of view of Student D involved application. For the MP module, understanding for Student D like Students B and C involved a holistic perspective.

> "I suppose with the stats its understanding how to apply the statistics. I suppose it's quite similar to a mathematical sense, yes knowledge and understanding are quite related in statistics. You have to know how to use it to understand it and you have to understand how to use it to know what you are doing" (RMS).

Not specific things but understanding of the area, the 'whole picture' (MP).

> "But I suppose with the perception you need to sort of not specific knowledge about things as an understanding of the area, how to use specific facts to sort, I can't explain what I mean. Using the information to supplement the 'whole picture' it's really hard to explain what I mean…So I think understanding is being able to 'draw a big picture

> together from all the knowledge you have of different things'…And how tying all this sort of thing together leads to an understanding of how memory works" (MP).

Student E

Student E very succinctly stated understanding in both modules could be displayed in the ability to teach the subject to someone else.

> "To be able to teach it (both RMS and MP) if you've understood it you can teach it to someone".

- What learning is

Student A

For Student A, learning in the MP module involved 'memorisation', taking in information and repeating. This 'regurgitation' can be seen as reflecting a surface approach to learning. However, in the RMS module, learning involved selection and application.

> "The perception one, learning is 'memorisation' more than anything, and being able to take all the information in and repeat it at the end (me – regurgitation?) yes definitely" (MP).

Selection and application (RMS).

> "With the stats one you've kind of got the option to use which parts of it you actually want because you've got various different things and you choose which one suits you depending on what your subject is" (RMS).

Student B

Student B did not differentiate between the modules, stating that learning involved application and understanding and was not about regurgitation.

> "It's being able to apply it. If you're being given information and you want an understanding of the information, if you can learn it you can. I guess you kind of need the knowledge and the understanding before you can learn it because to learn something you need to be able to know what's going on really. If you learn everything by 'rote' then yes you can 'sprout it out' in the exam or something but you can't truly know what's going on".

Student C

Similar to Student B, Student C stated learning was about knowing when and how to apply knowledge in both modules.

> "In the research foundations learning is about knowing when to apply it. If you've got the knowledge and you've got the understanding, learning is when you come across a design or….project, the learning is what you've accumulated so far and to apply that to your project and think well I'm doing it this way so I need a 'repeated measures' because it's going to involve the same person twice. So I suppose what learning is, working out how to apply it" (RMS).

> "(researcher – and the perceptions, is that the same or different?) Yes I suppose it's the same, when you read something and you realise that you know I understand that because you've learnt it hopefully" (MP).

Student D

Like Student A, Student D viewed learning differently for each module. In the RMS module learning was not about opinion, it was about application, and tests, suggesting a belief in certain knowledge. In the MP module however, learning involved linking information, and developing an opinion, suggesting a deep approach to learning and a subjective view of knowledge.

> "I suppose with the stats it's very much the same as knowledge and understanding. Learning how to use the statistical tests, you don't need to develop an opinion about whether they're good or not it's just they are what they are" (RMS).

> "With the perception you need to sort of not just learn and understand the material but sort of develop an opinion about it and look at the flaws of the theories. Not just sort of 'rote' learn facts and dates, you're learning more than just 'this study did this' learning is sort of combining all the things" (MP).

Student E

Student E, like Students B and C had the same perception for both modules. However, the perception of Student E differed from Student B and C as they believed learning was about taking in information and adding to it. This suggested a combination of a surface and/or deep approach to learning and a belief in evolving knowledge. Students B and C however, emphasised application and understanding.

> "It's the act of taking in information and adding, actually knowing it".

6.5.2 Discussion and conclusions students studying in both modules

Although students were consistent in their responses across modules there were differences between their individual perceptions, a variation also evident in their responses to the DEBQ (Table 6.4). The extent to which these differences occurred fluctuated between the questions asked about the different elements of teaching, learning and assessment within the two teaching and learning contexts. For example, all five students who were studying in both modules perceived knowledge differently in each of the modules. Students on the whole in the Research Methods and Statistics module emphasised the application of 'factual knowledge' in the form of research methods and statistics; whereas in the Memory and Perception module they reported knowledge was based on concepts and the 'linking together' of these concepts in order to gain an 'understanding'. This suggests students viewed knowledge within the two contexts differently, which appears to support the argument for the domain-specificity of beliefs about knowledge and the concept of SHAPE.

This was in contrast to their responses when asked what they needed to do/know to be regarded as successful in each of the two modules, where four of the five student responses were similar across the two contexts. Similar responses were also noted for three of the five students for their role within the teaching and learning context, the teacher aims, and their definition of what learning was; with two of the five students giving similar responses for questions pertaining to the role of the teacher, assessment, and understanding; and only one of the five students giving a similar response for the best way to learn within the two modules.

Table 6.4: Mean scores for the DEBQ for students studying both modules and who were interviewed

Personal Epistemology Dimensions

	Subj (MP)	**Subj (RMS)**	**Cert (MP)**	**Cert (RMS)**	**Evo (MP)**	**Evo (RMS)**	**Exp (MP)**	**Exp (RMS)**
Participant								
A	3.50	3.75	3.00	2.33	4.00	4.50	3.00	2.00
B	2.25	2.50	3.33	3.33	4.00	2.50	3.50	3.00
C	3.25	2.00	3.00	3.67	4.00	2.50	3.50	2.50
D	3.00	1.75	2.67	3.83	4.00	3.50	2.50	3.00

Note: MP = Memory and Cognition Module; RMS = Research and Statistics Module

*Student E did not complete the DEBQ for the MP module and has therefore been omitted from the table

Looking at the results on an individual basis, when students were asked about the role of the teacher, students A and D perceived the teacher to be there as a presenter/deliverer of information. With regard to their own role, student E perceived that it was to take in information for both the modules. When asked about their thoughts on the teachers' aims within the respective modules, students C and E stated the teachers in both modules were looking for students to pass the examination at the end of the semester, and with this in mind the role of the teacher was to pass on information to them. Conversely, students B and D perceived the teachers' aims in both modules as a process whereby they would reach an 'understanding' and make links between concepts. Students B and E believed to be successful in both the modules was characterised by doing well in examinations. On the other hand, students C and F saw reading around the respective subject areas. With regard to learning within both modules, student B reported application and Student E reported taking in information as representative of learning within both modules.

Taken together, the results show that overall Student A was more consistent than Students B, C, D and E who were more mixed in their responses to questions pertaining to different elements of TLA. All five students defined knowledge differently in the two modules. Student A consistently perceived the RMS and MP modules differently when asked about different elements of teaching, learning and assessment. More specifically, Student A views about knowledge, understanding, learning, the best way to learn, and what one needed to do to be regarded as successful, differed between the two modules. On the other hand, the other students perceived the context in a similar way with regard to what was required to be successful; with Student B and Student E having similar perceptions across the modules for understanding, and Students B, C and E having similar perceptions across the contexts for learning.

6.6 Overall discussion and conclusions

What are the conclusions to be drawn and the consequences for teaching and learning in higher education?

The investigation discussed in this chapter suggests:

- Perceptions of knowledge are domain-specific and appear to support the concept of SHAPE;
- Personal epistemologies are multifaceted and complex; and
- A combination of the teacher and other elements of the teaching and learning context influence student learning to a greater or lesser extent; and this may as the findings suggest, depend on the individual personal epistemologies of students.

It is clear from the interviews that differences exist with regard to perceptions of different elements of teaching, learning and assessment within different academic contexts. That is, student responses fall into two main categories which emphasise two qualitatively different perceptions, one where learning is viewed as a *process* involving an intention and aspiration to 'understand'. A process characterised by the linking of concepts, reading around the subject, and generally taking an active role in their learning - A role reflecting a deep approach to learning, and in some cases accompanied by a belief in the evolving knowledge, subjective knowledge, and experience of knowing or indeed combinations of these dimensions of personal epistemology. On the other hand, there are students who perceive learning as a *product*, a view very much outcome based. This particular approach to learning is characterised by 'rote' learning and memorising, where regurgitation and passing examinations is the goal, a role reflecting a surface approach to learning and the certain knowledge dimension of personal epistemology. However, this does not tell the whole story as the variation between individual student personal epistemologies and approach to learning within groups of students warrants further investigation.

As the subject matter can be viewed differently in the two psychology modules, one more 'applied' and 'factual' (RMS) and one more 'theoretical' (MP), one could assume it is the subject matter that explains these differences. For example, students in the Research Methods and Statistics emphasised 'application' of methods and techniques. However, when the majority of students emphasised 'application', they perceived the term in different ways, which related to the differing ways they perceived knowledge, understanding and learning within this particular module. One group of students focussed on applying the techniques and methods without any wish to understand why, or the inclination to read around the subject to gain more insight into the reasoning and justification for applying particular techniques of methods. Conversely, a second group of students expressed they would read around the subject to “get a feel” in advance to what they would be applying in practical sessions. Their intention was to understand why they were using a method or technique, what was the justification for deciding which to use, what were its strengths and weaknesses, and whether alternatives were available.

This suggests students although using the same term (in this case ‘application’), they are using it in different ways, which has different connotations. One group used application to describe the process of practicing techniques and methods, whilst another group used the term application to capture the process of reading around the subject and understanding with application. It is plausible the reason for this is their differing personal epistemologies. The suggestion is that students who have a less sophisticated personal epistemology are more susceptible to the influence of the subject matter itself, and take everything at ‘face value’ without questioning and investigating the meanings associated therein. Thus, some students believe in certain knowledge, whilst others believe in evolving knowledge and subjective knowledge.

It seems there is a complex interaction whereby a combination of the teacher, student and subject matter to a greater or lesser extent influences the learning in different contexts. That is, the teachers personal epistemologies, their perceptions of the teaching and learning environment, and how they approach their teaching, and the learning which occurs as a consequence of this. In Chapter Five the evidence suggested that the teacher personal epistemologies had an influence on the personal epistemologies of their students when the unit of analysis was at group level. In this chapter it has emerged that students within specific modules of study do differ in their personal epistemologies, and that there is variation between individuals within this group of students. This is evident in the way students conceive of teaching, learning and assessment, and this may be a consequence of different personal epistemologies. However, what has also emerged is that regardless of the subject matter, or the personal epistemology of their teacher, there are students who are consistent across different teaching and learning contexts and this, one could argue this is a consequence of students having a particular personal epistemology combined with the intention to ‘understand’ regardless of what the demands of the particular teaching and learning context are.

Chapter 7 Psychology students focus group

7.1 Introduction

The focus group was conducted as part of the case study into two psychology modules – Research Methods and Psychology, and Memory and Perception. The purpose of the focus group was to investigate further, the perceptions and conceptions that students have of different aspects of teaching and learning in a higher education context; and address Question Four of the four key questions:

How do academic epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

The participants were studying in both of the two psychology modules, and had taken part in Phase One and Phase Three of the research (i.e. questionnaires and interviews). This allowed comparative analyses between the two modules to be conducted.

The discussion was framed around the themes that emerged in the interviews as a means of accessing their personal epistemologies of students within the two teaching and learning contexts within the disciplinary field of psychology. The responses are organised around four themes based on the interview topic guide used for the interviews, and the responses of participants discussed in Chapter Six:

- Teaching and learning in higher education within the two psychology modules
- Teaching, learning and assessment as a process within the two psychology modules
- Teaching, learning and assessment as a product within the two psychology modules
- Teacher and student roles and responsibilities within the two psychology modules

This permitted further exploration of student perceptions and experiences of teaching, learning, and assessment regarding their undergraduate experiences within two contexts.

These four themes will be discussed in relation to the four dimensions of personal epistemology – certain knowledge, subjective knowledge, evolving knowledge, experience of knowing, and different approaches to learning – deep, surface, strategic.

7.2 Teaching and learning in the two psychology modules

The participants' opinions and perceptions of teaching and learning in higher education were both diverse and informative. Learning was perceived by Student D as disconnected chunks in Research Methods and Statistics (RMS), and the "bigger picture" in Memory and Perception (MP). Teaching and learning as perceived by Student A, was contingent upon who was teaching, who was learning, and where and when learning took place; but did not involve accepting what one was 'given', suggesting context was of particular importance. Student E suggested teaching and learning in RMS and MP was about thinking and attitudes, and involved questioning, expanding, and extrapolating.

The comments by Student D suggested knowledge was viewed differently in the RMS and MP modules. Context was also important for Student E, who suggested teaching and learning was an experience involving opinions and attitudes, which one could argue is related to the personal epistemology dimensions of subjective knowledge, experience of knowing and evolving knowledge; when also taking into account their comments about expansion, extrapolation and the questioning of ideas, suggesting also a deep approach to learning. The comment made by Student A about questioning information given, suggested a deep approach to learning and a belief perhaps in the experience of knowing dimension of personal epistemology.

7.3 Teaching, learning and assessment as a process

With regard to teaching, learning and assessment as a process, Student A made the majority of comments. Student A mentioned repetition for remembering; summarising; practical demonstrations, reading books, the association of ideas, and experience in the MP module; and the enthusiasm of the teacher, application, and feedback for the RMS module. Student A also mentioned overload, and the situation and context where the process takes place for both modules. Student D highlighted how the process of learning involved application, practice in the RMS module; and mentioned the part the brain played in the process – the language areas, memory, synaptic connections, and Hebbian plasticity, which are all part of the curriculum for the MP module. In addition, Student E commented that reading, talking, debating, thinking, key points, expanding and elaboration were also part of the process involved in learning, particularly in the MP module.

These mixed views appear to add weight to the argument for epistemological resources (e.g. Hammer & Elby, 2002) or epistemological theories (e.g. Hofer, 2002). That is, a belief in the contextual nature of the different elements of teaching and learning. However, it is unclear why the perceptions of students differed. Perhaps they perceived the demands of the context in different ways. For example, the comments from Student A suggested a personal epistemology that drew on experience and an approach to learning that could be either deep or surface depending on which teaching and learning context was being considered. Student D also appeared to differentiate between RMS and MP, drawing on the subject matter being taught in their comments. The comments made by Student E suggested a deep approach to learning through discussion and debate with peers, reading, and the expansion and elaboration of ideas, which also suggests a belief in subjective knowledge, experience of knowing, and evolving knowledge.

7.4 Teaching, learning and assessment as a product

When discussing teaching, learning and assessment as a product Student D appeared to have more to say than the other members of the focus group. This student expressed the opinion that pre higher education learning was product focused, where knowledge was given and certain, and highlighted the difference between the regurgitation of facts and the useful application of facts. Student D emphasised the application of knowledge and understanding to novel questions and situations was important; as was using one’s own experience in this process. Comments by other members of the group included understanding, knowledge, and competence (Student A); and the application in novel and/or repeated situations, competence, and thinking (Student E).

With regard to teaching and learning as a product, Student D was more vocal than other members of the group. This was in contrast to teaching and learning as a process where Student A was the one who made the majority of comments. One could posit from the comments made by Student D, that their comments were typical of a belief in experience of knowing and evolving knowledge.

The difference between compulsory and post-compulsory education, according to Student D was how ‘facts’ were utilised; with compulsory education rewarding regurgitation and post-compulsory education rewarding the application of these facts in a useful way. It is interesting that ‘facts’ whether applied or regurgitated were prevalent in the comments made by Student D, which may suggest a surface approach to learning and a belief in the certainty of knowledge. However, the application of these ‘facts’ in novel and an emphasis on using personal experience, suggests a belief in the experience of knowing and evolving knowledge dimensions of personal epistemology. The comments by both Student A and Student E about competence in addition to the mention of application by Student D suggest the students valued the transfer and application of knowledge. A point further emphasised when Student D and Student E suggested the need to apply knowledge and understanding in novel situations. Interestingly, when the student participants were asked, their opinions about the product element within the two modules, they did not differ.

7.5 Teacher and student roles and responsibilities

As a group, the students expressed that in both modules, it was their responsibility to give feedback to the teacher early in the semester, whilst intimating the teacher had a responsibility to give formative assessment and feedback which would to help students monitor progress in their studies. That is, feedback which was both timely and appropriate was necessary and essential to their success.

The group also alluded to the need to distribute their workload, not ‘overloading’ them, in the words of one student, “smaller amounts”. As a group there was an emphasis on more thought being given to the organisation of assignment deadlines. These comments emphasised a need for distributing the workload so students didn’t have too much to complete in a relatively short period of time.

Students also thought that it was the responsibility of the teacher not to make assumptions about students, mentioning a positive step would be, in certain circumstances to be less patronising and should use fewer acronyms, achieved by “building and/or cementing by constant use of the terms”.

As a group, the students’ comments suggested a personal epistemology that reflected a belief in the experience of knowing and evolving knowledge as a result of a two-way feedback process between themselves and their teacher. The participating students also gave the impression they had an aversion to surface learning as a result of the workload being too demanding. This suggested students valued a deeper teaching and learning ethos, one which gave them time to gain an understanding of the key concepts rather than attempting to cover too much information in a limited amount of time. Thus, students suggested they required a period of incubation, which gave them time to assimilate and understand the subject matter. A process allowing them to perhaps to draw on their personal experience; and the experience of the teacher to develop their knowledge.

7.6 Teacher training and its impact on student perceptions

An unexpected, but very important point raised was the training of teachers. The student participants asked the author and his fellow facilitator (the authors PhD supervisor) about their respective roles within the university. The facilitators mentioned one aspect of their respective roles was their involvement in the ‘Teaching in Higher Education’ (tHE) programme, a master’s level course for university lecturers accredited by the Higher Education Academy (HEA). This programme permits those who successfully complete the course to teach in higher education. This was inadvertently the cue for the discussion to turn to which teachers had taught them, and which teachers were ‘better’ than their colleagues. Opinions were given on who had been on the tHE course, who needed to go on the course, and how there was a noticeable difference when they had been on a course (their teaching improved). This took place with very little input from the facilitators who listened as the discussion evolved. Members of the group gave names of teachers they presumed had been on the course, and without receiving any indication or encouragement either way from the facilitators, were correct in all of their assumptions.

This is particularly interesting as this issue was also mentioned in some, but not all of the interviews. One student (not a member of the focus group) expressed how students had noticed a change in one teacher when they returned from their summer break. They highlighted how they had discussed between themselves how the teacher must have been on a course. This emphasises how adept students are at recognising changes in teaching practice and the aspects that contribute toward such practice.

7.7 Conclusion

This chapter aimed to address the following question from the student perspective: How do academic personal epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

With regard to elements of teaching and learning within the two modules, the responses given by the students suggested variation in the personal epistemologies of those who participated in the focus group. Student E perceived knowledge in similar ways in both modules of study. This consistency was also evident in their comments regarding teaching, learning and assessment (TLA) as a process and product, and also the roles and responsibilities of the teacher and their students within the context of the two modules. Conversely, Student D perceived knowledge differently within the context of the RMS and MP modules of study. And again, this difference was also evident in the comments they made about the processes involved in TLA. However, the comments made by Student D regarding the product aspect of TLA and the roles and responsibilities of teachers and students suggested a consistency in their perceptions across the contexts. Student A emphasised the importance of context, which included the teacher, student, and the where and when learning took place. As was the case with Student D, Student A pointed to the way in which the process of TLA differed within the two modules, whereas their perception of product of TLA and teacher and student roles and responsibilities was similar across the two contexts.

Whilst the teaching and learning context appears to be important, the variation between individual students within these contexts is also noteworthy and warrants further investigation. This individual variation was also evident in Chapter Six when considering the interview data, and their espoused beliefs about knowledge measured by the discipline-focused Epistemological Beliefs Questionnaire (DEBQ). The evidence suggests that academic personal epistemologies do influence teacher and student perception of different elements of teaching and learning. However, the nature of how this influence occurs is complex and manifests in different ways for individuals within groups of students depending on the elements of context being addressed. As stated in Chapter Six, this is something that therefore requires further investigation.

An important issue that emerged unexpectedly was how students appeared to be aware of which teachers had been on a professional development course. This resulted in their perception that the teachers practice had improved as a consequence result of this training. As the author was part of the team involved in this particular course for teachers, he was aware that a significant part of the training involved an approach to teaching aimed at conceptual change and development and enhancement of the personal epistemologies of participants. The comments made by different students, highlights how sensitive students are to the nuances and idiosyncrasies of each teaching-learning context, particularly the teaching, and how an epistemological shift in the form of teacher perceptions is detected by their students. A change that may be apparent to students whether or not the teacher has made a conscious effort to change their practice and elements of the teaching and learning context in which they operate.

CHAPTER 8

8.1 Discussion

In the introduction to this thesis the author highlighted the aims of the research conducted for this thesis were to:

> "Investigate the utility of SHAPE within a higher education context in order to establish the influence teacher personal epistemologies have on student personal epistemologies; and how this influences perceptions of, and approach to teaching and learning in a higher education context"

With this in mind, four questions the author believed key to investigating the concept of a 'socialised habitus of personal epistemology' (SHAPE) formed the basis for the studies conducted and discussed within this thesis:

1. What academic personal epistemologies do teachers bring to the teaching and learning context, and how does this influence how they perceive different aspects of teaching and learning?

2. How do teachers perceive knowledge and how does this influence their conceptions of and approaches to teaching?

3. What academic personal epistemologies do teachers have and does this influence the academic epistemologies of their students?

4. How do these academic personal epistemologies influence teacher and student perceptions of different aspects of teaching and learning in different contexts?

This final chapter discusses the findings from the research conducted and draws conclusions from the studies, relating them to research conducted previously and the four questions above. The key findings will be highlighted and elaborated upon in order to frame them in the context of teaching and learning in higher education. The key findings were:

1. A revised Discipline-focused Epistemological Belief Questionnaire (DEBQ) with fewer items explaining more variance than its predecessor (Chapter Four).
2. Disciplinary differences for dimensions of personal epistemology when using the DEBQ (Chapter Four)
3. Significant 'shifts' for the personal epistemologies of students over a semester of study that differed within a particular disciplinary field (Chapter Five).
4. Differences in teachers' personal epistemologies and those of their students in modules drawn from the same undergraduate degree (Chapters Five and Six).

Two case studies (Psychology, Sports, Health and Exercise Science) brought together different strands of educational research in order to contribute toward an ever increasing and evolving 'knowledge base' from research with different perspectives, philosophical stances, and methodologies; and that have used a variety of different methods. All of these had one thing in common, to investigate the concept of a 'Socialised Habitus of Academic Personal Epistemologies' (SHAPE).

The following, based on the research conducted, forms a cohesive set of explanations of the findings; and relates them to previously conducted research. The objective was to compare the findings from the research conducted and discussed in this thesis with previous research in the field; and to generate hypotheses for future research, with the ultimate aim of the process being the enhancement of teaching and learning in a higher education context. With this in mind, the author was mindful of the comments made by Krause (2012):

> "Challenging academics to rethink their beliefs about knowledge and pedagogy may be best approached by centering discussions in discipline-based communities of practice (Wenger, 1998) in partnership with academic developers and researchers, the latter providing cross-discipline and cross-cultural facilitation, to bring theory and practice together (Blackmore et al. 2010; Trowler et al. 2005; Neumann et al. 2002)" (p.204)

However, Greene (2009) when discussing personal epistemology stated that future research should investigate more domain-specific beliefs. With this in mind the concept of a 'socialised habitus of academic personal epistemologies' (SHAPE) was hypothesised and investigated to form the basis of this thesis. A concept that has the potential to permit comparisons to be made both within and between fields of study, and extends domain-specific research beyond the traditional disciplinary parameters by attempting to capture and describe teaching and learning at a more fine-grained and contextual level than has previously been reported. Entwistle (1998) has argued 'knowledge'

> "…is too formal a description of what most lecturer's experience. The term 'conception' is better, at least if we accept the term as a set of inter-related experiences, ideas, knowledge and feelings, which together allow teachers to reflect on their practice" (p.7)

The author posits that it is the personal epistemologies of the teacher that influences such conceptions, and this in turn influences the conceptions of their students. To emphasise this point research reported by Freedman et al. (1979) who conducted interviews with over 700 faculty members, concluded that few instructors could define the basis for their classroom behaviour. Moreover, Williams and Burden (1997) argued that teacher beliefs influence everything they do in the classroom, even when acting spontaneously or from habit without thought for their actions. More recently, Schraw and Olafson (2002) reported at the time very little epistemological research focussed on the role of teachers' epistemological beliefs and how their views affect classroom practices. However, subsequent research has reported that the epistemological beliefs held by both the teacher and student affect teacher-student interactions (Clancy & Fazey, 2007; Fruge & Ropers-Huilman, 2008).

8.1.1 Chapter Four: factor analysis and disciplinary differences

The four key questions emerged from Chapter Four, which was the starting point for the research, and allowed the author to get a feel for the academic climate in which the research would be conducted – an overview – where the author could identify possible avenues to explore in greater depth in subsequent chapters. The quantitative element of the research utilised a context-specific measures of personal epistemology – the Discipline-focused Epistemological Beliefs Questionnaire (DEBQ) (Hofer, 2000).

In addition to testing for the dimensions of personal epistemology, Chapter Four also explored potential differences between disciplines. The results are valuable for two reasons. First, the factor analysis of the DEBQ resulted in a more streamlined amended measure of personal epistemology that explained more variance than its predecessor (Hofer, 2000). Of course, the reliability and validity of this 12 item questionnaire needs corroborating in further studies with different and larger samples drawn from different cultural contexts. Something the author will pursue in future research endeavours. Second, the results from Chapter Four suggest the utility of this instrument in displaying not only disciplinary differences, but also differences at a more contextual level. That is, differences within disciplines at the modular level. This could prove invaluable in future investigations, particularly those using a number and variety of questionnaires, as the 12 item DEBQ is a quick and easy measure of personal epistemology, particularly across different contexts.

Thus, the starting point corroborated previous work conducted (e.g. Buehl et al., 2002; Hofer, 2000; Jehng et al., 1993; Lonka & Lindblom-Ylanne, 1996; Paulsen & Wells, 1998; Schommer & Walker, 1995), by reporting disciplinary differences in the personal epistemologies of students. However, this initial study in addition to finding differences between disciplines, as with previous studies, found differences within disciplinary fields of study. Previous research has noted personal epistemologies differ according to subject matter (e.g. Buehl & Alexander, 2002; Hofer, 2000; Schommer & Walker, 1995; Trautwein & Ludtke, 2007), or are topic-specific (Braten & Stromso, 2010). The intradisciplinary differences suggested in Chapter Four warranted further investigation as an explanation for the differences was lacking. This led to two case studies utilising a combination of quantitative and qualitative methods. The first case study focused on modules drawn from a Sports Health and Exercise Science (SHES) undergraduate degree. The second case study involved two modules drawn from a Psychology undergraduate degree. These studies investigated whether it was the teacher, students or the subject matter which contributed toward the differences; whether it was a combination of these; or whether there were emerging factors that had not been envisaged.

8.1.2 Chapter Five: Sports, Health and Exercise Science (SHES) Case Study - key questions one, two, three and four

Previous research has suggested personal epistemology interacts with students' disciplinary environment; and that academic practices instilled by teachers influenced the shaping and development of students' personal epistemologies (Hofer, 2005). Moreover, Sheppard and Gilbert (1991) stated epistemological beliefs and beliefs about the process of teaching and learning should be viewed as an inter-related set; with Kember (2001) arguing it is these beliefs about learning, teaching and knowledge that form a concerted set. Moreover, Kember and Kwan (2000) reported:

> "…the study approaches adopted by students are a function of the student's predisposition, the form of the teaching and the nature of the teaching and learning environment, or the curriculum in the broadest sense" (p.470).

With this in mind, the studies reported investigated the personal epistemologies of students and their teachers, their conceptions of different aspects of teaching, learning and assessment in a higher education context, and how these interact to influence perceptions and subsequent actions.

In Chapter Five, the analyses revealed significant shifts for students at the group level over the duration of a semester of study for dimensions of personal epistemology measured by the DEBQ. These shifts however, were not the same for modules drawn from the same academic discipline. Moreover, the shifts in the personal epistemologies of students over a semester of study reflected in part the personal epistemology of the teacher for those particular modules. These results appear to corroborate the work of Fruge and Ropers-Huilman (2008) who conducted a small-scale piece of research involving a survey of 28 students followed by interviews with four of those 28 students. Fruge and Ropers-Huilman (2008) used the term 'epistemological congruence' to describe the convergence of beliefs about learning between students' and their teacher; and how this influences how these students interpret their classroom experience, and how instructors interpret their students' experiences.

When looking at the shifts and comparing these across three modules drawn from the Sports, Health and Exercise Science (SHES) Undergraduate Degree, the data suggest it was the teacher who had the most profound influence on the shifting personal epistemologies of their students as a group. The reason for this conclusion, is that when comparing two of the SHES modules (Biomechanics and Sports and Exercise Physiology), which could be deemed to have similar 'scientific' subject matter content and assessment methods, there were different personal epistemologies on display. One could be forgiven for assuming that the shifts would have been similar if it was the subject matter that was influencing the changes in the personal epistemologies of the two groups of students. Moreover, one could also assume the shifts for the Sporting Identity module would have been different as its content is focused less on 'hard' science and more on how perceptions affect participation and performance is sports activities.

However, this was not the case as the results displayed patterns where a convergence occurred between the personal epistemologies of the teachers and their students. This suggests the teacher may have been the major influence on the personal epistemologies of their student group. For example, the teacher of the Biomechanics module scored relatively high for the evolving knowledge (3.00) and experience of knowing (3.00) when compared with the other dimensions of personal epistemology, and their student scores also increased significantly for evolving knowledge. It should be noted however, there was also a significant increase for the certain knowledge and a significant decrease for the experience of knowing dimensions of personal epistemology. One explanation for these shifts may be the intention of the teacher manifest in their approach to teaching. This particular teacher scored relatively high for both CCSF (3.63) and ITTF (3.25), which intimated this particular teacher felt it important to present a lot of facts to students so they could learn what they needed to learn. This may have been construed by students in such a way that within the Biomechanics module, knowledge was certain and thus did not require one to draw on personal experience. As the subject matter content is scientific, and based on rules and laws of motion, it could have intensified these student beliefs and contributed to the shifts that occurred.

In the Sports and Exercise Physiology module the teacher scored high for the evolving knowledge (4.50) and experience of knowing (3.50) dimensions of personal epistemology; and high for both CCSF (3.48) and ITTF (3.63), which was also the case for the Biomechanics module. However, the only evident significant increase for students studying this particular module was for evolving knowledge, with a non-significant decrease for experience of knowing. Like the Biomechanics module, the decrease in the experience of knowing dimension of personal epistemology may have been due to a combination of a mixed approach to teaching where there was the intention on the part of the teacher to present a lot of facts, to steer students in a specific direction; and perhaps like the Biomechanics module, the scientific nature of the module was influential. On the other hand, the score for certain knowledge stayed very much the same in the Sports and Exercise Physiology module, which was somewhat dissimilar to the Biomechanics module. This suggests the subject matter content in the Sports and Exercise Physiology module, even though it was scientific in nature, played less of an influential role than in the Biomechanics module.

To emphasise the potential of the teacher influence further, the teacher from the Sporting Identity module scores were high for the evolving knowledge (5.00) and subjective knowledge (4.50) dimensions of personal epistemology. The teacher for this module had a more obvious difference between CCSF (3.63) and ITTF (2.25) than either the Biomechanics or Sports and Exercise Physiology modules. The only significant shift for this group of students was for evolving knowledge. However, the student group score for subjective knowledge stayed very much the same. This suggests the teacher personal epistemology was influential, whilst also considering the epistemological environment they created for their students. An environment, as the results suggest, was conducive to the development of particular personal epistemologies.

Taken together, the results do suggest it is indeed the teacher personal epistemologies that are the major contributor when identifying influences on the personal epistemologies of students. This however, does not mean the author is dismissing other elements of the teaching and learning context, which to a greater or lesser extent are also influential.

8.1.3 Chapter Six: Psychology Case Study (interviews) – key question three

Having established in Chapter Five the potential influence teachers have on the personal epistemologies of their students, it was important to investigate the consequences of this influence, whilst also taking into account the influence subject matter and other potential aspects of the teaching and learning environment have. To explore these issues in more depth Chapter Six described a study involving a series of interviews conducted with two teachers and a sample of their students drawn from two psychology modules – Research Methods and Statistics (RMS), and Memory and Perception (MP).

Differences were apparent in student conceptions of teaching, learning and assessment (TLA), differences which were apparent both within and between the two modules. There appeared to be a demarcation whereby students conceived of TLA as either a *product* or *process* and this delineation was characterised by a 'deep' or 'surface' approach to learning and differing personal epistemologies. These findings support Parpala et al. (2010) who suggested different approaches to learning occur as a consequence of experiencing the teaching-learning environment in different ways. For example, the findings from the interviews conducted revealed, like Mok and Wong (2008) previously, that subgroups of student profiles exist in addition to the deep-surface concept. Consequently this delineation may be too simplistic to capture the complexity of the student learning process. For example, students studying in one or either of the two psychology modules made comments suggesting that 'application' was important in the RMS module. Application however, was perceived differently. One group of students viewed application as the process of practicing a variety of techniques and methods. A second group whilst recognising application involved a practical element, also emphasised reading around the subject area and understanding in the process. The question is how does this relate to a deep, surface, and strategic approach to learning and different personal epistemologies? In the context of the RMS module, application whilst having a cognitive element has practical elements too. Thus, the teacher and students in the RMS module in particular were engaging in teaching and learning activities that had no small amount of procedural skills as well as 'knowledge' from the perspective of personal epistemology.

These findings suggest a need to contextualize what are perceived to be generic issues in teaching and learning in higher education. This is something that can potentially be achieved by tailoring academic development programmes and activities to specific contextual issues with regard to processes of teaching and learning in higher education. Moreover, it appears that students' personal epistemologies influence engagement in learning, depth of processing and comprehension monitoring (Hofer, 2001, Ryan, 1984).

The demarcation between students who perceived the different elements of teaching, learning, and assessment as a process or product raised two important questions:

1. What are the explanations for the difference between teachers and students in the two modules?
2. What are the explanations for the difference between students in each particular module?

One explanation may be found in the concept of ‘study orchestration’ a term used by Meyer (1991) to describe a contextualised study approach adopted by an individual or groups of students which involves 3 important aspects of student learning:

- The existence of qualitative individual differences in the manner in which students approach and engage in learning tasks
- The influence of context on such engagement
- Differing conceptions of learning among individual students

(Source: Lindblom-Ylänne, 2003)

A dissonant study orchestration may be the result of the students trying to adapt to the learning environment and changes in learning practices. Lindblom-Ylanne and Lonka (2000) argued that students who express coherent study orchestrations are ‘immune’ to the demands of the learning environment. That is, students will continue to search for meaning despite study materials containing lots of ‘facts’ (Lindblom-Ylanne, 2003). Moreover, Buehl (2005) noted how the profiles of students differed across domains, but sophisticated beliefs tended to be consistent across domains.

This adds to the argument that students who have ‘more sophisticated’ personal epistemologies are more persistent and consistent in their approaches to learning. It may well be that study orchestrations and personal epistemologies are one and the same, or perhaps part of a ‘holistic’ learning experience and therefore cannot be separated. This may be the reason for the continuing domain-specific, domain-general personal epistemology debate.

The results from Chapter Six suggest there are both domain-specific and domain-general personal epistemologies (Buehl & Alexander, 2001). Interestingly, the domain-general beliefs (i.e. those consistent across modules), appear to be the exception rather than the rule within the group as a whole. That is, the majority of students displayed domain-specific personal epistemologies on a consistent basis in the studies conducted. This adds to the burgeoning evidence for domain-specific personal epistemologies (e.g. Alexander, 2006; Buehl et al., 2002, 2005; Greene et al., 2010; Hofer, 2006; Muis et al., 2006). However, it may well be the 'outliers' are the students with the more sophisticated beliefs. These students pursue deeper approaches to learning, and look for meaning and attempt to understand whatever they are studying, regardless of whether the context encourages or discourages this particular approach to learning.

The findings reflect in some way the qualitative and quantitative conceptions of knowledge, which have two fundamental differences (Marton et al. 1993; Saljo, 1979). In the quantitative conceptions the learner believes that learning is acquiring external knowledge from an external source without active construction of knowledge. Whereas, qualitative conceptions involve a process of active knowledge construction whereby the individual extracts meaning from the learning task (Brownlee et al, 2002).

This is why it may be necessary to challenge teachers' conceptions of teaching and learning. Particularly, when they see the relationship between teaching and learning as cause and effect or input and output (Peseta et al. 2007). Thus, a shift in "world view" may be required as an individual has a need to experience conceptual change for themselves and what this entails in order to facilitate this process in others.

Moreover, qualitative and quantitative beliefs or conceptions also relate to the nature of what is learnt (Wilkinson, 1989). Individuals with quantitative conceptions of learning, view knowledge as discrete elements existing 'out there' and which can be acquired without transformation (Marton et al., 1993). On the other hand, qualitative conceptions reflect views that knowledge is complex (not discrete but interconnected); and is relative to the individual's interaction with a particular context (not absolute); and may reflect the dualistic-relativistic perspectives of knowing described by Perry (1970), Belenky et al. (1986), and Baxter Magdola (1993a) (Brownlee et al, 2002, p.10). This is important as students with more sophisticated beliefs have higher levels of motivational task performance (Buehl, 2005).

In separate quantitative analyses using the 'Discipline-focused Epistemological Beliefs Questionnaire" (DEBQ), there were significant differences in scores for certain knowledge for students studying in both modules. In addition, there were significant differences for certain knowledge, evolving knowledge and experience of knowing between groups of students in the two Psychology modules. Taken together, these two results suggest that personal epistemology is domain-specific and supports the concept of SHAPE.

Significant positive correlations were evident for evolving knowledge and a deep approach to learning; and for experience of knowing and a surface approach to learning in the Memory and Perception module. In the Research Methods and Statistics Module positive correlations were found between evolving knowledge and subjective knowledge; and negative correlations were apparent for certain knowledge and subjective knowledge. All of these correlations had large effect sizes according to Cohen (1988), and this emphasises the importance of the results, which suggest (1) student personal epistemologies are context-dependent; (2) student personal epistemologies and approaches to learning are inextricably intertwined, and are thus part of a two-way dynamic process. The question is which influences which? Do they influence each other equally? Is the influence unidirectional or bidirectional? Future research focusing on these questions would be beneficial as it is important to establish how these phenomena are influenced and what they are influenced by. Subsequent interventions can then be implemented to enhance the processes involved in the development of these phenomena.

In addition to the associations between personal epistemology and approaches to learning there were also associations between the different dimensions of personal epistemology. For example, evolving knowledge and subjective knowledge were associated, which suggests students who perceive knowledge as both tentative, evolving and also about opinions. Knowledge from this perspective is dependent on and driven by the interactions individuals have, including discussions and debates with peers, teachers, and through their interpretations of such interactions. A negative association was evident between certain knowledge and subjective knowledge suggesting these two dimensions of personal epistemology are ‘flip sides’ of a coin.

The premise being if one believes knowledge is certain, the perception is of a consensus of opinion whereby ‘experts’ in the particular field agree as do its texts. On the other hand, a belief in subjective knowledge is exemplified by an awareness that although there may well be a general consensus, opinions do differ within the field. Debates and discussions are therefore to be expected with contradictory texts available expressing these differing perspectives.

8.1.4 Chapter Seven: Psychology Case Study (focus group) - key questions two and four

There was variation in the personal epistemologies of individual participants who attended the focus group and these differences were manifest in the comments and responses they gave. For example, the way in which knowledge was viewed in the Research Methods and Statistics and Memory and Perception psychology modules. This was evident in the level of consistency of responses across the two modules for views about knowledge and other aspects of the process and product of teaching and learning in higher education.

The comments students made highlighted how sensitive they are to what they perceive to be the demands of the teaching-learning environment and any changes therein. This was clearly demonstrated in the discussion within the focus group centred around teachers who had attended and participated in a mandatory professional development course focused on teaching in higher education. The participants within the focus group, with great accuracy, identified teachers who were either on, or who had completed the course. These same participants were in no doubt that in their opinion the course had improved the practice of teachers.

The reason for this change in teachers, the author would argue, is a change in their personal epistemology and thus their perceptions of their teaching, their approach to teaching, and ultimately students’ learning. Indeed, Gibbs and Coffey (2004) highlighted the beneficial effect teacher training courses had on teachers in higher education. In a sample drawn from twenty-two universities in eight countries Gibbs and Coffey (2004) reported positive changes in student ratings of teachers, manifest in the extent to which the teachers changed from a teacher-focused to student-focused approach to teaching, and the extent to which their students adopted a deep rather than surface approach to learning. However, no specific reason for these changes was given. The author would argue that personal epistemology and the accompanying conceptions of teaching and learning is in no small part a contributor to this change. Kane et al. (2002) conducted a review of the literature on teacher beliefs and practices emphasised a need to gather data on teacher beliefs and how this influences their actions. Furthermore, Marra (2005) pointed to a need to identify and understand where these belief systems developed and in what way these influence teacher actions.

8.2 Implications for practice

8.2.1 Research into personal epistemology

Limon (2006) emphasised the importance of exploring personal epistemologies across domains and contexts to inform the debate on domain generality-specificity. Furthermore, Limon highlighted how it is difficult or nigh impossible to directly measure personal epistemology. Furthermore, Hofer (2006), highlighted how empirical investigations into the domain generality or domain specificity of personal epistemology have to be viewed with some amount of scepticism as there has been an over reliance on quantitative measures of the phenomenon (see also Clarebout et al., 2001; DeBacker et al., 2008; Wood & Kardash, 2002).

Bearing in mind the above points, the case studies conducted and discussed within this thesis utilised a combination of quantitative and qualitative methods and are significant for the following reasons. First, by consulting both staff and students the investigation gives a greater insight into teaching and learning practice and process in a higher education context. Second, the use of a mixed methods approach renders this study more comprehensive than previous studies of personal epistemology. As far as the author is aware, the only other study conducted using a multidisciplinary, comparative approach, and which constitutes a new opening to the study of personal epistemology was conducted by Kaartinen-Koutaniemi and Lindblom-Ylanne (2008); who hypothesised (and confirmed):

- "Personal epistemology firstly evolves from interaction with the nature of the discipline;
- Secondly, from the disciplinary environment and curriculum; and
- Thirdly, from academic practices and aims modified by university teachers" (p.180)

However, Kaartinen-Koutaniemi and Lindblom-Ylanne (2008) did not utilise a mixed methods approach, opting instead for a qualitative study involving 52 semi-structured interviews with students drawn from three disciplinary areas (psychology, pharmacy, theology). Kaartinen-Koutaniemi and Lindblom-Ylänne (2008) reported:

> "…further research into disciplinary differences is still needed to gain a broader understanding of students' personal epistemology" (p.189).

8.2.2 Teaching and learning in higher education

In the introduction to this thesis reference was made to theories of learning. The discussion then turned to teaching in higher education and the established expectations of the profession. Attention was then drawn to a number of influential aspects of teaching in higher education that are equally important, and need to be highlighted as they are sometimes overlooked.

With regard to theories of learning, the results from the series of studies discussed in this thesis suggest teachers and students have different perceptions of the teaching and learning context, and as a result adopt different approaches to teaching and learning. These perceptions and approaches reflect the different theories of learning discussed in the introduction to this thesis. There are those with a behaviourist ethos who see teaching and learning involving a change in the behaviour of the learner through responses to external stimuli. The cognitivist ethos sees the learner as a processor of information with learning involving internal processes such as thinking, memory, knowing and problem solving which need to be explored, again emphasising the importance of external stimuli. The constructivist perspective however, sees learning as an active contextualised process, and differs from the cognitivist perspective, which emphasise how the learner constructs knowledge for themselves through a process of social interaction and negotiation, rather than acquiring 'knowledge' from an external source. Learning from the humanist perspective is student-centred and the role of the educator is that of a facilitator.

The results from the studies discussed in this thesis highlight how these different perspectives were evident in the perceptions of, and approaches within different teaching and learning contexts. That is, teachers and particularly learners could be partitioned by these particular perspectives on learning. Some students perceived and approached their learning in a way that reflected a behaviourist or cognitivist perspective whereby learning is something passively acquired from and through an external source. Conversely, other students reflected the constructivist, humanist ethos in both their perceptions and approaches, whereby learning is seen as an active meaning-making process, and the learner constructs the knowledge for themselves. The author would argue based on the investigations conducted, that it is personal epistemology that influences these different perceptions and approaches which is the authors considered response to the four questions set out as the key to understanding teaching, learning, and assessment practices in higher education.

The results discussed in this thesis appear to corroborate previous findings suggesting students' approach to learning may be influenced by their beliefs about the nature of knowledge and knowing and thus their conceptions of learning (e.g. Biggs, 1999; Meyer & Boulton-Lewis, 1999; Pillay, 2002; Schommer, 1993). What the current research has added however, is the extent to which teachers in higher education influence their student's beliefs and conceptions in different contexts; and how these differ not only between disciplines, but within disciplines too. Research conducted previously has emphasised it is the teachers' intention that is of paramount importance in the teaching and learning context (Fives, 2011; Martin et al., 2000; Patrick, 1992). A phenomenon described by Entwistle and Smith (2002) as 'personal understanding' and 'target understanding'. Personal understanding is typified by teacher perceptions of the requirements in specific teaching and learning contexts. Target understanding describes what it is the teacher expects of their students within that teaching and learning context. The literature suggests a link between the approach to teaching of teachers and the approach to learning of their students (e.g. Marton & Ramsden, 1998; Trigwell et al., 1999). Furthermore, it has been argued that when teachers enter a teaching and learning context they have prior conceptions of what good teaching and learning is in their discipline (Prosser & Trigwell, 1999).

Moreover, Greene (2009) investigated faculty expectations of students' epistemological and ontological cognition in relation to their likelihood of academic success. The results from the study suggested faculty believed students with more sophisticated beliefs would be more likely to attain higher grades. Greene (*idem*) posited that the findings from his study supported the need to investigate how students' personal epistemologies can be aligned with collegiate faculty's expectations. The convergence of student personal epistemologies at the group level of analysis toward those of their teacher described in Chapter Five of this thesis in addition to the findings of Greene (2009) suggest that future research is certainly needed at a more domain-specific level.

8.3 Conclusion

Taking into account the findings from the current investigation, it is evident that a simple definitive explanation of the association between personal epistemology and perceptions of, and approaches to teaching and learning is not possible. The associations are complex and need further investigation. What is possible, however, is to highlight the findings from this research and potential streams of research in the future.

The results suggest teachers have different perceptions of what the purpose of their teaching is, and this perception is associated with their personal epistemologies, and to a lesser extent the subject matter that they are teaching. The perceptions of teachers (based on their personal epistemologies), influences their intention in specific teaching and learning contexts, which is then manifest in the approach to teaching they adopt.

The evidence also suggests personal epistemologies are not 'trait-like'. Rather they are malleable and can be influenced. A phenomenon highlighted in Chapter Five. This is important as previous research has shown the personal epistemologies of student's influences the way in which they approach their learning, and their academic performance (e.g. Bendixen & Rule, 2004; Paulsen & Feldman, 2005, 2007; Schraw & Sinatra, 2004).

8.3.1 A socialised habitus of academic personal epistemologies (SHAPE)

Stromso and Braten (2011) asked whether university teachers' teaching beliefs are related to personal epistemology. Furthermore, Weinstock and Roth (2011), argued teachers' theories of knowledge and knowing may play a role in the teaching and learning context, and thus influence students' attitudes toward learning. The author suggests, based on the findings from the series of investigations contained within this thesis, that personal epistemology influences how teachers and students perceive and conceive of teaching and learning in higher education.

The concept of SHAPE offers a way of addressing the complexity and social construction of personal epistemology as recognised by a plethora of educational researchers including Baxter Magolda (1992), Belenky et al. (1986), Bendixen and Rule (2004, Hofer and Pintrich (1997), and Jehng et al. (1993). Moreover, Pizzolato (2008) highlighted at the time that there had not been an

> "...investigation into whether epistemological orientations are in fact coherent or if they change with context" (p.229).

As far as the author is aware, no investigation addressing these issues has been conducted that compares with the rigour and comprehensive use of research methods as the current study since Pizzolato's (2008) declaration. Whilst disciplinary based research has been helpful, the author agrees with Hofer (2001) who stated:

> "…we need to develop a more situated view of epistemology and also one that enables us to examine a more microgenetic level of change…Another problem with general stage structures is the growing recognition by cognitive theorists of domain specificity (Carey and Smith, 1993; Case, 1985, 1992; Ceci, 1989, also see Buehl and Alexander,

2001). If knowledge is more likely to be viewed as organised within domains rather than in unitary structures, it would hardly be surprising to suggest that beliefs *about* knowledge would also be domain-specific. Research into domain-specific beliefs is growing rapidly, such as beliefs about mathematics (Schoenfeld, 1983, 1985), or science (Bell and Linn, 2002; Hammer, 1994; Hammer and Elby, 2002, Hogan, 1999, 2000; Songer and Linn, 1991)" (p.363).

Earlier, Gerharde (2000) highlighted the micro-social processes involved in quite localised meaning systems and practices. Thus, it is wise not to make generalised statements about the practices of academics in particular specialisms (Becher & Trowler, 2001, p.xiv). It would be far more fruitful and beneficial to investigate intra and inter disciplinary beliefs about knowledge and knowing. From a phenomenographic perspective, teachers and their students have qualitatively different person-world relationships. For example, Schrodt et al. (2008), posited five teacher power bases that related to teacher-student roles. It is these relationships that influence the way in which teaching and learning contexts are conceived of. For example, the intentions of the teacher based on their 'personal understanding' and what they intend for their students, the 'target understanding' (Entwistle & Smith, 2002). A phenomenon also highlighted in the work of Donald (2002), who discussed how teachers and learners think in different academic contexts.

The author wants to suggest that the idea of a 'socialised habitus of academic personal epistemology' (SHAPE), governed by contextual factors like purpose and form, which subsume many of the key conceptual suggestions made over the last twenty years in the area. These include:

- Eley (1992) who found students adapted their approaches to learning to their perception of the demands of the unit
- Meyer (1991) who describes this process as 'study orchestration'
- Gow & Kember (1993) who highlighted the impact of teachers' approaches to teaching had on student approaches to learning. When the teacher was an information giver students were low on deep approach. When the teacher was a facilitator their students were low on surface approach. Teacher beliefs had therefore created teaching environments to which students responded.

- Sheppard & Gilbert (1991) who investigated epistemological beliefs in 4 academic departments and concluded beliefs influenced in an inter-related way by students' approach to learning, their conceptions of knowledge, and their teacher's beliefs about teaching.
- Campbell et al. (2001) who argued the learning strategy adopted by a student is determined by a complex interaction between the student's pre-existing beliefs about knowledge and learning, general predisposition towards a particular approach to learning, and students' perceptions of the learning approach required by the educational context
- Martin et al. (2000) who reported how teachers constitute knowledge within the teaching and learning context, and attempt to bring their students into a relationship with that knowledge through teaching in that context (p.388), whereby the 'object of study' determines quality of teaching and learning outcome.

This may seem a bold statement to make but the findings of these and many other studies do point toward SHAPE as an explanation toward these practices and processes. The ethos underpinning SHAPE is not far removed from Kegan's (1994) holistic model of "self-authorship" (p.185), which incorporates and integrates three dimensions of development that equip individuals to respond to complex tasks. These are:

- The cognitive dimension;
- The intrapersonal dimension; and
- The interpersonal dimension.

All of which are involved and contribute to SHAPE to a greater or lesser extent depending on the particular context and its accompanying demands.

The evidence from Chapters Four, Five, Six and Seven provides a strong case for the concept of SHAPE and how it provides a framework on which to base future investigations; whilst at the same time acknowledging subcultures and individual differences within groups of students. The concept of SHAPE highlights how groups of students when learning, are influenced by a variety of elements within teaching and learning contexts including: their own perceptions about teaching and learning, the perceptions and practice of the teacher, and the subject matter. The author argues however, that the results in this investigation suggest it is the teacher personal epistemologies and the academic context they create for their students, which provides the climate that influences the perceptions of their students and thus their approach to learning, and ultimately their learning experience. This may be the reason Baeten (2010) reported student-centred learning environments expected to stimulate deep approaches to learning have failed to display consistent results. As Neissen (2008) points out, from an enactivist point of view, personal epistemology is not manifest in cognitive elements alone as these are played out in a web of interaction within the social milieu of the particular teaching and learning context. This involves a ‘fusing of horizons’ (Gadamer, 1990) whereby an on-going process of interpretation takes place and this involves past, present and projected experience.

Thus, it is what the teacher intends their students to learn, and how their students will learn that is of paramount importance (e.g. Donald, 2002; Entwistle & Smith, 2002). The author argues that this intention is bounded within their personal epistemology, and it is this that influences teacher perceptions within the teaching and learning environment. These perceptions inform the approach to teaching taken, and this in turn influences student perceptions of, and approaches to their learning.

Taking into account the potential influence context can have on student personal epistemologies, the author wishes to reconfigure the concept of SHAPE to take account of a variety of potential influences within each particular context; whilst also emphasising the contribution the teacher makes and the way in which they provide the context for students. Thus, SHAPE reconfigured recognises the complex interaction between teacher personal epistemologies, student personal epistemologies, subject matter and other elements of different teaching and learning environments. It is these interactions that contribute the epistemological context in which teaching and learning takes place.

Starting with Chapter Four differences were apparent both within and between disciplines for the four dimensions of personal epistemology. Chapter Five highlighted how epistemological shifts occurred at the group level for three modules drawn from the same undergraduate degree programme over the duration of a semester of study. This finding appears to support Hennessey (2013) who pointed out, that the actions of teachers within the teaching-learning environment act as a model, and students use this as a template to display 'knowledge' within the particular context. Chapter Six discussed the findings from a number of interviews and quantitative analyses conducted within the context of two Year Two psychology modules drawn from the same undergraduate programme. The responses again displayed differences within disciplinary field and thus appear to support the concept of SHAPE.

Indeed, in the recent text by Trowler et al. (2012) entitled 'Tribes and Territories in the 21st Century' a shift is evident from the disciplinary differences that was and still is to a significant extent lauded in the literature, and which is seen as the conventional wisdom within the field of educational research. For example, the Higher Education Academy (HEA) (2006) UK Professional Standards Framework for Teaching and Supporting Learning in Higher Education states staff who teach and support student learning must demonstrate both knowledge of how students learn generally and in specific subjects. Moreover, Jenkins and Burkill (2004) emphasise the importance of a disciplinary focus in learning and teaching courses for new academic staff.

Within the last three years, Brennan et al. (2010) when reflecting on the SOMUL project highlighted how student learning is frequently framed around academic disciplines. This emphasis can also be found in the subject benchmarks implemented by the Quality Assurance Association for Higher Education and the HEA subject centres. Moreover, Nelson Laird et al. (2008) argued it may be useful to investigate patterns of disciplinary socialization for students and faculty, and its influence at different points in academic development.

Whilst the author accepts 'knowledge' varies between different disciplines (e.g. Parpala, 2010; Parry, 1998; Yiijoki, 2000), the current study also suggests variation within disciplines. This issue is not lost on Krause (2012) who highlighted the persistence of discipline within the literature. Like Krause (2012), the author accepts that discipline still has a part to play, however, the rise of 'interdisciplinarity' in particular, reflects a need for a more contextual, subcultural perspective with regard to teaching and learning practice and process in higher education. As Kleiman (2012) notes

“There is a strong sense that we have moved or certainly are moving beyond a period when there are single identifiable disciplines...and a shared understanding of what that discipline was” (p.135)

Moreover Young (2010) stated

> "Studies of epistemological characteristics of disciplines have tended to opt for broad classifications, rather than claim unique epistemologies for particular disciplines" (p.119).

The variation between student interview responses who were studying in one or both of the psychology modules also highlights that although SHAPE is an improved framework on which educational researchers can 'anchor' their studies, there is a need to acknowledge the variation between individuals within the group. It has to be accepted that it is not possible to cover all eventualities and possibilities in the complexity of teaching and learning in higher education. What SHAPE does offer however, is a means of recognising how using group, at a modular level of analysis, influential aspects of the teaching and learning context (including individual and group personal epistemologies) can be identified. This allows a number of stakeholders including teachers, students and academic developers to foster appropriate teaching and learning experiences through interventions resulting from the 'profiling' of different teaching and learning contexts, and the teachers and learners therein.

Whilst Nelson Laird et al. (2008) do highlight the need for nuanced forms of educational practice by moving from a hard-soft dimension to a disciplinary level of analysis; the author would argue we need to go further. It appears SHAPE is a preferable alternative to the disciplinary differences explanation (e.g. Becher & Trowler, 2001; Biglan, 1973; Donald, 2002; Kolb, 1991) of student learning in a higher education context. The author, as a proponent of the 'post-disciplinarity' approach agrees with Krause (2012) who acknowledges such an approach

> "...offers an additional, parallel space for scholars to build community beyond disciplines" (p.191).

Furthermore, the argument put forward by Knewstubb and Bond (2009) that

> "If beliefs about knowledge, teaching, learning and the subject were treated as part of the interpretive context of teaching-learning communication, it might be possible to develop models that integrate the conceptual and communicative elements vital to higher education" (p.191/192).

Indeed, attempting to wrestle advocates of the disciplinary paradigm from the solace it provides in its traditions may be too big a battle to be fought. Evolution rather than revolution is the watchword. If one takes a postmodernist perspective, it is clear there is some justification for this in the work of Foucault's archaeological method and genealogical approach, which in the words of Drolet

> "made a significant contribution to the shattering of barriers between established academic disciplines" (p.21).

As Saussere (1989) points out it is culture and its meaning that are produced and reproduced in order to sustain the status quo. It is here that the power relations between teacher and student discussed in Chapter One become apparent. The phenomenon of teaching and learning in higher education is complex and variation within groups of students drawn from different teaching and learning contexts is evident. This aligns with the 'subculture' and 'microculture' thesis (e.g. Mårtensson et al., (2012; Roxå et al., 2011), which was evident in Chapters Four, Five, Six and Seven of this thesis.

Pizzolato (2008) stated epistemological orientations are contextual and not necessarily easily transferable. Thus, there is the potential for students with more 'sophisticated' personal epistemologies to not display such behaviours as the context in which learning takes place is not deemed to require such sophistication as such complex ways of thinking are not valued; and students therefore become more strategic in the approaches displayed. Moreover, Pizzolato (2008) goes further stating that whilst students may not necessarily believe in, what they may regard as more naive personal epistemologies, they note they will suffice and be rewarded within a particular context. It may be these students are mindful of the demands of the context and what is regarded as success and its accompanying values and rewards in the form of a good grade. Discussing approaches to learning, Wilson and Fowler (2005) found that 'deep learners' were consistent across two different learning environments; and 'surface learners' changed as a result of being exposed to a 'deeper' learning environment. Later, Brennan et al. (2010) citing earlier work by Richardson (2007), posited that the perceptions of academic context held by students in the same department may induce different approaches to learning

These are important points as many educators see academic success reflected in students' ability to think critically, construct their knowledge through a process of conceptual change (Schraw, 2007); and it is student beliefs about learning, knowing and knowledge that influences this process (Alexander et al., 1998; Greene, 2009). This expectation was demonstrated in a United States study conducted by (Greene, 2009) who asked faculty members to grade four hypothetical students after being provided with a profile for each one. Interestingly, the hypothetical students who were deemed as more sophisticated in their personal epistemologies received higher grades.

The findings from the current investigation suggest there is some justification for the models positing both domain-specific and domain-general personal epistemologies (e.g. Buehl & Alexander, 2002; Limón, 2006; Muis et al., 2006). Research has noted personal epistemologies differ according to subject matter (e.g. Buehl & Alexander, 2002; Hofer, 2000; Schommer & walker, 1995; Trautwein & Ludtke, 2007), or are topic-specific (Braten & Stromso, 2010). It may well be that the inconsistent findings with regard to the domain-specific, domain-general debate are in part due to whether students have reached a certain level of sophistication in their personal epistemologies. If the findings in Chapter Six are indicative of the wider higher education community, this could be the case. The variation within groups of students suggests that the more sophisticated the personal epistemologies are, the more students are able to adapt to different contexts whilst at the same time retaining the perception that a deep approach to learning is the best way to proceed (Entwistle & McCune, 2009; McCune & Entwistle, 2011). To use the example of threshold concepts (e.g. Mayer & Land, 2003), one could argue these 'sophisticated' students have passed through the threshold of conceptual understanding and beliefs about knowledge.

Chapter Five emphasised how student epistemologies converged with those of their teacher. This is an important finding as teachers with sophisticated personal epistemologies are likely to communicate these to students. Thus, interventions that can positively influence teacher epistemologies and accompanying behaviours can benefit all concerned (Marra, 2005).

8.3.2 Limitations and recommendations for further research

The aim of the research conducted for this thesis was to explore the utility of the concept of SHAPE and how personal epistemology influences perceptions of, and approaches to teaching and learning in higher education.

With this in mind it is important to note the methodological limitations of the research conducted for this thesis. The conclusions from these studies are limited as it is difficult for the results to be generalised to the wider undergraduate higher education community. The case studies have given valuable insights into the perceptions and experiences of teachers and students in two disciplinary fields of study – Psychology and Sports, Health and Exercise Science. However, further research conducted within diverse academic environments is required to establish the utility of the concept of SHAPE and the influence personal epistemology has in higher education. Future research would benefit from the use of a larger sample of participants, which would permit the application of more sophisticated statistical methodologies in order to examine the complex relationships between personal epistemology and different elements of the teaching and learning environment.

It has been implied throughout this thesis that personal epistemology has a profound influence on teaching and learning in higher education. Future research using longitudinal, cross-sectional and experimental approaches may provide stronger evidence of influence and causality between these constructs.

Although the questionnaires in this study showed adequate reliability, much has been written about an over-reliance on self-report measures when attempting to capture the complexity of different elements of teaching and learning in higher education. This is particularly pertinent when attempting to capture beliefs about knowledge. Future research may require the development of more reliable measures for examining the construct of personal epistemology.

With regard to the data collection itself, the SHES case study would have been strengthened by having pre-post data for all four modules – Physiology was missing. In addition, conducting interviews and a focus group and asking students to complete the ASSIST would have permitted a comparison between the case studies in Psychology and SHES. The collection and analysis of demographic details (i.e. age, gender) may have also given valuable insights into different characteristics as these may be influential, particularly with regard to personal epistemology, approach to learning, and beliefs and perceptions of different elements of teaching and learning in higher education.

The author accepts the utility of previous research into 'teaching and learning regimes' (Trowler, 2009), and 'ways of thinking and practicing' (Entwistle, 2006; Hounsell & Anderson, 2008), the focus of which is at the disciplinary level. SHAPE however, is a way of focusing on specific teaching and learning contexts and gathering information at a finer-grained level of analysis which can be utilised to inform academic development activities that are more nuanced than previous attempts. Moreover, SHAPE can then help to inform how successful such interventions have been and the need for amendments in the form of academic development initiatives.

It has become apparent that one size does not fit all, and the call by staff for teaching development programmes to be tailored to the nuances of their particular discipline may not suffice as subcultures and microcultures within and between disciplines also need to be catered for.

The results in this thesis do suggest personal epistemology influences teaching, learning and assessment in different contexts in different ways. It is possible to enhance research into personal epistemology by using previous research as a 'frame of reference' whereby comparisons between investigative programmes can be of benefit to a variety of stakeholders. In the past, personal epistemology research has come from a number of different perspectives – developmental, independent beliefs, and contextual theories. It does not have to be either or, it can be a combination of the three perspectives that contribute toward a greater 'understanding' of the issues and origins involved in the complexity of teaching and learning in the context of higher education.

This thesis suggests personal epistemology research has a significant contribution to make toward understanding teaching, learning and assessment practices and processes in higher education. Progress and evolution as researchers, educators and developers is needed whereby a focus on the personal epistemologies of all stakeholders is evident. This involves learning from each other, sharing 'understandings' and the foundations on which they are built. Practitioners can then 'cherry pick' if you like, and apply what is relevant and appropriate to different contexts.

Kember (2001) characterised students who were having difficulties in their studies as having three distinct beliefs which have three mutually consistent components. These students believe that knowledge is defined by an authority, so is either largely right or wrong. Where multiple opinions exist an authority will eventually decide which is correct. These students also believe that it is the role of the teacher to transmit or teach this body of authoritative knowledge. With regard to their role these particular students believed the way to learn was to absorb the knowledge deemed as appropriate by the teacher. The outcome of the process of teaching and learning, according to these students, was to be judged on their ability to reproduce the body of knowledge for the examinations and other assessment.

Whilst acknowledging both teachers and their students need some 'baseline knowledge' it is important to focus on the progress made. How students relate to such knowledge, how they justify and validate their knowledge, their awareness of where knowledge lies, how it is constructed, transmitted, and perpetuated are all important issues. There is a need for personal epistemologies and learning that allow people to function efficiently, effectively, flexibly; need to be able to think and solve problems that may not have been encountered previously.

Entwistle (2009) recently reported how:

> "Barnett (2007) has recently been discussing what he believes to be a goal for university education in the 21st Century (see, also Baxter Magolda, 2008)…he argues that students will have to tackle problems which are not just complex, in the sense of open-ended, real-life situations, but also 'super-complex' in that the problems faced, such as climate change, are fundamentally irresolvable, as competing proposed solutions spring from incompatible ideologies and value positions" (p.1).

Moreover, Entwistle and McCune (2009) discussed how coping with 'supercomplexity' depends on students developing a 'disposition to understand for oneself' whereby their learning strategy, will to learn, and sensitivity to context act in consort.

The author agrees with Entwistle (2009) who highlighted how student learning should be characterised by:

- Understanding in imaginative, forward-looking ways
- Integrative understanding
- Proactive understanding
- Flexible understanding

Thus, students need to learn how to think, and not just about the subject matter itself. There is the danger in higher education of becoming too focussed on subject matter 'knowledge' and this diverts attention away from important aspects of knowledge and knowing themselves. That is, what is knowledge, how it is perpetuated, how it is constructed, how it is valued and validated. These are important issues in higher education.

Returning to the observations made by Entwistle (1998) with regard to academics often having little understanding or awareness of how they approach teaching has a profound effect on the learning of their students; and Donald (2003), who discussed how expectations for students can either limit or extend their frontiers. This highlights the need to look at teachers' predispositions, their epistemological expectations. Teacher personal epistemologies are influential in how they perceive their students, their abilities, what they know, and how they have the potential to influence the personal epistemologies of their students. In order to effect change it is vital teachers are aware of their own personal epistemologies and how they impact on how they plan and deliver courses (Stark, 2002).

Marton and Fazey (2002) point out that at the level of analysis useful for shaping pedagogy we need to know what changes as someone learns. 'Change' describes the process. Understanding is the conventional, received object that is changed. To avoid the common pitfalls they suggest that understanding is the conflation of procedural and declarative knowledge which can be thought of as the person-world relationship.

Thus, this relationship (their understanding), is proposed as the outcome of the varied experience of the learner, and the degree of variation is seen as the most important factor in determining adaptability within and between contexts. This particular view argues for a process that, following identification of a personal epistemology will expose teachers to a wide range of variation in perspectives, processes and products as their meanings, methods and modes of their own learning. The emergent understanding will be a relationship between the teacher and his/her outer world based on a more sophisticated epistemology, which Schraw and Olafson (2002) have shown to be associated with better choices by the teacher with regard to aspects of teaching and learning.

How this is achieved on a large scale is a challenge that must be taken up. Knight (2006), and Gibbs and Coffey (2004), have provided evidence of the beneficial impact of intensive teaching development programmes. Benefits displayed in a 'shift' from a teacher-focused to student-focused approach to teaching. However, the reason for this shift was neither investigated nor established.

The author would argue such a shift probably involved a conceptual change in teachers' personal epistemologies and how they perceived their role in the teaching and learning process. If this is indeed the case, there is the potential for such effects to benefit teachers and students, a win-win situation. It has already been established that it is the teachers' intention (e.g. Martin et al., 2000; Entwistle & Smith, 2002), that has a profound effect on the learning of students. Moreover, Baeten et al. (2013) highlighted how student-centred teaching environments subsume three main features: active involvement of students in constructing knowledge for themselves (Kirschner et al., 2006; Stuyven et al., 2008); selecting, interpreting and applying information to problem solve (Stuyven et al., 2008); and coaching and facilitating from the teacher (Beigaard et al., 2000).

It is essential therefore that teacher development programmes include the vital element of examining teacher predispositions – how they develop, how they are perpetuated, and how they influence teaching and learning practices and processes in higher education. Prebble et al. (2004), in a systematic review of 150 teaching education courses, concluded that programmes underpinned by conceptual change models were effective in changing teachers' beliefs from a teacher-focused to student-focused approach (cited in Hanbury, Prosser and Rickson, 2008). Moreover, research conducted by Lawson, Fazey and Clancy (2007), discussed the positive impact a teaching in higher education scheme had on the beliefs of teachers.

Of course, one should not discount the established expectations of teacher knowledge, and the contribution these make. However, it also crucial to emphasise the importance of predispositions and how they influence perceptions of these established elements of teaching and how they are utilised in teaching practice. Reay et al. (2001) discussed 'institutional habitus' where habitus is a complex internalised core from which everyday experiences emanate. A problem arises when the habitus is constraining in that it is bound in social groups, parameters and paradigms that influence actions that are reproductive rather than transformative.

Bibliography

Abbas, A., & McLean, M. (2003). Communicative Competence and the Improvement of University Teaching: insights from the field. *British Journal of Sociology of Education*, Vol.24, Issue 1, 69-82.

Adler, S.M. (2011). Teacher epistemology and collective narratives: Interrogating teaching and diversity. *Teaching and Teacher Education*, 27, 609-618.

Akerlind, G.S. (2008). A phenomenographic approach to developing academics' understanding of the nature of teaching and learning. *Teaching in Higher Education*, 13:6, 633-644.

Akerlind, G.S. (2005). Academic Growth and Development – How do University Academics Experience it? *Higher Education*, 50:1-32.

Akerlind, G.S. & Jenkins, S. (1998). Academics' views of the relative role of responsibility of teachers and learners in a first-year university course. *Higher Education Research and Development*, 17(3), 277-289.

Alexander, P.A., Kulikowich, J.M. & Jetton, T.L. (1994). The Role of Subject-Matter Knowledge and Interest in the Processing of Linear and Nonlinear Texts. Review of Educational Research, Vol. 64, No. 2, 201-252.

Alise, M.A., & Teddlie, C. (2010). A Continuation of the Paradigm Wars? Prevalence Rates of Methodological Approaches Across the Social/Behavioural Sciences. *Journal of Mixed Methods Research*, 4:2, 103-126.

Alvesson, M. (2002). *Understanding organizational culture*. London: Sage Publications.

Ancona, D., Kochan, T., Scully, M., Van Maanen, J., & Westney, E. (2009). *Managing for the future: organizational behaviour and processes*. South Western CENGAGE Learning.

Anderson, C., & Hounsell, D. (2007). Knowledge practices:'Doing the subject'in undergraduate courses. *The Curriculum Journal*, *18*(4), 463-478.

Andre, T. & Windshitl, M. (2003) Interest, epistemological beliefs, and intentional conceptual change, in: G. M. Sinatra & P. R. Pintrich (Eds) *Intentional conceptual change* (Mahwah, NJ, Lawrence Erlbaum).

Arenas, E. (2009). How teachers' attitudes affect their approaches to teaching international students. *Higher Education Research and Development*, 28:6, 615-628.

Aristotle (1908-1952). *The Works of Aristotle Translated into English Under the Editorship of WD Ross, 12 vols*. Oxford: Clarendon Press.

Aristotle: Nichomachean Ethics Book 2 Chapter 1. In Ross, W.D., revised by J.O. Urmson. in *The Complete Works of Aristotle*, The Revised Oxford Translation, vol. 2, Jonathan Barnes, ed., Princeton: Princeton University Press, 1984.

Arnd-Caddigan, M., Averett, P., & Pozzuto, R. (2010). Teaching Human Behaviour and the Social Environment to Enhance Student's Personal Epistemology. *Journal of Human Behaviour in the Social Environment*, 20:8, 974-988.

Asch, S. (1951). 'Effects of group pressure upon the modification and distortion of judgements'. In Guetzkow, H. (Ed.). *Groups, Leadership and Men*. Carnegie Press, Pittsburgh, pp.177-190.

Audi, R. (1999). *The Cambridge Dictionary of Philosophy* (2nd Ed.). New York: Cambridge University Press.

Babbie, E. R. (1990). *Survey research methods*. California, USA: Wadsworth Publishers

Baeten, M., Struyven, K., & Dochy, F. (2013). Student-centred teaching methods: Can they optimise students' approaches to learning in professional higher education? *Studies in Educational Evaluation*, 39, 14-22.

Baeten, M., Kyndt, E., Struyven, K., & Dochy, F. (2010), Using student-centred learning environment to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness. *Educational Research Review*, 5, 243-260.

Bain, J.D. (2004). *What the Best College Teachers Do*. Cambridge, MA: Harvard University Press.

Bain, J.D. (2000). 'Celebrating good teaching in higher education: Putting beliefs into practice', in Bowie, C. (ed.), *Improving the Quality of Teaching for Learning.* Proceedings of the 1998 Conference of the Queensland Branch of HERDSA, Brisbane.

Bamber, V. (2012). Learning and Teaching, Disciplines and Social Practice Theory. In Paul Trowler, Murray Saunders, and Veronica Bamber (Eds.), *Tribes and Territories in the 21st Century: Rethinking the significance of disciplines in higher education*. Routledge: London.

Bandura, A. (1977). *Social Learning Theory*. New York: General Learning Press.

Barnett, R. (1994). *The Limits of Competence*. London: Open University Press.

Barron, B. (2003). When smart groups fail. *The Journal of Learning Sciences*, 12, 307-359.

Bartlett, F.C. (1932). *Remembering: an experimental and social study*. London: Cambridge University Press.

Barnett, R. (1994). *Academic Community: Discourse or Discord?* Bristol, PA; Jessica Kingsley Publishers.

Baudillerd, J. (1988). Selected Writings, Mark Poster editor. Stanford: Stanford University Press.

Bauersfeld, H. (1988). Interaction, construction, and knowledge: Alternative perspectives for mathematics education. In T. Cooney and D. Grouws (Eds.), *Effective Mathematics Teaching*. National Council of Teachers of Mathematics and Erlbaum Associates, Reston, VA (pp.27-46).

Baxter Magolda, M.B. (2004). Evolution of a Constructivist Conceptualization of Epistemological Reflection. *Educational Psychologist*, 39 (1) special issue, 31-42.

Baxter Magolda, M.B. (2001). *Making their own way: Narratives for transforming higher education to promote self-development*. Sterling, VA: Stylus.

Baxter Magolda, M.B. (1992). *Knowing and reasoning in college: Gender-related patterns in students' intellectual development*. San Francisco: Josey-Bass.

Bazeley, P. (2009). Integrating Data Analysis in Mixed Methods Research. *Journal of Mixed Methods Research*, 3:3, 203-207.

Bazeley, P., & Kemp, L. (2012.). Mosaics, Triangles, and DNA: Metaphors for Integrated Analysis in Mixed Methods Research. *Journal of Mixed Methods Research*, 6:1, 55-72.

Beausaert, S.A.J., Segers, M.S.R., Wiltink, D.P.A. (2013). The influence of teachers' teaching approaches on students' learning approaches: the student perspective. *Educational Research*, 55:1, 1-15.

Becher, R.A. (1989). Academic tribes and territories. Bristol, PA: Open University Press.

Becher, R.A. (1981). Towards a definition of disciplinary cultures. *Studies in Higher Education*, 6 (2), 109-122.

Becher, T., & Trowler, P. (2001). *Academic tribes and territories*: *intellectual enquiry and the culture of disciplines*. Open University Press.

Beck, J, & Young, M.F.D. (2005). The Assault on the Professions and the Restructuring of Academic and Professional Identities: A Bernsteinian analysis. *British Journal of Sociology of Education*, 26:2, 183-197.

Beijaard, D., Verloop, N., & Vermunt, J. (2000). Teachers' perceptions of professional identity: An exploratory study from a personal knowledge perspective. *Teaching and Teacher Education*, 16:7, 749-764.

Begley, C. M. (1996). Using triangulation in nursing research. *Journal of advanced nursing*, *24* (1), 122-128.

Belenky, M.F., Clinchy, B.M., Goldberger, N.R., & Tarule, J.M. (1986). *Women's Ways of Knowing*. New York: Harper Collins.

Belsey, C. (2002). *Postructuralism: A Very Short Introduction*. Oxford: Oxford University Press.

Benbaset, I., Goldstein, D.K. & Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. *MIS Quarterly*, September, 369-386.

Bendixen, L.D., & Rule, D.C. (2004). An Integrative Approach to Personal Epistemology: A Guiding Model. *Educational Psychologist*, 39 (1) special issue, 69-80.

Berger, A.A. (2003). *The Portable Postmodernist*. Oxford, UK: AltaMira Press.

Bendixen, L. D., Dunkle, M. E., & Schraw, G. (1994). Epistemological beliefs and reflective judgement. *Psychological Reports*, *75*(3f), 1595-1600.

Bergman, M.M. (2011). The Good, the Bad, and the Ugly in Mixed Methods Research and Design. *Journal of Mixed Methods Research*, 5:4, 271-275.

Bergman, M.M. (2011). The Politics, Fashions, and Conventions of Research Methods. *Journal of Mixed Methods Research*, 5:2, 99-102)

Bergman, M.M. (2010). On Concepts and Paradigms in Mixed Methods Research. *Journal of Mixed Methods Research*, 4:3, 171-175.

Beausaert, S.A.J., Segers, M.S.R., & Wiltink, D.P.A. (2013). The influence of teachers' teaching approaches on students' learning approaches: the student perspective. *Educational Research*, 55:1, 1-15.

Biggs, J. (2003). *Teaching for Quality Learning at University (2nd edition)*. Maidenhead: Open University Press.

Biggs, J. (2001). The reflective institution: Assuring and enhancing the quality of teaching and learning. *Higher Education*, 41, 221-238.

Biggs, J.B. (1999). *Teaching for Quality Learning at University*. Buckingham: Open University Press.

Biggs, J.B. (1989). Approaches to the enhancement of tertiary teaching. *Higher Education Research and Development*, 8, 7-25.

Biggs, J.B. (1988). Approaches to learning and to essay writing. In R.R. Schmeck

(ed.) *Learning Strategies and Learning Styles*. New York: Plenum.

Biggs, J.B. (1987a). *Student Approaches to Learning and Studying*. Hawthorne,

Victoria. Australian Council for Educational Research.

Biggs, J.B. (1987b). *The Study Process Questionnaire (SPQ) Users' Manual*. Hawthorne, Victoria. Australian Council for Educational Research.

Biggs, J.B., Kember, D., & Leung, D. (2001). The Revised Two Factor Study

Process Questionnaire: R-SPQ-2F. *British Journal of Educational Psychology. 71,* 133-149.

Biglan, A. (1973a). Relationships between subject matter characteristics and the structure and output of university departments. *Journal of Applied Psychology*, 57 (3), 204-213.

Biglan, A. (1973b). The characteristics of subject matter in different academic areas. *Journal of applied Psychology*, *57*(3), 195.

Birenbaum, M. (1997). Assessment preferences and their relationship to learning strategies and orientations. *Higher Education,* Vol.33, No.1, p.71-84.

Black, P.J., & Wiliam, D. (1998). *Assessment and classroom learning*. Assessment in Education, 5, 7-74.

Bollen, K. A. (1989). *Structural equations with latent variables.* New York: Wiley.

Bonoma, T.V. (1989). *Learning with cases*. Harvard Business School Publishing.

Bonwell, C.C. & Sutherland T.E. (1996). 'The Active Learning Continuum: Choosing Activities to Engage Students in the Classroom'. In Sutherland, T.E. & Bonwell, C.C. (Eds.), *Using Active Learning in College Classes: A Range of Options for Faculty*.

San Francisco: Jossey-Bass. pp. 3–16.

Bourdieu, P. (2000). *Pascalian Meditations*. Translated by R. Nice. Cambridge: Polity Press.

Bourdieu, P. (1989). In Wacquant L. Towards a Reflexive Sociology: A workshop with Pierre Bourdieu. *Sociological Theory*. 7, 26-63

Bourdieu, P. (1988). *Homo academicus*. Cambridge, UK: Polity Press.

Bourdieu, P. (1977). *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.

Bourdieu, P. (1967). Systems of education and systems of thought. In M. Young (Ed), *Knowledge and control* (pp. 133-160). London: Collier-Macmillan.

Bowden, J., & Marton, F. (1998). *The University of Learning: Beyond Quality and Competence in Higher Education*. London: Kogan page.

Bråten, I., and H.I. Strømsø. 2005. The relationship between epistemological beliefs, implicit theories of intelligence, and self-regulated learning among Norwegian postsecondary students. *British Journal of Educational Psychology* 75: 539–65.

Bråten, I., and H.I. Strømsø. 2004. Epistemological beliefs and implicit theories of intelligence as predictors of achievement goals. *Contemporary Educational Psychology* 29, 371–88.

Braxton, J.M. (1995). Disciplines with an affinity for the improvement of undergraduate education. In Hativa, N. & Marincovich, M. (eds), *Disciplinary Differences in Teaching and Learning: Implications for Practice*. Jossey-Bass: San Francisco pp.59-64.

Braxton, J.M., & Hargens, L.L. (1996). Variations among academic disciplines: Analytic frameworks and research. In J.C. Smart (Ed.), *Higher Education: Handbook of Theory and Researc*h, Vol.XI. New York: Agathon Press.

Breen, R. (1999). *Student motivation and conceptions of disciplinary knowledge*. Paper presented at the HERDSA Annual International Conference, Melbourne, 12-15 July.

Brennan, J., Edmunds, R., Houston, M., Jary, D., Lebeau, Y., Osbourne, M., & Richardson, J.T.E. (2010). *Improving What is Learned at University*. London: Routledge.

Brewer, J., & Hunter, A. (1989). *Multimethod research: A synthesis of styles*. Thousand Oaks, CA: Sage.

Bridges, D. (2000). Back to the Future: the higher education curriculum in the 21st century. *Cambridge Journal of Education*, Vol. 30, No. 1, 37-55.

Brindley, R. (2000). Learning to walk the walk; Teacher educators' use of constructivist epistemology in their own practice. *The Professional Educator*, 12 (2), 1-14.

Brown, J.S., & Duguid, P. (2002). *The Social Life of Information*. Harvard Business School Press.

Brown,J.S., Collins, A., & Duguid, P. (1989). Situated cognition and the Culture of Learning. *Educational Researcher*, 18 (1), Jan-Feb, 32-42.

Brownlee, J., Purdie, N., & Boulton-Lewis, G. (2002). An investigation of student teachers' knowledge about their own learning. *Higher Education*, 45, 109-125.

Bruner, J.S. (1986). *A Study of Thinking*. Transaction Publishers.

Bruner, J.S. (1990). *Acts of Meaning*. Harvard University Press.

Bruner, J.S. (1996). *The Culture of Education*. Harvard University Press.

Bruner, J.S. (1967). *On knowing: Essays for the left hand*. Cambridge, Massachutsetts: Harvard: Harvard University Press.

Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research*, 1 (1), 8-22.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, 6, 97-113.

Bryman, A. (1984). The debate about quantitative and qualitative research: a question of method or epistemology? *British Journal of Sociology*, Vol.35, No.1, (Mar.), 75-92.

Buehl, M.M. & Alexander, P.A. (2005). Motivation and Performance Differences in Students' Domain-Specific Epistemological Belief Profiles. *American Educational Research Journal*, 42 (4), 697-726.

Buehl, M.M. & Alexander, P.A. (2001). Beliefs About Academic Knowledge. *Educational Psychology Review*, 13, 4, p.385-418.

Buehl, M.M., Alexander, P.A., & Murphy, P.K. (2002). Beliefs about Schooled Knowledge: Domain Specific or Domain General? *Contemporary Educational Psychology*, 27, 415-449.

Burnett, P.C., Pillay, H., & Dart, B.C. (2003). The influences of conceptions of learning and learner self-concept on high school students' approaches to learning. *School Psychology International*, 24 (1), 54-66.

Calderhead, J. (1996). Teachers: Beliefs and knowledge. In D Berliner and R. Calfee (Eds.), *Handbook of educational psychology* (pp.709-725). New York: Simon and Schuster MacMillan.

Calhoun, C. (2003). Pierre Bourdieu, In G.Ritzer (Ed.), *The Blackwell companion to major social theorists* (pp. 696-730. Cambridge, MA: Blackwell.

Campbell, J., Smith, D., Boulton-Lewis, G., Brownlee, J., Burnett, P.C., Carrington, S., & Purdie, N. (2001). Students' Perceptions of Teaching and Learning: the influence of students' approaches to learning and teachers' approaches to teaching. *Teachers and Teaching: theory and practice*, Vol. 7, No. 2, 173-187.

Cannon, R.A., & Lonsdale, A.J. (1987). A "muddled array of models". Theoretical and organisational perspectives on change and development in higher education. *Higher Education*, 16 (1), 21-32.

Carnap, R. (1967). *The Logical Structure of the World (first appeared in German, 1928)*. London: Routledge and Kegan Paul.

Carpenter, B., & Tait, G. (2001). The rhetoric and reality of good teaching: A case study across three faculties at the Queensland University of Technology. *Higher Education*, 42, 191-203.

Stake, R. E. (2000). Case Studies In: Denzin N. and Lincoln, Y.(Ed.). *Handbook of qualitative research* (pp. 435-455).

Catt, S., Miller, D., & Schallenkamp, K. (2007). You are the key: Communicate for learning effectiveness. *Education*, 127, 369-377.

Chamorro-Premuzic, T; Furnham, A; Lewis, M; (2007) Personality and approaches to learning predict preference for different teaching methods. *Learning and Individual Differences* , 17 (3) 241 – 250.

Chan, K-W., & Elliott, R.G. (2004). Relational analysis of personal epistemology and conceptions about teaching and learning. *Teaching and Teacher Education*, 20:8, 817-831.

Choi, J., & Kwon, N.Y. (2012). The General and Domain-Specific Epistemological Beliefs of Korean Pre-Service Mathematics Teachers. *The Asia-Pacific Education Researcher*, 21 (2), 353-364.

Clancy, D., Fazey, J., & Lawson, R. (2007). Personal epistemology and teaching and learning in higher education. In *Proceedings of 30th Annual HERDSA Conference*.

Cobern, W.W. (1993). Contextual constructivism: The impact of culture on the learning and teaching of science. In K.Tobin (Ed.), *The practice of constructivism in science education*. Washington, DC: American Association for the Advancement of Science.

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences. 2nd edn. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cohen, S.G., & Bailey, D.E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management*, 23, 239-290.

Collins, K.M.T., Onwuegbuzie, A.J., & Sutton. (2006). A model incorporating the rationale and purpose for conducting mixed-methods research in special education and beyond. *Learning Disabilities: A Contemporary Journal*, 4 (1), 67-100.

Comte, A. (1844). *Discourse on the Positive Spirit*, trans. E.S. Beesley (1903).

Conley, A. M., Pintrich, P. R., Vekiri, I., & Harrison, D. (2004). Changes in epistemological beliefs in elementary science students. Contemporary Educational Psychology, 29, 186–204.

Coolican, H. (1991). *Research Methods and Statistics in Psychology*. London: Hodder and Stoughton.

Cope, C., & Staehr, L. (2005). Improving students' learning approaches through intervention in an information systems learning environment. *Studies in Higher Education*, 30:2, 181-197.

Coupland, J. (2003). Small talk: Social functions. Research on Language and Social Interaction, 36, 1-6.

Cousins, G. (2009) *Researching Learning in Higher Education.* New York: Routledge.

Crawford, K., Gordon, S., Nicholas, J., & Prosser, M. (1998). University mathematics students' conceptions of mathematics. *Studies in Higher Education*, 23:1, 87-94.

Cresswell, J.W., & Plano Clark, V.L. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.

Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). *Best practices for mixed methods research in the health sciences*. Bethesda (Maryland): National Institutes of Health, 2094-2103.

Crook, C. (1998). Children as computer users: The case of collaborative learning. *Computers and Education*, 30, 237-247.

Crotty, M. (1998). The Foundations of Social Research: Meaning and Perspectives in the Research Process. London: Sage Publications Ltd.

Dahlgren, L.O. (1988). *'Enduring and short term effects of higher education'*. Paper presented at the 14th International Congress of Psychology, Sydney.

Dahlin, B. & Watkins, D. (2000). The role of repetition in the processes of memorising and understanding: A comparison of the views of German and Chinese secondary school students in Hong Kong. *British Journal of Educational Psychology*, 70, 65-84.

Dall'Alba, G. (1991). Foreshadowing conceptions of teaching. *Research and Development in Higher Education.* 13, 293-297

Davidson, Donald. (1980). *Inquiries into Truth and Meaning*. Clarendon Press.

De Waal, C. (2001). *On Peirce*. Belmont, CA: Wadsworth.

De Backer, T.K., Crowson, H.M., & Beesley, A.D. (2008). The Challenge of Measuring Epistemological Beliefs: An Analysis of Three Self-Report Instruments. *The Journal of Experimental Education*, 76 (3), 281-312.

De Botton, A. (1999). The Essential Plato (trans. by B. Jowett 1871).

De Corte, E. (2000). Marrying theory building and the improvement of school practice: A permanent challenge for instructional psychology. Learning and Instruction, 10, 249-266.

Dennett, David. (1991). *Consciousness Explained*. Little, Brown and Company.

Denscombe, M. (2008). Communities of Practice: A Research Paradigm for the Mixed Methods Approach. *Journal of Mixed Methods Research*, 2:3, 270-283.

Denzin, N. K. (2012). Triangulation 2.0. *Journal of Mixed Methods Research*, *6*(2), 80-88.

Denzin, N. (2010). Moments, Mixed Methods, and Paradigm Dialogs. *Qualitative Inquiry*, 16:6, 419-427.

Denzin, N.K. (1989). *The research act* (3rd ed.). Englewood Cliffs, NJ: Prentice Hall.

Denzin, N.K. (1978). Triangulation: A case for methodological evaluation and combination. *Sociological methods* (2nd ed., pp. 339-357). New York.

Denzin, N.K. (1970). *The research act*. Chicago, IL: Aldine.

Denzin, N.K., & Lincoln, Y.S. (1998). Collecting and interpreting qualitative data. Thousand Oaks, CA: Sage Publications Incorporated.

Derrida, J. (1998). Of Grammatology (Gayatri Spivak trans.). Baltimore: John Hopkins University Press.

Dewey, John. (1938). *Logic: The Theory of Research*. New York: McGraw-Hill.

Dewey, John. (1930). *The Quest for Certainty: A Study of the Relation of Knowledge and Action*. London: George Allen & Unwin.

Dewey, John. (1925). *Experience and nature*. Whitefish, MT: Kessinger.

Dewey, J. (1917). *The need for a recovery of philosophy*.

Dewey, John. (1916). *Democracy and Education: An introduction to the philosophy of education*. Southern Illinois University Press.

Dilthey, W., & Jameson, F. (1972). The Rise of Hermeneutics. *New Literary History*, 3 (2), 229-244.

Diseth, A. (2007). Approaches to learning, course experience and examination grading among undergraduate psychology students: Testing of mediator effects and construct validity. *Studies in Higher Education*, 32:3, 373-388.

Diseth, A., Palleson, S., Hovland, A., & Larsen, S. (2006). Course experience, approaches to learning and academic achievement. *Education & Training*, 48 (2/3), 156-169.

Dobransky, N.D., & Frymier, A.B. (2004). Developing teacher-student relationships through out of class communication. *Communication Quarterly*, 52 (3), 211-223.

Dochy, F.J.R.C., & McDowell, L. (1997). Assessment as a tool for learning. *Studies in Educational Evaluation*, 23, 279-298.

Dochy, F., Segers, M., & Sluijsmans, D. (1999). The use of self-, peer-, and co-assessment in higher education: A review. *Studies in Higher Education*, 24, 331-350.

Donald, J.G. (2002). *Learning to Think: Disciplinary Perspectives*. Jossey-Bass.

Donald, J.G. (1995). Disciplinary differences in knowledge validation. In Hativa, N. & Marincovich, M. (eds), *Disciplinary Differences in Teaching and Learning: Implications for Practice*. Josey-Bass: San Francisco pp.7-18.

Donald, J.G. (1992). The development of thinking processes in postsecondary education: Application of a working model. *Higher Education*, 24 (4), 413-430.

Donald, J.G. (1990). University professors' views of knowledge and validation processes. *Journal of Educational Psychology*, 82 (2), 242-249.

Donald, J.G. (1986). Knowledge and the university curriculum. *Higher Education*, 15 (3), 267-282.

Donald, J.G. (1983). Knowledge structures: Methods for exploring course content. *Journal of Higher Education*, 54, 31-41.

Dressel, P., & Marcus, D. (1982). *Teaching and Learning in College*. San Francisco: Jossey-Bass.

Drolet, M. (2004). *The Postmodern Reader: Foundational texts*. London, UK: Routledge.

Dubois, A., & Gadde, L.E. (2002). Systematic combining: an abductive approach to case research. *Journal of Business Research*, 55 (7), 553-560.

Duell, O.K. & Schommer-Aikins, M. (2001). Measures of People's Beliefs About Knowledge and Learning. *Educational Psychology Review*, Vol.13, No.4, December.

Dunkin, M.J. & Precians, R.P. (1992). 'Award-winning university teachers' concepts of teaching'. *Higher Education*, 24, 483-502.

Durkheim, E. (1966). *The Rules of Sociological Method*. New York: Free Press.

Dweck, C.S., & Leggett, E.L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256-273.

Ebbinghaus, H. (1885). *Űber das Gedäachtnis*. Leipzig: Duncker. Translated H. Ruger and C.E. Bussenius 1913.

Edmondson, A.C. (1999). Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly*, 44, 350-381.

Edmunds, R., & Richardson, J. (2009). Conceptions of learning, approaches to studying and personal development in UK higher education. *British Journal of Educational Psychology,* 79, 295–309.

Eisenhardt, K.M., & Graebner, M.E. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal*, 50 (1), 25-32.

Elen, J. & Clarebout, G. (2001). An invasion in the classroom: Influence of an ill-structured innovation on instructional and epistemological beliefs. *Learning Environments Research*, 4, 87-105.

Elen, J., & Lowyck, J. (2000). Instructional metacognitive knowledge: A qualitative study on conceptions of freshmen about instruction. *Journal of Curriculum Studies*, 32 (3), 421-444.

Elen, J., Clarebout, G., Léonard, R., & Lowyck, J. (2007). Student-centred and teaching-centred learning environments: What students think. *Teaching in Higher Education*, 12:1, 105-117.

Eley, M.G. (1992). Differential adoption of study approaches within individual students. *Higher Education*, 23, 231-254.

Emanuel, R. C., & Potter, W.J. (1992). Do Students' Style Differences Differ by Grade Level, Orientation Toward College and Academic Major? *Research in Higher Education*, 33:3, 395-414.

Entwistle, N.J. (2009). *Teaching for Understanding at University: Deep Approaches and Distinctive Ways of Thinking*. Basingstoke: Palgrave Macmillan.

Entwistle, N.J. (2006). Ways of Thinking and Ways of Teaching Across Contrasting Subject Areas. Education on-line at http://www.leeds.ac.uk/educol/documents/15601.html

Entwistle, N.J. (2000). Promoting deep learning through teaching and assessment: conceptual frameworks and educational contexts. *Paper presented at the TLRP Conference*, Leicester, November.

Entwistle, N.J. (1998). Conceptions of Learning, Understanding and Teaching in Higher Education [online] SCRE Fellowship. Available from http://www.scre.ac.uk/fellow/fellow98/entwistle.html

Entwistle, N.J. (1995). 'Frameworks for understanding, as experienced in essay writing in preparation for examinations. *Educational Psychologist*, 30, 47-54.

Entwistle, N.J. (1991). Approaches to learning and perceptions of the learning environment. Introduction to the special issue. *Higher Education*, 22, 201-204.

Entwistle, N. (1987). A model of the teaching-learning process. *Student learning: Research in education and cognitive psychology*, 13-28.

Entwistle, N. J. (1981). Styles of learning and teaching: An integrated outline of educational psychology for students, teachers and lecturers. Chichester: Wiley.

Entwistle, N.J., & Entwistle, A. (1991). Contrasting forms of understanding for degree examinations: the student experience and its implications. *Higher Education*, 22 (3), 205-227.

Entwistle, N. J., & McCune, V. (2009). The disposition to understand for yourself: Learning strategies, effort and alertness to context in studying. *Perspectives on the nature of intellectual styles*, 29-63.

Entwistle, N.J., & McCune, V. (2004). The conceptual bases of study strategy inventories. *Educational Psychology Review*, 16: 325-345.

Entwistle, N.J., & Ramsden, P. (1983). *Understanding Student Learning*. London: Crown Helm

Entwistle, N.J., & Smith, C. (2002). Personal understanding and target understanding: Mapping influences on the outcome of learning. *British Journal of* Educational *Psychology*, Vol.72, No.3, pp.321-342.

Entwistle, N.J.and Tait, H. (1990) Approaches to learning, evaluations of teaching and preferences for contrasting academic environments. *Higher Education* 19: 169-194.

Entwistle, N.J., Tait, H., & McCune, V. (2000). Patterns of Response to an Approaches to Studying Inventory across Contrasting Groups and Contexts. *European Journal of Psychology of Education*, Vol.15, No.1, p33-48 Mar

Erickson, P., & Murphy, L.D. (2010). *Readings for a History of Anthropological Theory* (3rd ed.). Toronto: Toronto University Press.

Ertmer, P., Newby, T., & MacDougall, M. (1996). Students' responses and approaches to case-based instruction: The role of reflective self-regulation. *American Educational Research Journal*, 33:3, 719-752.

Erzberger, C., & Kelle, U. (2003). Making inferences in mixed methods: The rules of integration. In A Tashakorri & C. Teddlie (Eds.) *Handbook of mixed methods in social and behavioural sciences* (pp. 457-490). Thousand Oaks, CA: Sage.

Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research*, 38 (1), 47-65.

Fanghanel, J. (2009). The Role of Ideology in Shaping Academics' Conceptions of Their Disciplines. *Teaching in Higher Education*, 14:5, 565-577.

Faranda, W. T., & Clarke, I. (2004). Student observation of outstanding teaching: Implications for marketing educators. *Journal of Marketing Education*, 26, 271-281.

Farnham-Diggory, S. (1994). Paradigms of Knowledge and Instruction. *Review of Educational Research*, Vol. 64, No. 3, 463-477.

Fassinger, P. A. (2000). How classes influence students' participation in college classrooms. *Journal of Classroom Interaction*, 35, 38-47.

Feilzer, M.Y. (2010). Doing Mixed Methods Research Pragmatically: Implications for the Rediscovery of Pragmatism as a Research Paradigm. *Journal of Mixed Methods Research*, 4:1, 6-16.

Festinger, L. (1954). An experimental investigation of the effect of unstable interpersonal relations in a group. *Journal of Abnormal Psychology*, Oct;49 (1, Part 1): 513-522.

Feyerband, P. (1975). *Against Method: Outline of an Anarchist Theory of Knowledge*. London: New Left Books.

Feyerband, P. (1970). How To Be a Good Empiricist – A Plea for Tolerance in Matters Epistemological. In B. Brody (ed.), *Readings in the Philosophy of Science*. Englewood Cliffs: Prebtice-Hall.

Fielding, N.G. (2012). Triangulation and Mixed Methods Designs: Data Integration With New Research Technologies. *Journal of Mixed Methods Research*, 6:2, 124-136.

Fielding, N.G., & Fielding, J.L. 1986). *Linking data*. Beverley Hills, CA: SAGE.

Flick, U. (2010). Triangulation of micro-perspectives on juvenile homelessness, health, and human rights. In N.K. Denzin & M. Giardina (Eds.), *Qualitative inquiry and human rights* (pp. 186-204). Walnut Creek, CA: Left Coast Press.

Flick, U. (2002). *An introduction to qualitative research*. London: SAGE.

Flick, U., Garms-Homolová, V., Hermann, W.J., Kuck, J., & Röhnsch, G. (2012). "I Can't Prescribe Something Just Because Someone Asks for It..." : Using Mixed Methods in the Framework of Triangulation. *Journal of Mixed Methods Research*, 6:2, 97-110.

Flyberg, B. (2006). Five Misunderstandings About Case Study Research. *Qualitative Inquiry*, Vol.12, No.2, 219-245.

Ford, M.J., & Forman, E.A. (2006). Redefining Disciplinary Learning in Classroom Contexts. *Review of Research in Education*, 30, 1-32.

Foucault, M. (1984). *Le souci de soi. L'Historie de la sexualite, Vol. III*. Paris: Gallimard.

Foucault, M. (1972). *The Archaeology of Knowledge* (Alan Sheridan trans.). New York: Pantheon.

Fox, D. (1983). Personal theories of teaching. *Studies in Higher Education.* 8(2), 151-163

Frederiksen, N. (1984). The real test bias: Influences of testing on teaching and learning. *American psychologist*, *39*(3), 193.

Frey, L.R., Botan, C.H., & Kreps, G.L. (2000). *Investigating Communication: An Introduction to Research Methods* (2nd edition). Boston: Allyn and Bacon.

Fries, C.J. (2009). Bourdieu's Reflexive Sociology as a Theoretical Basis for Mixed Methods Research: An Application to Complementary and Alternative Medicine. *Journal of Mixed Methods Research*, 3:4, 326-348.

Frisby, B.N., & Martin, M.M. (2010). Instructor-Student and Student-Student Rapport in the Classroom. *Communication Education*, 59 (2), 146-164.

Frisby, B. N., & Myers, S. A. (2008). The relationships among perceived instructor rapport, student participation, and student learning outcomes. *Texas Speech Communication Journal*, 33, 27-34.

Fruge, C.W., & Ropers-Huilman, R. (2008). Epistemological congruency in community college classrooms: Effects of epistemological beliefs on students' experiences. *College Teaching*, 56 (2), 121-127

Frymier, A. B. (2007). Teachers' and students' goals in the teaching_learning process. Paper presented at the annual meeting of the National Communication Association, Chicago, IL.

Frymier, A.B., & Houser, M.L. (2000). The teacher-student relationship as an interpersonal relationship. *Communication Education*, 49, 207-219.

Gadamer, H-G. (1977). *Philosophical Hermeneutics*, translated by David E. Linge (Berkeley: University of California Press).

Gagne, R.M. (1965). *Conditions of Learning*. New York: Holt, Rinehart and Winston.

Gallotti, K.M., Clinchy, B.M., Ainsworth, K.H., Lavin, B., & Mansfield, A.F. (1999). A new way of assessing ways of knowing: The Attitudes Toward Thinking and Learning Survey (ATTLS). *Sex Roles*, 40, 745-766.

Garrison, D. R., & M. Cleveland-Innes. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *The American Journal of Distance Education, 19* (3), 133-148.

Ghauri, P. (2004). Designing and conducting case studies in international business research. In R. Marschan-Piekkari & C.Welch, *Handbook of Qualitative Research Methods for International Business*. Edward Elgar Publishing.

Gibbs, Anita (1997) 'Focus Groups', *Social Research Update*, 19, Department of

Sociology, University of Surrey.

Gibbs, G. (1993). The CNAA Improving Student Learning Project. *Research and Development in Higher Education*, 14, 8-19.

Gibbs, G., & Coffey, M.G. (2004). The Impact of Training of University Teachers on their Teaching Skills, their approach to teaching and the approach to learning of their students. *Active Learning in Higher Education*, 5, 87-100.

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory*.

Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers: An introduction* (p. 6). White Plains, NY: Longman.

Goffman, E. (1959). *The Presentation of Self in Everyday Life*. Penguin Books: Harmondsworth.

Goldman, A. (1995). In Defence of Simulation Theory, in Davies, M. & Stone, T. (Eds.) *Folk Psychology*, 191-206

Goldman, A.I. (1995). Education and Social Epistemology. Philosophy of Education

Goldman, A.I. (1994). Argumentation and Social Epistemology. The Journal of Philosophy, 91, 27-49.

Goodboy, A.K., & Bolkan, S. (2011). Student Motives for Communicating with Instructors as a Function of Perceived Instructor Power Use. *Communication Research Reports*, 28:1, 109-114.

Goodboy, A.K., & Myers, S.A. (2007). Student communication satisfaction, similarity, and liking as a function of attributional confidence. *Ohio Communication Journal*, 45, 1-12.

Goodboy, A. K., Martin, M. M., & Bolkan, S. (2009). The development and validation of the student communication satisfaction scale. *Communication Education*, 58, 372–396.

Goodboy, A.K., Bolkan, S., Myers, S.A., & Zhao, X. (2011). Student Use of Relational and Influence Messages in Response to Perceived Instructor Power Use in American and Chinese College Classrooms. *Communication Education*, 60:2, 191-209.

Goodboy, A.K., Martin, M.M., & Bolkan, S. (2009). The development and validation of the student communication satisfaction scale. *Communication Education*, 58, 372-396.

Gorard, S., & Taylor, C. (2004). What is "triangulation"? Building research capacity. *Journal of the ESRC Teaching and Learning Research Programme Research Capacity Building Network*, 7, 7-9.

Gouinlock, J. (1993). *Rediscovering the moral life; philosophy and human practice*. Buffalo, NY: Prometheus Books.

Gow, L. & Kember, D. (1993). Conceptions of teaching and their relationship to student learning. *British Journal of Educational Psychology*, 63, 20-33.

Greene, J., Benjamin, L., & Goodyear, L. (2001). The merits of mixing methods in evaluation. *Evaluation*, 7, 25-44.

Greene, J.A. (2009). Collegiate faculty expectations regarding students' epistemic and ontological cognition and the likelihood of academic success. *Contemporary Educational Psychology*, 34, 230-239.

Greene, J. C. (2007). *Mixed methods in social inquiry* (Vol. 9). John Wiley & Sons.

Greene, J.A., Torney-Purta, J., & Azevedo, R. (2010). Empirical Evidence Regarding Relations Among a Model of Epistemic and Ontological Cognition, Academic Performance, and Educational Level. *Journal of Educational Psychology*, 102:1, 234-255.

Greene, J.C., Caracelli, V.J., & Graham, W.F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, 11 (3), 255-274.

Greeno, J.G. (1998). The Situativity of Knowing, Learning, and Research. *American Psychologist*, Vol.53, No.1, 5-26.

Gregoire, M., Gill, P.T.A., Algina, J. (2004). Changing preservice teachers' epistemological beliefs about teaching and learning in mathematics: An intervention study. *Contemporary Educational Psychology*, 29, 164-185.

Grossman, P.L. (1995). Teachers' knowledge. In W. Anderson (Ed.), *The international encyclopedia of teaching and teacher education* (pp.20-24).

Guba, E. G. (1990). The alternative paradigm dialog. In E. G. Guba (Ed.), The paradigm dialog (pp. 17–27). Newbury Park, CA: Sage.

Gummesson, E. (2005). Qualitative research in management: addressing complexity, content and persona. *Management Decision*, 44 (2), 167-179.

Haarala-Muhonen, A., Ruohoniemi, M., Katajavuori, N., & Lindblom-Ylänne, S. (2011). Comparison of students' perceptions of their teaching-learning environments in three professional academic disciplines; A valuable tool for quality enhancement. *Learning Environment Research*, 14, 155-169.

Habermas, J. (1987). *The Theory of Communicative Action*, Vol.1. Cambridge: Polity.

Haggis, T. (2009). What have we been thinking of? A critical overview of 40 years of student learning research in higher education. Studies in Higher Education, 34 (4), 377-390.

Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate data analysis* (5th ed.). Prentice Hall, New Jersey.

Hall, J. N. (2013). Pragmatism, evidence, and mixed methods evaluation. *New Directions for Evaluation, 2013*(138), 15-26.

Halinen, A., & Törnroos, J.A. (2005). Using case methods in the study of contemporary business networks. *Journal of Business Research*, 58 (9), 1285-1297.

Hammer, D., & Elby, A. (2002). On the form of a personal epistemology. In B.K.

Hannafin, M., Hill, J., & Land, S. (1997). Student-centred learning and interactive multimedia: Status, issues, and implications. *Contemporary Education*, 68:2, 94-99.

Hanbury, A., Prosser, M., & Rickinson, M. (2008). The differential impact of UK accredited teaching development programmes on academics' approaches to teaching. *Studies in Higher Education*, 33:4, 469-483.

Hanson, B. (2008). Wither qualitative/quantitative? Grounds for methodological convergence. *Quality & Quantity*, 42, 97-111.

Hatch, D.H., & Farris, C.R. (1989). Helping TAs use active learning strategies. New directions for teaching and learning, 39: 89-97.

Hativa, N. (2000). Becoming a better teacher: A case of changing the pedagogical knowledge and beliefs of law professors. *Instructional Science*, 28, 491-523.

Hativa, N. (1997). *Teaching in a research university: Professors' conceptions, practices, and disciplinary differences*. Paper presented at the annual meeting of the American Education Research Association. Chicago, IL.

Hativa, N. (1995). The department-wide approach to improve faculty instruction in higher education: a qualitative evaluation. *Research in Higher Education*, 36(4), 377-413.

Hativa, N., & Birenbaum, M. (2000). Who Prefers What? Disciplinary Differences in Students' Preferred Approaches to Teaching and Learning Styles. *Research in Higher Education*, Vol.41, No.2, April.

Hativa, N., & Goodyear, P. (Eds.). (2002). *Teacher Thinking, Beliefs and Knowledge in Higher Education*. London: Kluwer Academic Publishers.

Hativa, N., & Marincovich, M. (1995). Disciplinary differences in teaching and learning in higher education.

Hazel, E., Prosser, M., & Trigwell, K. (1996). Student learning of biology concepts in different university contexts. *Research and Development in Higher Education*, 19, 323-326.

Hegarty, K. (2008). Shaping the Self to Sustain the Other: Mapping impacts of academic identity in education for sustainability. *Environmental Education Research*, 14:6, 681-692.

Heidegger, M. (2010). *Being and Time*, trans. by Joan Stambaugh, revised by Dennis J. Schmidt. Albany: State University of New York Press.

Hennessey, M.N., Murphy, P.K., & Kulikowich, J.M. (2013). Investigating teachers' beliefs about the utility of epistemic practices: a pilot study of a new assessment. *Instructional Science*, 41, 499-519.

Ho, A., Watkins, D., & Kelly, M. (2001). The conceptual change approach to improving teaching and learning: An evaluation of a Hong Kong staff development programme. *Higher Education*, 42, 143-169.

Hofer, B.K. (2006). Domain specificity of personal epistemology: Resolved questions, persistent issues, new models. *International Journal of Educational Research*, 45, 85-95.

Hofer, B.K. (2004a). Exploring the dimension of personal epistemology in differing classroom contexts: Student interpretations during the first year of college. *Contemporary Educational Psychology*, 29, 129-163.

Hofer, B.K. (2004b). Introduction: Paradigmatic Approaches to Personal Epistemology. *Educational Psychologist*, 39 (1), 1-3.

Hofer, B.K. (2002). Epistemological World Views of Teachers: From Beliefs to Practice. *Issues in education*, 8 (2), 167-174.

Hofer, B.K. (2001). Personal epistemology research: Implications for learning and teaching. *Educational Psychology Review*, 133, 353-382.

Hofer, B.K. (2000). Dimensionality and disciplinary differences in personal epistemology. *Contemporary Educational Psychology*, 25, 378-405.

Hofer, B.K., & Pintrich, P.R. (Eds.). (2002). *Personal epistemology: The psychology of beliefs about knowledge and knowing*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Hofer, B.K., & Pintrich, P.R. (1999). *Knowing and believing: personal epistemology and classroom context*. Paper presented at the annual meeting of the American Educational Research Association. Montreal.

Hofer, B.K., & Pintrich, P.R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, 67, 88-140.

Holt-Reynolds, D. (2000). What does the teacher do? Constructivist pedagogies and prospective teachers' beliefs about the role of a teacher. *Teaching and Teacher Education*, 16, 21-32.

Hounsell, D., & Anderson, C. (2007). Knowledge practices; "doing the subject" in undergraduate courses. *Curriculum Journal*, 18 (4), 463-478.

Houser, N., De Tienne, A., Eller, J., Clark, C., Lewis, A., & Bront Davis, D. (Eds.). (1998). *The essential Peirce. Vol. 2: Selected philosophical writings*. Indianapolis: Indiana University Press.

Howe, K.R. (2012). Mixed Methods, Triangulation, and Causal Explanation. *Journal of Mixed Methods Research*, 6:2, 89-96.

Howe, K.R. (1988). Against the quantitative-qualitative incompatibility thesis or dogmas die hard. *Educational Researcher*, 17, 10-16.

Huber, M.T., & Morreale, S.P. (2002). *Disciplinary Styles in the Scholarship of Teaching and Learning: Exploring Common Ground*. Washington, DC: American Association for Higher Education and the Carnegie Foundation for the Advancement of Teaching.

Husserl, E. (1936). *Die Krisis der europäischen Wissenschaften und die transzendentale Phänomenologie: Eine Einleitung in die phänomenologische Philosophie* (*The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Phenomenological Philosophy*).

James, William. (1890). *The Principles of Psychology* (Vols 1 & 2). New York: Holt.

Jehn, K.A., Northcraft, G.B., & Neale, M.A. (1999). Why differences make a difference: A field study of diversity, conflict, and performance in work groups. *Administrative Science Quarterly*, 44, 741-763.

Jehng, J.-C., Johnson, S.D., & Alexander, R.C. (1993). Schooling and students' epistemological beliefs about learning. *Contemporary Educational Psychology*, 18, p.23-25.

Jenkins, A. (1996). Discipline-based educational development. *International Journal for Academic Development*, 1 (1), 50-62.

Jensen, H.S., Richter, L.M., & Vendelø, M.T. (Eds.). (2003). *The evolution of scientific knowledge*. Cheltenham, UK: Edward Elgar.

Johnson, B. (2008). Living With Tensions: The Dialectic Approach. *Journal of Mixed Methods Research*, 2:3, 203-207.

Johnson, B., & Turner, L.A. (2003). Data Collection Strategies in Mixed Methods Research. In Abbas Tashakkori and Charles Teddlie *Handbook of mixed methods research in social and behavioural research*, 297-320. Sage Publications Incorporated.

Johnson, D. I. (2009). Connected classroom climate: A validity study. *Communication Research Reports*, 26, 146-157.

Johnson, R.B., Onwuegbuzie, A.J. & Turner, L.A. (2004). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1 (2), 112-133.

Johnson, R.B., & Onwuegbuzie, A.J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, Vol.33, No.7, 14-26.

Jonassen, D.H., Marra, R.M., & Palmer, B. (2003). Epistemological development: An implicit entailment of constructivist learning environments. In N.M. Seel and S. Dijkstra (Eds.), *Curriculum, plans and processes of instrumental design: International perspectives* (pp. 75-88). Mahwah, NJ: Lawrence Erlbaum.

Jorgenson, J. (1992). Social approaches: Communication, rapport, and the interview: A social perspective. *Communication Theory*, 2, 148-156.

Kaartinen-Koutaniemi, M., & Lindblom-Ylänne, S. (2008). Personal epistemology of psychology, theology and pharmacy students: a comparative study. *Studies in Higher Education*, Vol.33 (2), 179-191.

Kagan, D. (1992). Implications of research on teacher belief. *Educational Psychologist*, 27, (1), 65-90.

Kant, I. (1896). Critique of Pure Reason, trans. By F.M. Műller (2nd ed.). New York: Macmillan (1934).

Kardash, C.A.M. & Howell, K.L. (2000). Effects of Epistemological Beliefs and Topic-Specific Beliefs on Undergraduates' Cognitive and strategic Processing of Dual-Positional Text. *Journal of Educational Psychology*, Vol. 92, No.3, 524-535.

Kardash, C.A.M., & Scholes, R.J. (1996). Effects of pre-existing beliefs, epistemological beliefs, and need for cognition on interpretation of controversial issues. *Journal of Educational Psychology*, 88, 260-271.

Karp, D. A., & Yoels, W. C. (1975). The college classroom: Some observations on the meanings of student participation. *Sociology and Social Research*, 60, 421-439.

Kayrooz, C., & Trevitt, C. (2004). *Research in Organisations and Communities: Tales from the real world*. Sydney: Allen and Unwin.

Kember, D. (2009). Promoting student-centred forms of learning across an entire university. "Higher Education, 58"(1), pp. 1–13.

Kember, D. (2004). Interpreting student workload and the factors which shape students' perceptions of their workload. *Studies in Higher Education*, 29:2, 165-184.

Kember, D. (2001). Beliefs about Knowledge and the Process of Teaching and Learning as a Factor in Adjusting to Study in Higher Education. *Studies in Higher Education*, Vol. 26, No. 2, 205-221

Kember, D. (1998). Teaching beliefs and their impact on students' approach to learning. In B.Dart & G. Boulton-Lewis (Eds.), *Teaching and learning in Higher Education* (pp.1-25). Melbourne: Australian Council for Educational Research.

Kember, D. (1997). A reconceptualisation of the research into university academics' conceptions of teaching. *Learning and Instruction*, 7, 225-275.

Kember, D., & Gow, L. (1994). Orientations to teaching and their effect on the quality of student learning. *Journal of Higher Education*, 65, 59-74.

Kember, D. & Kwan, K.P. (2002). Lecturers' approaches to teaching and their relationship to conceptions of good teaching. In N. Hativa & P. Goodyear (Eds.), *Teacher Thinking, Beliefs and Knowledge in Higher Education*. Dordrecht, the Netherlands: Kluwer Academic Publishers.

Kember, D., & Leung, D.Y.P. (2011). Disciplinary Differences in Student Ratings of Teaching Quality. *Research in Higher Education*, 52, 278-299.

Kember, D., & Wong, A. (2000). Implications for evaluation from a study of students' perceptions of good and poor teaching. *Higher Education*, 40, 69-97.

Kember, D., Ho, A., Hong, C., (2008) The importance of establishing relevance in motivating student learning. Active Learning in Higher Education. 9 (3) 249-263.

Kember, D., Jenkins, W., & Ng, K.C. (2004). Adult students' perceptions of good teaching as a function of their conceptions of learning – Part 2: Implications for the evaluation of teaching. *Studies in Continuing Education*, 26:1, 81-97.

Kember, D., Leung, D. Y., & McNaught, C. (2008). A workshop activity to demonstrate that approaches to learning are influenced by the teaching and learning environment. *Active Learning in Higher Education*, *9*(1), 43-56.

Keogh, L. (1991). '*Student conceptions of atomic structure: a phenomenographic study'*. Unpublished BSc (Hons) dissertation. University of Western Australia.

Kerlinger, F. (1986). *Foundations of Behavioural Research* (3rd Ed). New York: Holt, Rinehart and Winston.

Killen, R. (2007) Effective Teaching Strategies: Lessons from Research and Practice (South Melbourne: Thomson Social Science Press).

King, P.M., & Kitchener, K.S. (1994). *Developing reflective judgement: Understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey-Bass.

King, P.M., Kitchener, K.S., Davison, M.L., Parker, C.A,., & Wood, P.K. (1983). The justification of beliefs in young adults: A longitudinal study. *Human Development*, 26, 106-116.

Kirschner, P., Sweller, J., & Clark, R. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41:2, 75-86.

Kitchener, K.S., Wood, P.K., & Jensen, L. (1999). *Curricular, co-curricular, and institutional influence on real-world problem-solving*. Paper presented at the meeting of the American Psychological Association. Boston, MA.

Kitchener, K.S. (1986). The reflective judgement model: Characteristics, evidence, and measurement. In R.A. Mines and K.S. Kitchener (eds.), *Adult Cognitive Development: Methods and Models* (pp.76-91). New York: Praeger.

Kitchener, K.S., & King, P.M. (1981). Reflective judgement: Concepts of justification and their relationship to age and education. *Journal of Applied Developmental Psychology,* 2, 89-116.

Kitzinger, J. (1995). Qualitative Research: Introducing focus groups. British Medical Journal, 311, 299-302, July.

Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.

Klix, F. (1978). On the representation of semantic information in human long-term memory: 2. *Psychology I*, 26-38.

Klix, F. (1971). *Information and Verhalten*. Huber: Bern.

Knefelkamp, L. (1999). Introduction. In W.G. Perry (ed.), *Forms of Intellectual and Ethical Development in the College Years: A Scheme* (pp. xi-xxxviii). San Francisco Jossey-Bass.

Knewstubb, B. & Bond, C. (2009). What's he talking about? The communicative alignment between a teacher's intentions and students' understandings. *Higher Education Research and Development*, 28:2, 179-193.

Knowles, M.S. (1990). The adult learner: a neglected species (3rd ed.). Houston, Texas: Gulf Publishing.

Knowles, M. S. (1986). *Using learning contracts*. San Francisco: Jossey-Bass.

Koffka, K. (1935). *Principles of Gestalt Psychology*. Lund Humphries: London.

Kohlberg, L., & Mayer, R. (1972). Development as the aim of education. *Harvard Educational Review*, 42, 449-496.

Kolb, D.A. (1984). Experiential Learning: Experience as the Source of Learning and Development. Prentice-Hall, Inc., Englewood Cliffs, N.J.

Kolb, D.A. (1981). Learning Styles and Disciplinary Differences. In A.W. Chickering (Ed) *Modern American College – Responding to the New Realities of Diverse Students and a Changing Society* (London, Jossey-Bass).

Krause, K-L. (2012). Change Vectors and Academic Identities: Evolving Tribes and Territories, in P.Trowler, M. Saunders and V. Bamber (eds) *Tribes and Territories in the 21st Century: Rethinking the significance of disciplines in higher education*. Abingdon, Oxon: Routledge.

Kreber, C. (2009). *The University and its Disciplines: Teaching and Learning Within and Beyond Disciplinary Boundaries*. New York: Routledge.

Kreber, C. (2003). The relationship between students' course perception and their approaches to studying in undergraduate science courses: A Canadian experience. *Higher Education Research and Development*, Vol. 22(1), pp. 57-75.

Kroll, L. R., & LaBosky, V. K. (1996). Practicing what we preach: Constructivism in a teacher education program. *Action in Teacher Education* 18(2), 63-72.

Kuhn, D. (2001). How Do People Know? *Psychological Science*, 12 (1), 1-8.

Kuhn, D. (1991). *The Skills of Argument*. Cambridge, UK: Cambridge University Press.

Kuhn, T. (1970). *The Structure of Scientific Revolutions* (2nd ed.). Chicago: Chicago University Press.

Kuhn, T. (1962). *The Structure of Scientific Revolutions* . Chicago: Chicago University Press.

Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: Sage.

Lamnek, S. (2005). *Qualitative Sozialforschung*. Lehrbuch. 4. Auflage. Beltz Verlag. Weihnhein, Basel.

Lancy, D.F. (1993). *Qualitative research in education: An introduction to the major traditions.* New York: Longman.

Lattuca, L.R., & Stark, J.S. (1994). Will Disciplinary Perspectives Impede Curricular Reform? *Journal of Higher Education*, 65 (4): 401-426.

Lattuca, L.R., Terenzini, P.T., Harper, B.J., & Yin, A.C. (2010). Academic Environments in Detail: Holland's Theory at the Sub-disciplinary Level.

Laurillard, D. (1997). Styles and approaches in problem solving. In F. Marton, D. Hounsell and N.J. Entwistle (eds.) *The Experience of Learning: Implications for Teaching and Studying in Higher Education*, 2nd edition. Edinburgh, Scottish Academic Press.

Laurillard, D. (1979). The process of student learning. *Higher Education*, 8, 395-409.

Lave, J. (1988). *Cognition in Practice: Mind, Mathematics and Culture in Everyday Life*. Cambridge University Press.

Lave, J. & Wenger, E. (1998). *Communities of Practice*: *Learning, Meaning, and Identity*. Cambridge University Press.

Lave, J. & Wenger, E. (1991) *Situated Learning*: *legitimate peripheral participation*. Cambridge University Press.

Law, D.S., & Meyer, J.H.F. (2008). Relationships between the Learning Strategies, Mental Models of Learning and Learning Orientations of Post-secondary Students in Hong Kong

Lawless, C., & Richardson, J. (2002). Approaches to studying and perceptions of academic quality in distance education. *Higher Education*, 44, 257-282.

Lawson, R. J., Fazey, J. A., & Clancy, D. M. (2007). The impact of a teaching in Higher Education scheme on new lecturers' personal epistemologies and approaches to teaching. *Improving student learning*.

Lazersfeld, P.F., & Henry, N.W. (1969). Corringenda: Mathematics Thinking in the Social Sciences.

Lazersfeld, P.F., & Rosenberg, M. (eds.) (1955). *The Language of Social Research*. New York: Free Press.

Lea, S.J., & Callaghan, L. (2012). Teaching in an Age of 'Supercomplexity': Lecturer Conceptions in Context, in P.Trowler, M. Saunders and V. Bamber (eds) *Tribes and Territories in the 21st Century: Rethinking the significance of disciplines in higher education*. Abingdon, Oxon: Routledge.

Lea, S., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student-centred learning: Beyond 'educational bulimia'? *Studies in Higher Education*, 28:3, 321-334.

Leech, N. L., & Onwuegbuzie, A. J. (2009). A typology of mixed methods research designs. *Quality & quantity*, *43*(2), 265-275.

Leinhardt, G. (1993). Weaving instructional explanations in history. *British Journal of Educational Psychology*, 63, 46-74.

Limón, M. (2006). The domain generality-specificity of epistemological beliefs; A theoretical problem, a methodological problem or both? *International Journal of Educational Research*, 45, 7-27.

Lincoln, Y.S., & Guba, E. (1985). *Naturalistic Inquiry*. Beverley Hills, California: Sage Publications.

Lindblom-Ylänne, S. (2003). Can a collaborative network environment enhance essay-writing processes? *British Journal of Educational Technology*, 34 (1), 17-30.

Lindblom- Ylänne, S., & Lonka, K. (2000). Dissonant study orchestrations of high-achieving university students. *European Journal of Psychology of Education*, 15 (1), 19-32.

Lindblom-Ylänne, S., Trigwell, K., Nevgia, A., and Ashwin, P. (2006). How approaches to teaching are affected by discipline and teaching context. *Studies in Higher Education*, Vol. 31, No. 3, June, pp. 285–298.

Lingard, L., Reznick, R., Espin, S., Regehr, G., & DeVito, I. (2002). Team communications in the operating room: Talk patterns, sites of tension, implications for novices. *Academic Medicine*, 77, 232-237.

Linton, P., Madigan, R., & Johnson, S. (1994). Introducing students to disciplinary genres: The role of the general composition course. *Language and Learning Across the Disciplines*, 1(2), 63-78.

Lonka, K., & Lindblom-Ylanne, S. (1996). Epistemologies, conceptions of learning, and study practices in medicine and psychology. *Higher Education*, 39, P.365-384.

Louca, L., Elby, A., Hammer, D. & Kagey, T. (2004). Epistemological Resources: Applying a New Epistemological Framework to Science Instruction. *Educational Psychologist*, 39(1) special issue, 57-68.

Loyens, S., & Rikers, R. (2011). Instruction based on inquiry. In R. Mayer & P. Alexander (Eds.), *Handbook of research on learning and instruction* (pp. 361-381). New York: Routledge.

Luke, H. (2003). *Medical education and sociology of medical habitus*. Boston: Kluwer Academic.

Lyotard, J-F. (1984). The Postmodern Condition: A Report on Knowledge. Manchester: Manchester University Press.

MacNealy, M. S. (1999). *Strategies for empirical research in writing*. Longman.

Madill, A., Jordan, A., & Shirley, C. (2000). Objectivity and reliability in qualitative analysis: Realist, contextualist and radical constructionist epistemologies. *British Journal of Psychology*, 91, 1-20.

Malcolm, J. & Zukas, M. (2009). Making a Mess of Academic Work: Experience, purpose and identity. *Teaching in Higher Education*, 14:5, 495-506.

Marra, R. (2005). Teacher beliefs; The impact of the design of constructivist learning environments on instructor epistemologies. *Learning Environments Research*, 8, 135-155.

Marsh, H.W. (1987). Student evaluation of university teaching: research findings, methodological issues, and directions for future research. *International Journal of Educational Research*, 11, 253-388.

Mårtensson, K., Roxå, T., & Olsson, T. (2011). Developing a quality culture through the Scholarship of Teaching and Learning. *Higher Education Research and Development*, 30:1, 51-62.

Mårtensson, K., Roxå, T., & Stensaker, B. (2012). From quality assurance to quality practices: an investigation of strong microcultures in teaching and learning. *Studies in Higher Education*, DOI: 10.1080/03075079.2012.709493

Martin, E. & Balla, M. (1991). Conceptions of teaching and implications for learning. *Research and Development in Higher Education,* 13, 298-304

Martin, M. M., Cayanus, J. L., Weber, K., & Goodboy, A. K. (2009). College students' stress and its impact on their motivation and communication with their instructors. In D. H. Elsworth (Ed.), Motivation in education (pp. 91–111). Hauppauge, NY: Nova Science.

Martin, M. M., Mottet, T. P., & Myers, S. A. (2000). Students' motives for communicating with their instructors and affective and cognitive learning. *Psychological Reports*, 87, 830–834.

Martin, E., Prosser, M., Trigwell, K., Ramsden, P., & Benjamin, J. (2000). What university teachers teach and how they teach it. *Instructional Science*, 28, 387-412.

Martin, E. & Ramsden, P. (1998). Approaches to teaching creative writing. In B.Dart & G. Boulton-Lewis (Eds.), *Teaching and Learning in Higher Education*. Melbourne: ACER.

Marton, F., & Booth, S. (1997). *Learning and Awareness*. Hillsdale, NJ: Lawrence Erlbaum.

Marton, F., Dall'Alba, G. & Beaty, E. (1993). 'Conceptions of learning', *International Journal of Educational Research*, 19 (3), 277-299.

Marton, F., & Fazey, J.A. (2002). Understanding the Space of Experiential Variation. *Active Learning in Higher Education*, 3:3, 234-250.

Marton, F., Hounsell, D., & Entwistle, N.J. (eds) (1997). *The Experience of Learning: Implications for Teaching and Studying in Higher Education*, 2nd edition. Edinburgh, Scottish Academic Press.

Marton, F., Runesson, U., & Tsui, A. (2004). The space of learning. In F. Marton & A. Tsui (Eds.), *Classroom discourse and the space of learning* (pp. 3-42). Hillsdale, NJ: Lawrence Erlbaum.

Marton, F. & Saljo, R. (1997). Approaches to Learning, in F. Marton, D.J. Hounsell & N.J Entwistle (eds.) *The Experience of Learning* (2nd edn) (pp.39-58). Edinburgh: Scottish academic Press.

Marton, F. & Saljo, R. (1976). On qualitative differences in learning. I – Outcome and process. British *Journal of Educational Psychology*, 46, 4-11.

Maslow, A. H. (1973). *On dominance, self-esteem, and self-actualization*. Maurice Bassett.

Maslow, A.H. (1970). *Motivation and Personality* (2nd ed.). New York: Harper Row.

Maslow, A. H. (1943). A Theory of Human Motivation. Psychological Review, 50, pp. 370-396.

Mason, L., Boscolo, P., Tornatora, M.T., & Ronconi, L. (2013). Besides knowledge: a cross-sectional study on the relations between epistemic beliefs, achievement goals, self-beliefs, and achievement in science. *Instructional Science,* 41, 49-79.

Mason, L., & Boscolo, P. (2004). Role of epistemological understanding and interest in interpreting a controversy and in topic-specific belief change. *Contemporary Educational Psychology*, 29 (2), 103-128.

Mathison, S. (1988). Why triangulate? *Educational Researcher*, 17, 13-17.

Mathieson, S. (2012). Disciplinary cultures of teaching and learning as socially situated practice: rethinking the space between social constructivism and epistemological essentialism from the South African experience. *Higher Education*, 63, 549-564.

Maxwell, J.A. (2010). Using numbers in qualitative research. *Qualitative Inquiry*, 16, 475-482.

Mayer, R. (2004). Should there be a three-strikes rule against pure discovery learning? The case for guided methods of instruction. *American Psychologist*, 59:1, 14-19.

McAlpine, L. & Weston, C. (2000). Reflection: Issues related to improving professors' teaching and students' learning. *Instructional Science*, 28, 363-385.

McCune, V. (2004). Development of first-year students' conceptions of essay writing. *Higher Education*, *47*(3), 257-282.

McCune, V., & Entwistle, N. (2011). Cultivating the disposition to understand in 21st century university education. *Learning and Individual Differences*, *21*(3), 303-310.

McCune, V., & Hounsell, D. (2005). The development of students' ways of thinking and practising in three final-year biology courses. *Higher Education*, *49*(3), 255-289.

McKinney, J. P., McKinney, K. G., Franiuk, R., & Schweitzer, J. (2006). The college classroom as a community: Impact on student attitudes and learning. *College Teaching*, 54, 281-284.

McLaughlin, M. L., & Erickson, K. V. (1981). A multidimensional scaling analysis of the ''ideal interpersonal communication instructor''. *Communication Education*, 30, 393_398.

McLellan, H. (1996). *Situated learning perspectives*. Educational Technology Publications.

Mertens, D.M. (2012). What Comes First? The Paradigm or the Approach? *Journal of Mixed Methods Research*, 6:4, 255-257.

Mertens, D.M. (2010). Divergence and Mixed Methods. *Journal of Mixed Methods Research*, 4:1, 3-5.

Mertens, D.M., & Hesse-Biber, S. (2012). Triangulation and Mixed Methods Research: Provocative Positions.

Meyer, J. H. (2000). The modelling of 'dissonant'study orchestration in higher education. *European Journal of Psychology of Education*, *15*(1), 5-18.

Meyer, J.H.F. (1991). Study orchestration: the manifestation, interpretation and consequences of contextualised approaches to studying. *Higher Education*, 22, 297-316.

Meyer, J.H.F., & Land, R. (2005). Threshold Concepts and Troublesome Knowledge (2); Epistemological Considerations and a Conceptual Framework for Teaching and Learning. *Higher Education*, 49:373-388.

Meyer, J.H.F. & Boulton-Lewis, G.M. (1999). On the operationalisation of conceptions of learning in higher education and their association with students' knowledge and experiences of their learning. *Higher Education Research and Development*, 18 (3), 289-302.

Miles, M.B., & Huberman, M. (1994). Qualitative Data Analysis. Beverley Hill, CA: Sage Publications.

Mill, J.S. (1865). Rahocinative and Inductive (6th ed.). London: Longmans Green.

Miller, L. (2008). Scenes in a University: Performing academic identities in shifting contexts. In R. Di Napoli and R. Barnett (Eds.), *Changing Identities in Higher Education: Voicing perspectives*. London and New York: Routledge.

Moon, J. (1999). *Reflection in learning and professional development*. London: Kogan Page.

Moore, W.S. (2002). Understanding Learning in a Postmodern World: Reconsidering the Perry Scheme of Ethical and Intellectual Development. In B.K. Hofer & P.R. Pintrich, (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp.17-36). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Morgan, D.L. (1996). Focus Groups. *Annual Review of Sociology*, Vol. 22: 129-152 (August).

Mottet, T. P., Frymier, A. B., & Beebe, S. A. (2006). Theorizing about instructional communication. In T. P. Mottet, V. P. Richmond, & J. C. McCroskey (Eds.), *Handbook of instructional communication: Rhetorical and relational perspectives* (pp. 255–282). Boston, MA: Allyn & Bacon.

Muis, K.R., Bendixen, L.D., & Haerle, F.C. (2006). Domain-Generality and Domain-Specificity in Personal Epistemology Research: Philosophical and Empirical Reflections in the Development of a Theoretical Framework. *Educational Psychology Review*, 18 (1), 3-54.

Murray, M. & MacDonald, R. (1997). The disjuncture between lecturer's conception of teaching and their claimed educational practices. *Higher Education. 33, 331-349*

Neissen, T., Abma, T., Widdershoven, G., van der Vleuten, C., & Akkerman, S. (2008). Contemporary Epistemological Research in Education: Reconciliation and Reconceptualization of the Field. *Theory and Psychology*, 18:1, 27-45.

Nelson Laird, T.F., Shoup, R., Kuh, G.D. Schwarz, M.J. (2008. The Effects of Discipline on Deep Approaches to Student Learning and College Outcomes. *Research in Higher Education*, 49, 469-494.

Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies*, 19, (4), 317-328.

Neumann, R. (2001). Disciplinary Differences and University Teaching. *Studies in Higher Education*, 26, 2, p.135-146.

Newton, D.P. (2000). *Teaching for understanding: what it is and how to do it. London*: Routledge Falmer.

Newton, D.P., Newton, L.D., & Oberski, I. (1998). Learning and Conceptions of Understanding in History and Science: Lecturers and New Graduates compared. *Studies in Higher Education* 23(1), 43-58.

Nickerson, R.S. (1985). 'Understanding Understanding'. *American Journal of Education*, 93, 201-39.

Nicol, D.J. (1997) *Research on Learning and Higher Education Teaching*, UCoSDA Briefing

Paper 45 (Sheffield, Universities and Colleges Staff Development Agency).

Nietzsche, F.W. (1954). *The Portable Nietzsche*. New York: Viking Press.

Nussbaum, J. F., & Scott, M. D. (1980). Student learning as a relational outcome of teacher student interaction. In D. Nimmo (Ed.), *Communication yearbook* 4 (pp. 553-564). New Brunswick, NJ: Transaction Books.

O'Cathain, A., Murphy, E., & Nicholl, J. (2007). Integration and publications as indicators of "yield" from mixed methods studies. *Journal of Mixed Methods Research*, 1 (2), 147-163.

O'Loughlin, M. (1992). Rethinking Science Education: Beyond Piagetian Constructivism toward a Sociocultural Model of Teaching and Learning. *Journal of Research in Science Teaching*, 29 (8), 791-820.

O'Loughlin, M. (1991). *Undergraduate and Graduate Student Teacher's Developing Understandings of Teaching and Learning: Report of a One-Year Journal Study and Follow-Up Interviews*. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Onwuegbuzie, A.J., & Teddlie, C. (2003). A framework for analysing data in mixed methods research. In A. Tashakorri & C. Teddlie (Eds.), *Handbook of Mixed Methods in Social and Behavioural Research* (pp.351-384). Thousand Oaks, CA: Sage.

Otting, H., Zwaal, W., Tempelaar, D., & Gijselaers, W. (2010). The

structural relationship between students' epistemological beliefs and conceptions of teaching and learning. *Studies in Higher Education*, 35:7, 741-760,

Packer, M.J., & Addison, R.B. (Eds.) (1989). Entering the Circle: *Hermeneutic Investigation in Psychology*. Albany, NY: State University of New York Press.

Pajares, F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62, (3), 307-337.

Pallas, A.M. (2001). Preparing education doctoral students for epistemological diversity. *Educational Researcher*, 30(5), 6-11.

Palmer, B., & Marra, R.M. (2004). College student epistemological perspectives across knowledge domains: A proposed grounded theory. *Higher Education*, 47, 311-335.

Papinczak, Tracey., Young, Louise., Groves, Michele., & Haynes, Michele. (2008) *Effects of a metacognitive intervention on students' approaches to learning and self-efficacy in a first year medical course.* Advances in Health Sciences Education, 13 (2). pp. 213-232.

Parawat, R.S. (1992). Teachers' beliefs about teaching and learning: A constructivist prespective. *American Journal of Education*, 100, 354-393.

Parpala, A., & Lindblom-Ylänne, S. (2012). Using a research instrument for developing quality at the university. *Quality in Higher Education*, 18:3, 313-328.

Parpala, A., & Lindblom-Ylänne, S. (2007). University teachers' conceptions of good teaching in the units of high-quality education. *Studies in Educational Evaluation*, 33, 355-370.

Parpala, A., Lindblom-Ylänne, S., & Rytkönen, H. (2011). Students' conceptions of good teaching in three different disciplines. *Assessment & Evaluation in Higher Education*, 36:5, 549-563.

Parpala, A., Lindblom-Ylänne, S., Komulainen, E., Litmanen, T., & Hirsto, L. (2010). Students' approaches to learning and their experiences of the teaching-learning environment in different disciplines. *British Journal of Educational Psychology*, 80, 260-292.

Pask, G. (1976). Styles and Strategies for Learning. *British Journal of Educational Psychology*, 46 (2), 128-148.

Patrick, K. (1992). *Teachers and curriculum at year 12: Constructing an object of study*. Paper presented at the joint conference of the Australia Association for Research in Education and the New Zealand Association for Research in Education. Deakin University, Geelong: Victoria.

Patton, E., & Applebaum, S.H. (2003). The case for case studies in management research. *Management Research News*, 26 (5), 60-71.

Patton, M. (1980). *Qualitative evaluation methods*. Thousand Oaks, CA: SAGE.

Paulsen, M.B., & K.A. Feldman. 2005. The conditional and interaction effects of epistemological beliefs on the self-regulated learning of college students: Motivational strategies. *Research in Higher Education,* 46:7, 731–768.

Paulsen, M.B., and K.A. Feldman. 2007. The conditional and interaction effects of epistemological beliefs on the self-regulated learning of college students: Cognitive and behavioural strategies. *Research in Higher Education*, 48:3, 353–401.

Paulsen, M.B. & Wells, C.T. (1998). Domain differences in the epistemological beliefs of college students. *Research in Higher Education*, 39, p.365-384.

Pavlov, I. (1927). *Conditioned reflexes*. Oxford: Oxford University Press.

Peirce, C.S. (1955). *Philosophical Writings of Peirce*. Justus Buchler (ed.). New York: Dover Publications.

Peirce, C. S. (1906). The basis of pragmaticism. *The collected papers of Charles Sanders Peirce, 1*, 1931-1935.

Pellegrino, J.W., Chudowsky, N., & Glaser, R. (2001). *Knowing what students know: The science and design of educational assessment*. Washington, DC: National Academic Press.

Perkins, D., Schenk, T. A., Stephan, L., Vrungos, S., & Wynants, S. (1995). Effects of rapport, intellectual excitement, and learning on students' perceived ratings of college instructors. Psychological Reports, 76, 627-635.

Perkinson, H.J. (1993). *Teachers without goals, students without purposes*. New York: McGraw-Hill.

Perreon, L., & Ram, M. (2004). Case-study method in small business and entrepreneurial research mapping boundaries and perspectives. *International Small Business Journal*, 22 (1), 83-101.

Perry, W.G. (1970). *Forms of intellectual and ethical development in the college years: A scheme*. New York: Holt, Rinehart & Winston.

Phenix, P. (1964). *Realms of Meaning: A Philosophy of the Curriculum for General Education*. New York: McGraw Hill.

Piaget, J. (1955). *The Childs Construction of Reality*. London: Routledge and Kegan Paul.

Pillay, H. (2002). Understanding Learner-centredness: does it consider the diverse needs of individuals.   *Studies in Continuing Education*, Vol. 24, No. 1, 93-102.

Pintrich, P. (2002). Future Challenges and Directions for Theory and Research on Personal Epistemology. In B.K. Hofer & P.R. Pintrich, (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp.389-414). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Pizzolato, J.E. (2008). Meaning making inside and outside the academic arena: Investigating the contextuality of epistemological development in college students. *The Journal of General Education*, 56:3/4, 228-251.

Plato. (1993). *Republic/Plato* (R Waterfield, Trans.). Oxford, England: Oxford University Press

D.F. Polit, C.T. Beck, B.P. Hungler. (2001). *Essentials of nursing research: Methods, appraisal, and utilization* (5th ed.), Lippincott, New York.

Pollock, J.L. & Gillies, A.S. (2000). Belief Revision and Epistemology. *Synthese*, 122, 69-92.

Popper, K. (1974). Autobiography. In P.A. Schilpp (Ed), *The Philosophy of Karl Popper*. LaSalle, III.; Open Court.

Popper, K. (1959). *The Logic of Scientific Discovery*. London: Hutchinson.

Postareff, L., & Lindblom-Ylänne, S. (2008). Variation in teachers' descriptions of teaching: Broadening the understanding of teaching in higher education. *Learning and Instruction*, 18, 109-120.

Powell, R.R. (1996). Epistemological Antecedents to Culturally Relevant and Constructivist Classroom Curricula: A Longitudinal Study of Teachers' Contrasting World Views. *Teaching and Teacher Education*, 12(4), 365-384.

Powell, R.R. (1992). The influence of prior experiences on pedagogical constructs of traditional and non-traditional pre-service teachers. *Teaching and Teacher Education*, 8, 225-238.

Pratt, D.D. (1992). 'Conceptions of teaching'. *Adult Education Quarterly*, 42 (4), 203-220.

Prosser, M., Martin, E., & Trigwell, K. (2007). Academics' Experiences of Teaching and their Subject-Matter Understanding, in N.J. Entwistle & P.D. Tomlinson (eds) *Student Learning and University Teaching*. British Journal of Educational psychology, Monograph Series II: Psychological Aspects of education – Current Trends (pp. 49-59). Leicester: British Psychological society.

Prosser, M., & Trigwell, K. (2006). Confirmatory factor analysis of the Approaches to Teaching Inventory. British Journal of Educational Psychology, Vol.76, No.2, June, pp. 405-419(15)

Prosser, M. & Trigwell, K. (1999). *Understanding Learning and Teaching: The Experience in Higher Education*. SRHE and Open University Press.

Prosser, M., & Trigwell, K. (1997). Relations between perceptions of the teaching environment and its relationship to approaches to teaching. *British Journal of Educational Psychology*, 67, 25-35.

Prosser, M., Trigwell, K., & Ginns. P. (2005). Phenomenographic pedagogy and a revised Approaches to teaching inventory. *Higher Education Research & Development*, Volume 24, Number 4, November, 349-360.

Prosser, M., Trigwell, K. & Taylor, P. (1994). A phenomenographic study of academics' conceptions of science learning and teaching. *Learning and Instruction*, 4, 217-232.

Qian, G. & Alverman, D. (1995). Role of epistemological beliefs and learned helplessness in secondary school students' learning science concepts from text. *Journal of Educational Psychology*, 87 (2), 282-292.

Quine, W.F.V. (1969). *Ontological Relativity and Other Essays*. New York: Columbia University Press.

Quinlan, K.M. (2002). Scholarly dimensions of Academics' Beliefs about Engineering Education. *Teachers and Teaching: theory and practice*, Vol. 8, No.1, 41-64.

Quinlan, K.M. (1999). Commonalities and controversy in context: a case study of academic historians' educational beliefs. Teaching and Teacher Education, 15 (4), 447-463.

Ramsden, P. (2003). Learning to teach in higher education. London: Routledge Falmer.

Ramsden, P. (1992). Learning to Teach in Higher Education. London: Routledge.

Ramsden, P. (1991). A performance indicator of teaching quality in higher education: The Course Experience Questionnaire'. *Studies in Higher Education*,16: 129-150.

Ramsden, P., Prosser, M., Trigwell, K., & Martin, E. (1997). *Perceptions of academic leadership and the effectiveness of university teaching*. Paper presented at the Annual Conference of the Australian Association for Research in Education, December 1997, Brisbane, Australia.

Reckwitz, A. (2002). Toward a Theory of Social Practices: A development in culturalist theorising. *European Journal of Social Theory*, 5:2, 243-263.

Reigeluth, C. (1992). Elaborating the elaboration theory. *Educational Technology Research and Development*, 40, (3), 80-86.

Rescher, N. (2005). *Realism and pragmatist epistemology*. Pittsburgh, PA: University of Pittsburgh Press.

Richardson, J.T.E. (2005). Students' perceptions of academic quality and approaches to studying in distance education. *British Educational Research Journal*, 31 (1), 7-27.

Richardson, J.T.E. (2000). *Researching Students Learning: Approaches to Studying in Campus-Based and Distance Education*. Buckingham: SRHE/Open University Press.

Richardson, J.T.E., & Price, L. (2003). Approaches to studying and perceptions of academic quality in electronically delivered courses. *British Journal of Educational Technology*, **34**, 45–56.

Richmond, V.P. (1990). Communication in the classroom: Power and motivation. *Communication Education*, 39, 181-195.

Richmond, V.P., & McCroskey, J.C. (1984). Power in the classroom II: Power and learning. *Communication Education*, 33, 125-136.

Roach, K.D. (1999). The influence of teaching assistant willingness to communicate and communication anxiety in the classroom. *Communication Quarterly*, 47, 166-182.

Robson, C. (1993). *Real world research*. Oxford, UK: Blackwell.

Rocco, T.S., Bliss, L.A., Gallagher, S., Perez-Prado, A. (2003). Taking the next step: Mixed methods research in organized systems. *Information Technology, Learning and Performance Journal*, 21 (1), 19-29.

Rockmore, T. (2002). *Marx After Marxism: The Philosophy of Karl Marx*. Blackwell Publishers.

Rogers, C. (1969). *Freedom to Learn: A View of What Education Might Become* (1st ed.). Columbus, Ohio: Charles Merrill.

Rogers, Carl R. (1967). The Interpersonal Relationship in the Facilitation of Learning. In *Humanizing Education: The Person in the Process*, T. Leeper (Ed.). National Education Association, Association for Supervision and Curriculum Development, p1-18.

Rorty, R. (1999). *Philosophy and social hope*. London: Penguin Books.

Rosenau, P.M. (1995). *Postmodernism and the Social Sciences: Insights, Inroads and Instructions*. Princeton, NJ: Princeton University Press.

Roth, Wolff-Michael. (2001). 'Encultration': acquisition of conceptual blind spots and epistemological prejudices. *British Educational Research Journal*, Vol. 27, No.1, 5-27.

Roth, Wolff-Michael., & Roychoudhury, A. (1994). Physics students' epistemologies and views about knowing and learning. *Journal of Research in Science Teaching*, 31 (1), 5-30.

Roxå, T., Mårtensson, K., & Alveteg, M. (2011). Understanding and influencing teaching and learning cultures at university: a network approach. *Higher Education*, 62, 99-111.

Royce, J.R. (1978). Three ways of knowing and the scientific world view. *Methodology and Science*, 11, 146-164.

Royce, J.R., Mos, L.P. (1980). *Manual: Psych-Epistemological Profile*. Centre for advanced study in theoretical psychology. University of Alberta, Canada.

Runesson, U. (1999). *Teaching as constituting a space of variation*. Paper presented at the 8th European Conference for Learning and Instruction. Gothenburg, Sweden.

Runesson, U., & Marton, F. (2002). The object of learning and the space of variation. In F. Marton and P. Morris (Eds.), *What matters? Discovering critical conditions of classroom learning*. Gothenburg, Sweden: ACTA Universitatis Gothogurgensis.

Ryan, M.P. (1984). Monitoring text comprehension: Individual differences in epistemological standards. *Journal of Educational Psychology*, 76, 249-258.

Sadlo, G,. & Richardson, J.T.E. (2003). Approaches to Studying and Perceptions of the Academic Environment in Students Following Problem-Based and Subject-Based Curricula. *Higher Education Research and Development*, 22 (3), 253-274.

Saljo, R. (1997). Reading and everyday conceptions of knowledge. In F. Marton, D. Hounsell and N.J. Entwistle (eds.), *The Experience of Learning: Implications for Teaching and Studying in Higher Education*, 2nd edition. Edinburgh, Scottish Academic Press.

Saljo, R. (1979). Learning about Learning. *Higher Education*, 8 (4), 443-451.

Saltmarsh, J. (1996). Education for Critical Citizenship: John Dewey's Contribution to the Pedagogy of Community Service Learning. *Michigan Journal of Community Service Learning*, 13-21.

Samuelowicz, K. & Bain, J.D. (2002). Identifying academics' orientations to assessment practice. *Higher Education*, 43, 173-201.

Samuelowicz, K. & Bain, J.D. (2001). Revisiting academics' beliefs about teaching and learning. *Higher Education*, 41, 299-325

Samuelowicz, K. & Bain, J.D. (1992). Conceptions of teaching held by academic teachers'. *Higher Education*, 24, 93-111.

Saroyan, A., & Snell, L.S. (1997). Incorporating theories of teacher growth and adult education in a faculty development program. In D. DeZure (Ed.), *To Improve the Academy* (Vol.16, pp.93-116).

Schoenfeld, A. (1985). Understanding and Teaching the Nature of Mathematical Thinking. USA: University of California Berkeley.

Schommer, M. (1998). The influence of age and education on epistemological beliefs. *British Journal of Educational Psychology*, 68, 551-562.

Schommer, M. (1994a). An emerging conceptualization of epistemological beliefs and their role in learning. In R. Garner and P.A. Alexander (Eds.), *Beliefs about text and instruction with text (pp.25-40)*. Hillsdale, NJ: Erlbaum.

Schommer, M. (1994b). Synthesising Epistemological Belief Research: Tentative Understandings and Provocative Confusions. *Educational Psychology Review*, Vol. 6, No. 4, 293-319.

Schommer, M. A. (1993a). Comparisons of beliefs about the nature of knowledge and learning among postsecondary students. *Research in Higher Education*, 34, 355-370.

Schommer, M. (1993b). Epistemological development and academic performance among secondary students. *Journal of Educational Psychology, 85 (3), 406-411*.

Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82, 498-504.

Schommer-Aikins (2004). Explaining the Epistemological Belief System: Introducing the Embedded Systemic Model and Coordinated Research Approach. *Educational Psychologist*, 39 (1) special issue, 19-30.

Schommer-Aikins, M., and M. Easter. 2006. Ways of knowing and epistemological

beliefs: Combined effect on academic performance. *Educational Psychology* 26:3, 411–23.

Schommer-Aikins, M., Duell, O., & Barker, S. (2003). Epistemological beliefs across domains using Biglan's classification of academic disciplines. *Research in Higher Education*, 44:3, 347-366.

Schommer, M., Calvert, C., Gariglietti,G., & Bajaj, A. (1997). The Development of Epistemological Beliefs Among Secondary Students: A Longitudinal Study. *Journal of Educational Psychology*, Vol. 89, No. 1, 37-40.

Schommer, M., Crouse, A., & Rhodes, N. (1992). Epistemological beliefs and mathematical text comprehension: Believing it is simple does not make it so. *Journal of Educational Psychology*, 82, 435-443.

Schommer, M. & Walker, K. (1997). Epistemological Beliefs and Valuing School: Considerations for College Admissions and Retention. *Research in Higher Education*, Vol. 38, No. 2, 173-185.

Schommer, M. & Walker, K. (1995). Are epistemological beliefs similar across domains? *Journal of Educational Psychology*, 87(3), 424-432.

Schon, D.A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.

Schraw, G. (2001). Current Themes and Future Directions in Epistemological Research: A Commentary. *Educational Psychology Review*, 13, 4, p.451-463.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*, 26, 113-125.

Schraw, G., and G.M. Sinatra. 2004. Epistemological development and its impact on cognition in academic domains. *Contemporary Educational Psychology* 29: 95–102.

Schraw, G., Bendixen, L.D., & Dunkle, M.E. (2002). Development and Validation of the Epistemic Belief Inventory (EBI). In B. Hofer & P. Pintrich (Eds.), *Personal Epistemology: The Psychology of Beliefs About Knowledge and Knowing.* Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc.

Schraw, G., Dunkle, M.E., & Bendixen, L.D. (1995). Cognitive processes in well-defined and ill-defined problem solving. Applied Cognitive Psychology, 9, 523-538.

Schraw, G. & Lehman, S. (2001). Situational Interest: A Review of the Literature and Directions for Future Research. *Educational Psychology Review*, Vol. 13, No. 1, 23-52.

Schraw, G., & Olafson, L. (2002). Teachers' epistemological world views and educational practices. *Issues in Education*, 8 (2), 99-148.

Schrodt, P., Witt, P.L., Myers, S.A., Turman, P.D., Barton, M.H., & Jernberg, K.A. (2008). Learner empowerment and teacher evaluations as a function of teacher power use in the college classroom. *Communication Education*, 57, 180-200.

Schrodt, P., Witt, P.L., & Turman, P.D. (2007). Reconsidering the measurement of teacher power use in the college classroom. *Communication Education*, 56, 308-332.

Schön, D. A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. San Francisco.

Schutz, A. (1963). Concept and theory formation in the social sciences. In M Natanson (ed.), *Philosophy of the Social Sciences* (pp.231-249). New York: Random House.

Schwab, J. J. (1978). Education and the structure of the disciplines. *Science, curriculum, and liberal education*, 229-272.

Schwab, J. J. (1964). The structure of the disciplines: Meanings and signification. *The Structure of Knowledge and the Curriculum. Chicago: Rand McNally*, 1-30.

Schwandt, T.A. (1989). Solutions to the Paradigm Conflict: Coping with Uncertainty .*Journal of Contemporary Ethnography*.1989; 17: 379-407

Scott, P.J. & Briggs, J.S. (2009). A Pragmatist Argument for Mixed Methodology in Medical Informatics. *Journal of Mixed Methods Research*, 3:3, 223-241.

Scouller, K. (1998). The influence of assessment method on students' learning approaches: Multiple choice question examination versus assignment essay. *Higher Education*, 4, 453-472.

Sechrest, L., & Sidani, S. (1995). Quantitative and qualitative methods: Is there an alternative? *Evaluation and Program Planning*, 18 (1), 77-87.

Seel, N.M. (2001). Epistemology, situated cognition, and mental models: 'Like a bridge over troubled water'. *Instructional Science*, 29, 403-427.

Segers, M., Nijhuis, J., Gijselaers, W. (2006). Redesigning a learning and assessment environment: The influence on students' perceptions of assessment demands and their learning strategies. *Studies in Educational Evaluation*, 32:3, 223-242.

Sfard, A. (1998). On Two Metaphors for Learning and the Dangers of Choosing Just One. *Educational Researcher*, Vol.27, No.2, 4-13.

Sheppard, C., & Gilbert, J. (1991). Course design, teaching method and student epistemology. *Higher Education, 22*, 229–249.

Sherman, T.M., Armistead, L.P., Fowler, F., Barksdale, M.A., & Reif, G. (1987). The quest for excellence in university teaching. *Journal of Higher Education*, 58 (1), 66-84.

Shuell, T.J. (1992). The two cultures of teaching and teacher preparation. *Teaching and teacher Education*, 8(1), 83-90.

Shulman, L.S. (1988). Disciplines of inquiry in education: An overview. In R.M. Jaeger (Ed.). *Complementary methods for research in education*. Washington, DC: American Educational Research Association.

Shulman, L.S. (1986). Those who understand : Knowledge growth in teaching. *Educational Researcher,* 15(2), 4-14.

Sibeon, R. (2007). *Contemporary Sociology and Policy Analysis*. Eastham: Tudor Business Publishing.

Siggelkow, N. (2007). Persuasion with case studies. *Academy of Management Journal*, 50 (1), 20-24.

Silverman, D. (2005). *Doing qualitative research* (2nd ed.). London: Sage.

Sinatra, G.M. (2001). Knowledge, Beliefs, and Learning. *Educational Psychology Review*, Vol. 13, No. 4, 321-323.

Sinatra, G.M., & Kardash, C.M. (2004). Teacher candidates’ epistemological beliefs, dispositions and views on teaching as persuasion. *Contemporary Educational Psychology,* 29, 483-498.

Skinner, B.F. (1938). *The behaviour of organisms: An experimental analysis*. New York: Appleton-Century-Crofts.

Slomin-Nevo, V., & Nevo, I. (2009). Conflicting Findings in Mixed Methods Research. *Journal of Mixed Methods Research,* 3:2, 109-128.

Smart, J.C. & Ethington, C.A. (1995). Disciplinary and institutional differences in undergraduate education goals. In Hativa, N. & Marincovich, M. (eds), *Disciplinary Differences in Teaching and Learning: Implications for Practice*. Jossey-Bass: San Francisco pp.49-57.

Smith, K.E. (1997). Student Teachers’ Beliefs About Developmentally Appropriate Practice: Pattern, Stability, and the influence of Locus of Control. *Early Childhood Research Quarterly,* 12, 221-243.

Smith, R.A. (1995). Reflecting critically on our efforts to improve teaching and learning. In E. Neal (Ed.), *To Improve the Academy,* Vol.14, pp.5-25. Stillwater, OK: New Forum Press.

Smith, S. N., & Miller, R. J. (2005). Learning approaches: Examination type, discipline of study, and gender. *Educational Psychology*, 25(1), 43–53.

Snow et al (1996)

Sommer, B., & Sommer, R. (1991). *A Practical Guide to Behavioural Research: Tools and Techniques (3rd edition).* Oxford: Oxford University Press.

Spiro, R.J., Coulson, R.L., Feltovich, P.J., & Anderson, D.K. (1988). Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains. In V. Patel and G Groen (eds.), *Tenth Annual Conference of the Cognitive Science Society*. NJ: Erlbaum Hillsdale.

Spradley, J.P. (1979). The Ethnographic Interview. San Francisco: Holt, Rineheart, and Winston

Stake, R. E. (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage.

Stake, R.E. (1994). Case Studies. In N.K. Denzin and Y.S. Lincoln, *Handbook of qualitative research*. Thousand Oaks, California: Sage Publications.

Stark, J. (2002). Planning introductory college courses: Content, context and form. In N. Hativa and P. Goodyear (eds.), *Teacher Thinking, Beliefs and Knowledge in Higher Education* (pp.127-150). London: Kluwer Academic Press.

Stark, J. (2000). Planning introductory college courses: Content, context and form. *Instructional Science*, 28, 413-438.

Stes, A., Gijbels, D., & Van Petegem, P. (2008). Student-focused Approaches to Teaching in Relation to Context and Teacher Characteristics. *Higher Education*, 55:3, 255-267.

Stodolsky, S.S. (1988*). The Subject Matters: Classroom Activities in Math and Social Studies*. Chicago: University of Chicago Press.

Stodolsky, S.S. & Glaessner, B. (1991). Student views about learning math and social studies. *American Educational Research Journal*, 28, p.89-116.

Strack, F., Schwarz, N., & Wanke, M. (1991). Semantic and pragmatic aspects of context effects in social and psychological research. *Social Cognition*, 9 (1), 111-125.

Struyven, K., Dochy, F., & Janssens, S. (2010). 'Teach as you preach': the effects of student-centred versus lecture-based teaching on student teachers' approaches to teaching. *European Journal of Teacher Education*, 33:1, 43-64.

Struyven, K., Dochy, F., & Janssens, S. (2008). Students' likes and dislikes regarding student-activating and lecture-based educational settings: Consequences for students' perceptions of the learning environment, student learning and performance. *European Journal of Psychology of Education*, 23, 295-317.

Struyven, K., Dochy, F., Janssens, S., & Gielen, S. (2010). On the dynamics of students' approaches to learning: The effects of the teaching/learning environment. *Learning and Instruction*, 16, 279-294.

Struyven, K., Dochy, F., Janssens, S., & Gielen, S. (2008). Students' experiences with contrasting learning environments: The added value of students' perceptions. *Learning Environments Research*, 11, 83-109.

Szili, G., & Sobels, J. (2011). Reflections on the Efficacy of a Constructivist Approach to Teaching and Learning in a First-Year Bachelor of Environmental Management Topic. *Journal of Geography in Higher Education*, 35:4, 499-512.

Tagg, J. (2003). *The learning paradigm college*. Boston, MA: Anker.

Tait, H., Entwistle, N.J., & McCune, V. (1998). ASSIST: a reconceptualisation of the Approaches to Studying Inventory. In C. Rust (ed.), *Improving students as learners*. Oxford: Oxford Brookes University, The Oxford Centre for Staff and Learning Development.

Tarnas, R. (1991). *The Passion of the Western Mind: Understanding the Ideas That Have Shaped our World View*. New York: Ballantine Books.

Tashakkori, A. (2009). Are We There Yet? : The State of the Mixed Methods Community. *Journal of Mixed Methods Research*, 3:4, 287-291.

Tashakkori, A. & Cresswell, J.W. (2008). Envisioning the Future Stewards of the Social-Behavioural Research Enterprise. *Journal of Mixed Methods Research*, 2:4, 291-295.

Tashakkori, A., & Teddlie, C. (2010). Putting the Human Back in "Human Research Methodology": The Researcher in Mixed Methods Research. *Journal of Mixed Methods Research*, 4:4, 271-277.

Taylor, P. (2008). Being an Academic Today. In R. Di Napoli and R. Barnett (Eds) *Changing Identities in Higher Education: Voicing perspectives*. London and New York: Routledge.

Taylor, B., Kermode, S., & Roberts, K. (2007). Research in Nursing and Health Care: Evidence for Practice, Sydney: Thomson.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research*. Thousand Oaks, CA: Sage.

Teddlie, C., & Tashakkori, A. (2008). *Foundations of mixed methods research*: *Integrating quantitative and qualitative techniques in the social and behavioural sciences*. Thousand Oaks, CA: Sage.

Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the behavioural and social sciences. In A. Tasakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioural research* (pp. 3-50). Thousand Oaks, CA: SAGE.

Thomas, L. (2002). Student retention in higher education: the role of institutional habitus. *Journal of Education Policy*, 17:4, 423-442.

Thomas, P.R., & Bain, J.D. (1984). Contextual dependence of learning approaches; The effects of assessments. *Human Learning*, 3, 227-240.

Thorndike, E.L. (1932). *Fundamentals of learning*. New York: Teachers College, Columbia University.

Tobin, G.A., & Begley, C.M. (2004). Methodological issues in nursing research: Methodological rigour within a qualitative framework. *Journal of Advanced Nursing*, 48, 388-396.

Tolhurst, D. (2007). The influence of learning environments on students' epistemological beliefs and learning outcomes. *Teaching in Higher Education*, 12:2, 219-233.

Tolhurst, D. & Debus, R. L. (2002) The influence of prior knowledge, attitude, ability and activity structure on students' learning and use of software. *Journal of Educational Computing Research*, 27, 275-313.

Topping, K.J., Smith, E.F., Swanson, I., & Elliot, A. (2000). Formative peer assessment of academic writing between postgraduate students. *Assessment and Evaluation in Higher Education*, 25, 146-169.

Torrance, H. (2012). Triangulation, Respondent Validation, and Democratic Participation in Mixed Methods Research. *Journal of Mixed Methods Research*, 6:2, 111-123.

Triadafillidis, T.A. (1998). Dominant epistemologies in mathematics education. *Learning of Mathematics*, 18, 21-27.

Trigwell, K. (2006). An analysis of the relations of learning and teaching approaches. In P. Sutherland and J. Crowther (Eds.) *Lifelong learning: concepts and contexts*, 108-116. Taylor and Francis Limited (Routledge).

Trigwell, K., & Prosser, M. (2004). Development and Use of the Approaches to Teaching Inventory. *Education Review*, Vol.16, No.4, p.409-424.

Prosser, M., & Trigwell, K. (1999). *Understanding learning and teaching: The experience in higher education*. McGraw-Hill Education (UK).

Trigwell, K. & Prosser, M. (1997). Towards an Understanding of Individual Acts of Teaching and Learning. *Higher Education Research and Development*, 16: 241-252.

Trigwell, K. & Prosser, M. (1996). Congruence between intention and strategy in university science teachers' approaches to teaching. *Higher Education*, 32, 77-87.

Trigwell, K. & Prosser, M. (1991). Relating approaches to study and the quality of learning outcomes at the course level. *British Journal of Educational Psychology*, 61, 265-275.

Trigwell, K., Prosser., & Ginns, P. (2005). Phenomenographic pedagogy and a revised approaches to teaching inventory. *Higher Education Research and Development*, 24 (4), 349-360.

Trigwell, K., Prosser, M., & Taylor, P. (1994). Qualitative differences in approaches to teaching first year university science. *Higher Education*, 27, 75-84.

Trigwell, K., Prosser, M., & Waterhouse, F. (1999). Relations between teachers' approaches to teaching and students' approaches to Learning. *Higher education*, 37, 57-70

Trigwell, K., Ramsden, P., Prosser, M., & Martin, E. (1998). Improving student learning through a focus on the teaching context, in: C. Rust (Ed.) Improving Student Learning (Oxford, Oxford Centre for Staff Development).

Trowler, P. (2012). Disciplines and Interdisciplinarity: Conceptual Groundwork. In P.Trowler, M. Saunders and V. Bamber (Eds.), *Tribes and Territories in the 21st Century*. Routledge: Abingdon, Oxon.

Trowler, P. (2009). Beyond Epistemological Essentialism: Academic Tribes in the 21st Century. In C. Kreber (Ed.) *The University and its Disciplines: Teaching and learning within and beyond disciplinary boundaries*. London: Routledge.

Trowler, P. (2008). *Cultures and Change in Higher Education: Theories and Practices*. Basingstoke, UK: Palgrave Macmillan.

Trowler, P., & Cooper, A. (2002). Teaching and Learning Regimes: Implicit theories and recurrent practices in the enhancement of teaching and learning through educational development programmes. *Higher Education Research and Development*, 21:3, 221-240.

Trowler, P., Saunders, M., & Bamber, V. (2012). *Tribes and Territories in the 21st Century: Rethinking the significance of discipline in higher education*. London, UK: Routledge.

Tsai, C-C. (2000). Relationships between student scientific epistemological beliefs and perceptions of constructivist learning environments. *Educational Research*, Vol. 42, No.2, 193-205.Trigwell, K., Prosser, M. (1996). Changing approaches to teaching: a relational perspective. *Studies in Higher Education*, 21, 275-284.

Tynjälä, P. (1999). Towards expert knowledge? A comparison between a constructivist and a traditional learning environment in the university. *International Journal of Educational Research, 31*(5), 357-442.

Valanides, N., & Angeli, C. (2005). Effects of instruction on changes in epistemological beliefs. *Contemporary Educational Psychology*, 3, 314-330.

Valk, A., &Marandi, T. (2005). How to support deep learning at a university? In F. E. H. Tay, T. S. Chuan, & S. Han-Ming (Eds.), *Proceedings of the international conference on education*. National University of Singapore.

Vanthornout, G., Donche, V., Gijbels, D., & Van Petegem, P. (2009). Alternative data-analysis techniques in research on student learning: Illustrations of a person-oriented and developmental perspectives. *Reflecting Education*, 5:2, 35-51.

Van den Bossche, P., Gijselaers, W., Segers, M., & Kirschner, P.A. (2006). Social and cognitive factors driving teamwork in collaborative learning environments: Team learning beliefs and behaviours. *Small Group Research*, 37, 490-521.

Van der Vegt, G., Emans, B., & Van de Vliert, E. (1998). Motivating effects of task and outcome interdependence in work teams. *Group and Organization Management*, 23, 124-143.

Van Driel, J., Verloop, N., Van Werven, H.I., & Dekkers, H. (1997). Teachers' craft knowledge and curriculum innovation in higher engineering education. *Higher Education*, 34, 105-122.

Van Gennip, N.A.E., Segers, M.S.R., & Tillema, H.H. (2009). Peer assessment for learning from a social perspective: The influence of interpersonal variables and structural features. *Educational Research Review*, Vol.4, (1), p.41-54.

Van Rossum, E.J., and R. Hamer. (2006). *Learning and teaching: A model of linked continua of conceptions*. Paper presented at the 24th Conference of the European Council on Hotel, Restaurant and Institutional Education, October 25–28, in Thessaloniki, Greece.

Van Rossum, E.J. & Schenk, S.M. (1984). The relationship between learning conception, study strategy and learning outcome. *British Journal of Educational Psychology*, 54, 73-83.

Vaughn, S., Schumm, J.S., & Sinagub, J. (1996). Focus group interviews in education and psychology. Sage Publications Incorporated.

Vermetten, Y., Daniëls, J., & Ruijs, L. (2004). *Application of assessment: Why, what, how, when and by whom? Decision model for a substantiate choice of ways of assessment in education* (OETC report 2001/13). Heerlen: Open University of the Netherlands.

Vermunt, J.D., & Vermetten, Y.J. (2004). Patterns in student learning: Relationships between learning strategies, conceptions of learning, and learning outcomes. *Educational Psychology Review*, 16 (4), 359-384.

Vermunt, J., and L. Verschaffel. (2000). Process-oriented teaching. In *New Learning*, ed. R-J. Simons, J. van der Linden, and T. Duffy, 209–26. Dordrecht: Kluwer.

Vissak, T. (2010). Recommendations for using the case study method in international business research. *The Qualitative Report*, *15*(2), 370.

Vos, C., Tsikriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations & Productions Management*, 22 (2), 195-219.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wadsworth, Y. (1997). *Do it yourself social research* (2nd ed.). St Leonards, NSW: Allen & Unwin.

Wareing, S. (2009). Disciplines, discourse and Orientalism: the implications for postgraduate certificates in learning and teaching in higher education. *Studies in Higher education,* 34:8, 917-928.

Warren Piper, D., Nulty, D.D., & O'Grady, G. (1996). *Examination Practices and Procedures in Australian Universities*. Canberra: Department of Employment, Education, Training and Youth Affairs.

Wasley, P. (2006). Underrepresented students benefit most from 'engagement'. *Chronicle of Higher Education*, 53, 39-40.

Watkins, D., & Regmi, M. (1990). An investigation of the approach to learning of Nepalese tertiary students. *Higher Education, 20,* 459–469.

Watson, J.B. (1916). The place of the conditioned reflex in psychology. *Psychological Review*, 23, 89-116.

Weber, M. (1949). *The Methodology of the Social Sciences*. Translated E Shils and M.A. Finch. New York: Free Press.

Weber, K. D., Martin, M. M., & Cayanus, J. L. (2005). Student interest: A two-study re-examination of the concept. *Communication Quarterly*, 53, 71–86.

Wenger, E. (1999). Communities of practice: Learning, meaning and identity.

Wenger, E. (1998). Communities of Practice: Learning as a Social System. In *Systems Thinker*.

Wertsch, J.V. (1991). *Voices of the mind: a sociocultural approach to mediated action*. Cambridge, Massachusettes: Harvard University Press.

Westphal, K. R. (1999). " Hegel's" epistemology? Reflections on some recent expositions. *Clio*, *28*(3), 303.

White, B.C. (2000). Pre-service Teachers' Epistemology Viewed through Perspectives on Problematic Classroom Situations. *Journal of Education for Teaching*, Vol.26, No.3, 279-305.

Wilde, S., Wright, S., Hayward, G., Johnson, J., and Skerrett, R. (9 February 2006). *Nuffield Review Higher Education Focus Groups Preliminary Report.*

Wilkinson, W.K. (1989). A Contrast of Perry and Royce: Implications in the study of college students' epistemological orientations. *Canadian Journal of Higher Education.* 14, 87-96

Williams, M. & Burden, R. (1997). *Psychology for language learners: A social constructivist approach*. Cambridge: Cambridge University Press.

Williams, K. D., & Frymier, A. B. (2007). The relationship between student educational orientation and motives for out-of-class communication. *Communication Research Reports*, 24, 249–256.

Wilson, K., & Fowler, J. (2005). Assessing the impact of learning environments on students' approaches to learning: Comparing conventional and action learning designs. *Assessment and Evaluation in Higher Education*, 30:1, 87-101.

Wilson, S.M., Shulman, L.S., & Richert, A.E. (1987). '150 different ways' of knowing: Representations of knowledge in teaching. In J. Calderhead (Ed.), *Exploring teachers' thinking* (pp.104-124).

Windschitl, M. (2002). Framing constructivism in practice as the negotiation of dilemmas: An analysis of the conceptual, pedagogical, cultural and political challenges facing teachers. *Review of Educational Research*, 72, 131-175.

Wittgenstein, L. (2001). *Philosophical Investigations*. Blackwell Publishing.

Wolf, F. (2010). Enlightened Eclecticism or Hazardous Hotchpotch? Mixed Methods and Triangulation Strategies in Comparative Public Policy Research. *Journal of Mixed Methods Research*, 4:2, 144-167.

Wood, P., & Kardash, C.A. (2002). Critical elements on the design and analysis of studies of epistemology. In B.K. Hofer & P.R. Pintrich (Eds.), *Personal Epistemology: The Psychology of Beliefs About Knowledge and Knowing* (pp.231-260). Mahwah, NJ: Lawrence Erlbaum Associates.

Woods, T. (2009). *Beginning Postmodernism* (2nd Ed.). Manchester: Palgrave Macmillan.

Woodside, A.G., & Wilson, E.J. (2003). Case study research methods for theory building. *Journal of Business & Industrial Marketing*, 18 (6/7), 493-508.

Woolley, C.M. (2009). Meeting the Mixed Methods Challenge of Integration in a Sociological Study of Structure and Agency. *Journal of Mixed Methods Research*, 3:1, 7-25.

Worley, D., Titsworth, S., Worley, D., & Cornett-DeVito, M. (2007). Instructional communication competence: Lessons learned from award-winning teachers. *Communication Studies*, 58, 207_222.

Wulff, D.H. (2005). Using the alignment model of teaching effectiveness. In D.H. Wulff (Ed.), *Aligning for learning* (pp. 3-15). Bolton, UK: Anker.

Yager, R. E., & Akcay, H. (2010). The advantages of an inquiry approach for science instruction in middle grades. School Science and Mathematics, 110(1), 5–12.

Yiijoki, (2000). Disciplinary cultures and the moral order of studying – A case-study of four Finnish university departments. *Higher Education*, 39:3, 339-362.

Yin, R.K. (2006). Mixed methods research: Are the methods genuinely integrated or merely parallel? *Research in the Schools*, 13 (1), 41-47.

Yin, R. (1984). *Case study research*. California: Sage Publications.

Young, L.J. (2001). Border crossings and other journeys: Re-envisioning the doctoral preparation of education researchers. *Educational Researcher*, 30 (5), 3-5.

Young, P. (2010). Generic or discipline-specific? An exploration of the significance of discipline-specific issues in researching and developing teaching and learning in higher education. *Innovations in Education and Teaching International*, 47:1, 115-124.

Zeegers, P. (2001). Approaches to learning in science: A longitudinal study. *British Journal of educational Psychology*, 71 (1), 115-132.

Zhu, C., Valcke, M., & Schellens, T. (2008). The relationship between epistemological beliefs, learning conceptions, and approaches to study: a cross-cultural structural model. *Asia Pacific Journal of Education*, 28:4, 411-423.

APPENDICES

Appendix 3.1a

Interview Schedule for Students

Identifier:

Module Title:

1. How do you see the role of the teacher in this particular module?
2. What do you think the teachers main aims are for this module?
3. What do you see as your role in the learning and teaching process for this module?
4. How would you define knowledge in this module?
5. What do you consider to be understanding in the module?
6. What is learning in this module?
7. What do you think are the desirable learning outcomes for this module?
8. What helps students to learn and what stops them learning in this module?
9. What is the focus and emphasis of teaching for this module?
10. What types of assessment methods will be used to assess students in this module?
11. What do you think the teacher is trying to assess when they use assignments, quizzes, projects, examination papers etc.?
12. Describe your current views on assessment in this module.
13. What assessment methods do you think would give the teacher the most information about their students in this module?
14. What do you think students should be able to do/know to be successful in this module?
15. What types of activity characterise the teaching in this module?
16. Which modes (e.g. lecture, seminar etc.) of instruction do you think are the most effective?
17. What do you think is the best way to learn in this module?

Appendix 3.1b

Interview Schedule for Teachers

Identifier:

Module Title:

1. How do you see your role in this particular module?

2. What are the aims of teaching for this module?

3. What is the role of your students in the teaching and learning process for this module?

4. What do you consider to be the most important concepts for students to learn in the modules you teach?

5. How would you define knowledge in this module?

6. What do you consider to be understanding in this module?

7. What is learning in this module?

8. What are the desirable learning outcomes for this module?

9. What helps your students learn and what stops them learning in this module?

10. What is the focus and emphasis of your teaching for this module?

11. What types of assessment methods do you use to assess your students in this module?

12. Refer to assignments, quizzes, projects, examination papers, etc. that you have used to assess your students in this module. What are you trying to assess with these questions?
13. Describe you current views on assessment within this module.

14. What assessment methods give you, as the teacher, the most Information about the students in this module?

15. What should students be able to do/know to be successful in this module?

16. What types of activity characterize your teaching in this module?

17. Which modes of instruction (e.g. lecture, seminar) do you think are most effective?

18. What is the best way to learn in this module?

Appendix 3.2

INFORMATION SHEET

The project that you are being asked to participate in aims to engage students in the improvement of the processes of teaching and learning at undergraduate level.

The project will ensure an active and collaborative learning ethos is embedded within the curriculum. The intention is to learn from both student and staff experience in order to enhance the student learning experience.

The project activities will include: a survey of staff and students, interviews and focus groups. This cycle of evaluation measures, and subsequent discussion and debriefing, will engage both staff and students in an on-going feedback cycle. Students will be the experts and interpreters as they are the ones who are ‘living it’. We want to give students a voice in order to enhance their experience and enhance the practice of their teachers.

Appendix 3.3

PROJECT CONSENT FORM

A study investigating teaching, learning, and assessment in undergraduate programmes. Student participants will be drawn from a variety of academic disciplines.

1. I have read and understood the information sheet and have had the opportunity to ask questions that have been answered satisfactorily.
2. I agree to take part in this research study and understand that all my details will be kept confidential and my name will not appear on any reports or documents.
3. I understand that the interview (s) will be audio-recorded and that no one but the researcher will hear the recording.
4. I understand that my participation is voluntary and that I am free to withdraw at any stage without giving reasons.
5. I give permission for anonymous quotes from the focus groups or interviews to be included in reports of the findings from the research

______________________ ______________________

(Name of participant) (Participant signature) (date)

______________________ ______________________

(Name of researcher) (Researcher signature) (date)

Appendix 4.1

Discipline-focused Epistemological Belief Questionnaire (DEBQ)

The statements below are intended to capture your opinions about knowledge within this particular module of study. Please give your responses with this particular context in mind when responding.

Put a cross in the appropriate box to indicate how strongly you agree with each of the following statements:

✓ = strongly agree ✓? = agree X? = disagree X = strongly disagree

Try not to use ?? = unsure unless you really have to, or unless the item cannot apply to you

	✓	✓?	??	X?	X
1. Truth is unchanging in this subject.	☐	☐	☐	☐	☐
2. In this subject, most work has only one right answer.	☐	☐	☐	☐	☐
3. Sometimes you just have to accept answers from the experts in this subject, even if you don't understand them.	☐	☐	☐	☐	☐
4. What we accept as knowledge in this subject is based on objective reality.	☐	☐	☐	☐	☐
5. All professors in this subject would probably come up with the same answers to questions in this course.	☐	☐	☐	☐	☐
6. The most important part of work in this subject is coming up with original ideas.	☐	☐	☐	☐	☐
7. If you read something in a textbook for this subject, you can be sure it is true.	☐	☐	☐	☐	☐
8. A theory in this subject is accepted as true and correct if experts reach consensus.	☐	☐	☐	☐	☐
9. Most of what is true in this subject is already known.	☐	☐	☐	☐	☐

10. Ideas in this subject are really complex.	☐	☐	☐	☐	☐
11. In this subject, it is good to question the ideas presented.	☐	☐	☐	☐	☐
12. Correct answers in this subject are more a matter of opinion than fact.	☐	☐	☐	☐	☐
13. If scholars try hard enough, they can find the answers to almost anything in this subject.	☐	☐	☐	☐	☐
14. The most important part of being an expert in this subject is accumulating a lot of facts.	☐	☐	☐	☐	☐
15. I know the answers to questions in this subject because I have figured them out for myself.	☐	☐	☐	☐	☐
16. One expert's opinion in this subject is as good as another's.	☐	☐	☐	☐	☐
17. Experts in this subject can ultimately get to the truth.	☐	☐	☐	☐	☐
18. Principles in this subject are unchanging.	☐	☐	☐	☐	☐
19. Principles in this subject can be applied in any situation.	☐	☐	☐	☐	☐
20. If my personal experience conflicts with ideas in the subject textbook, the book is probably right.	☐	☐	☐	☐	☐
21. There is really no way to determine whether someone has the right answer in this subject.	☐	☐	☐	☐	☐
22. Expertise in this subject consists of seeing the interrelationships among ideas.	☐	☐	☐	☐	☐
23. Answers to questions in this subject change as experts gather more information.	☐	☐	☐	☐	☐
24. All experts in this subject understand the field in the same way.	☐	☐	☐	☐	☐
25. I am more likely to accept the ideas of someone with first-hand experience than the ideas of researchers in this subject.	☐	☐	☐	☐	☐
26. I am most confident that I know something when I know what the subject experts think.	☐	☐	☐	☐	☐
27. First-hand experience is the best way of knowing something in this subject.	☐	☐	☐	☐	☐

Appendix 5.1

Shapiro-Wilk test

Tests of Normality

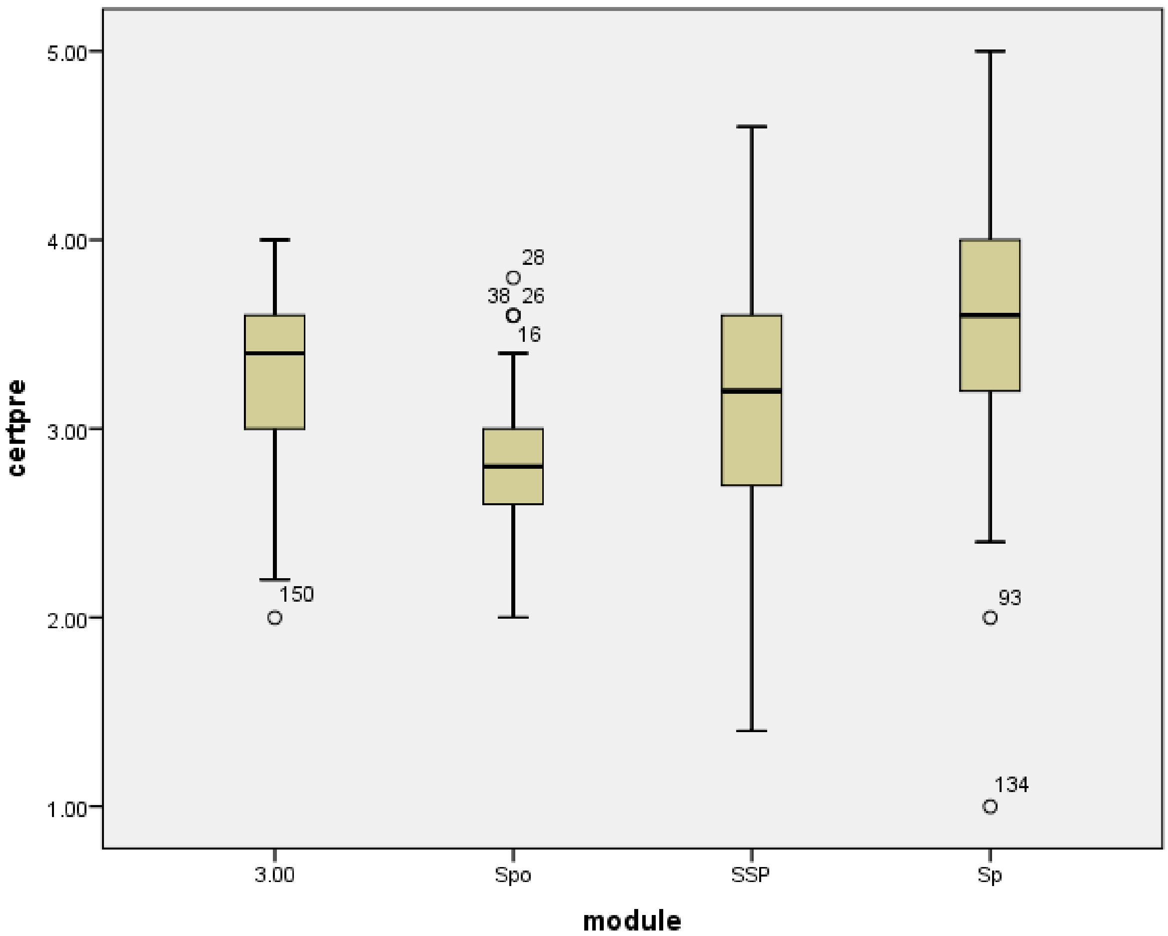
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Certpre	.077	175	.013	.986	175	.068
Evopre	.165	175	.000	.948	175	.000
subjpre	.126	175	.000	.971	175	.001
Exppre	.179	175	.000	.953	175	.000

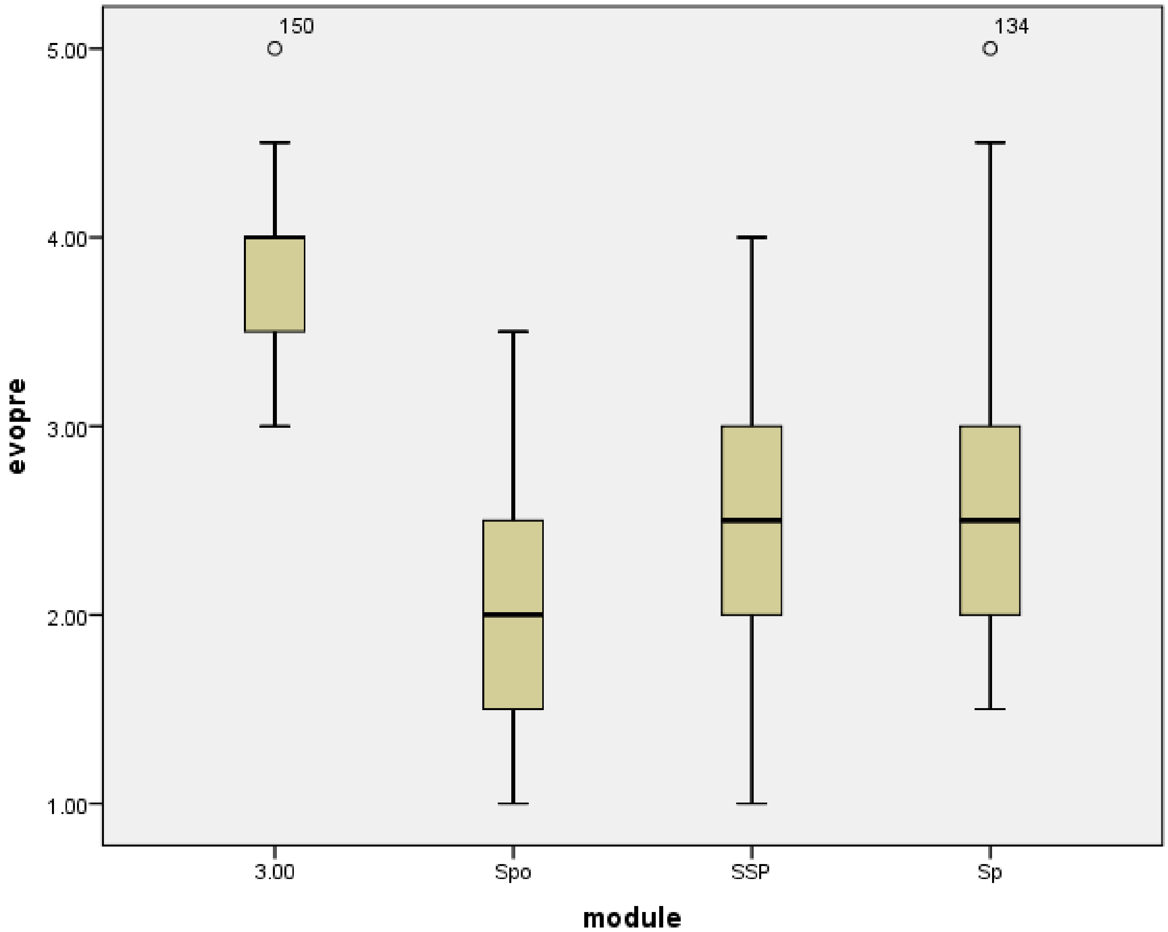
a. Lilliefors Significance Correction

Appendix 5.2

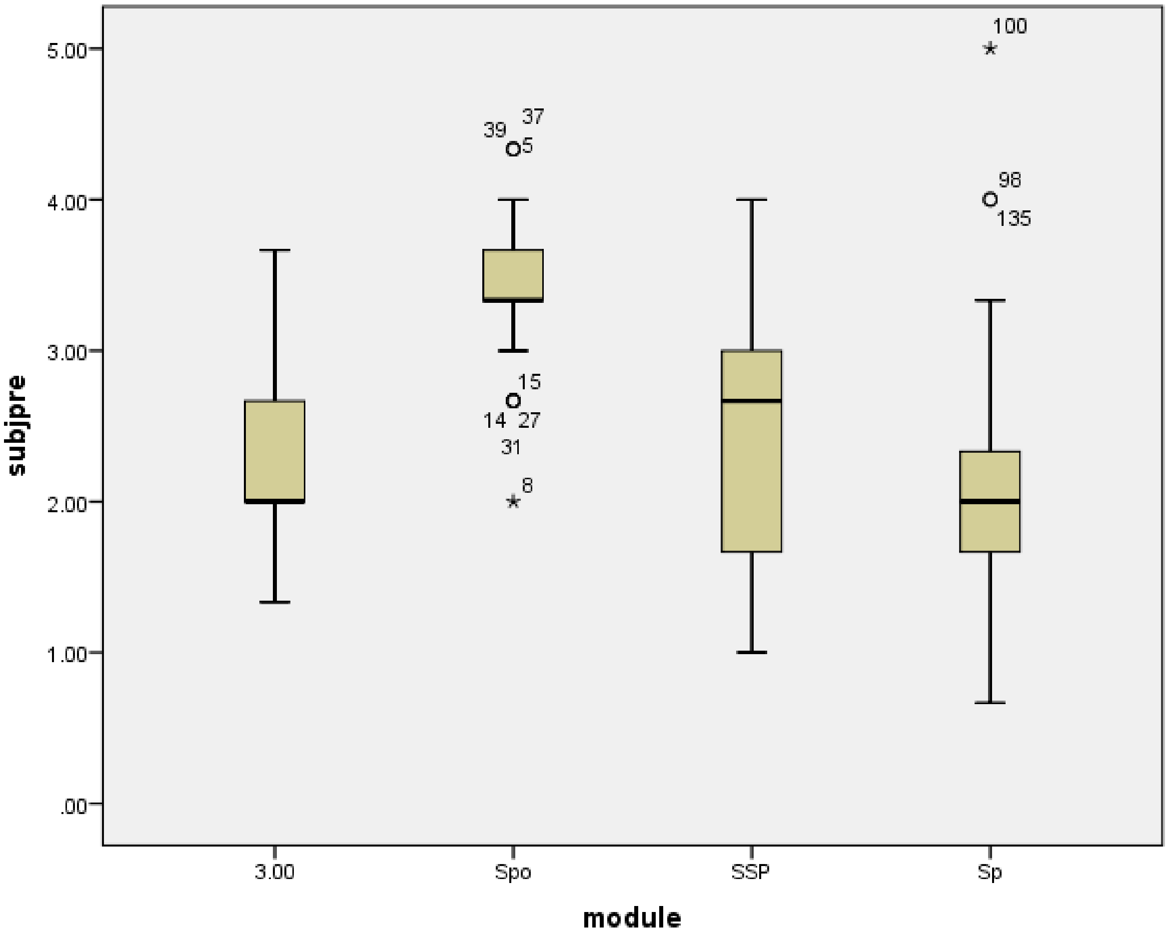
Boxplots for each personal epistemology dimension:

Certain Knowledge

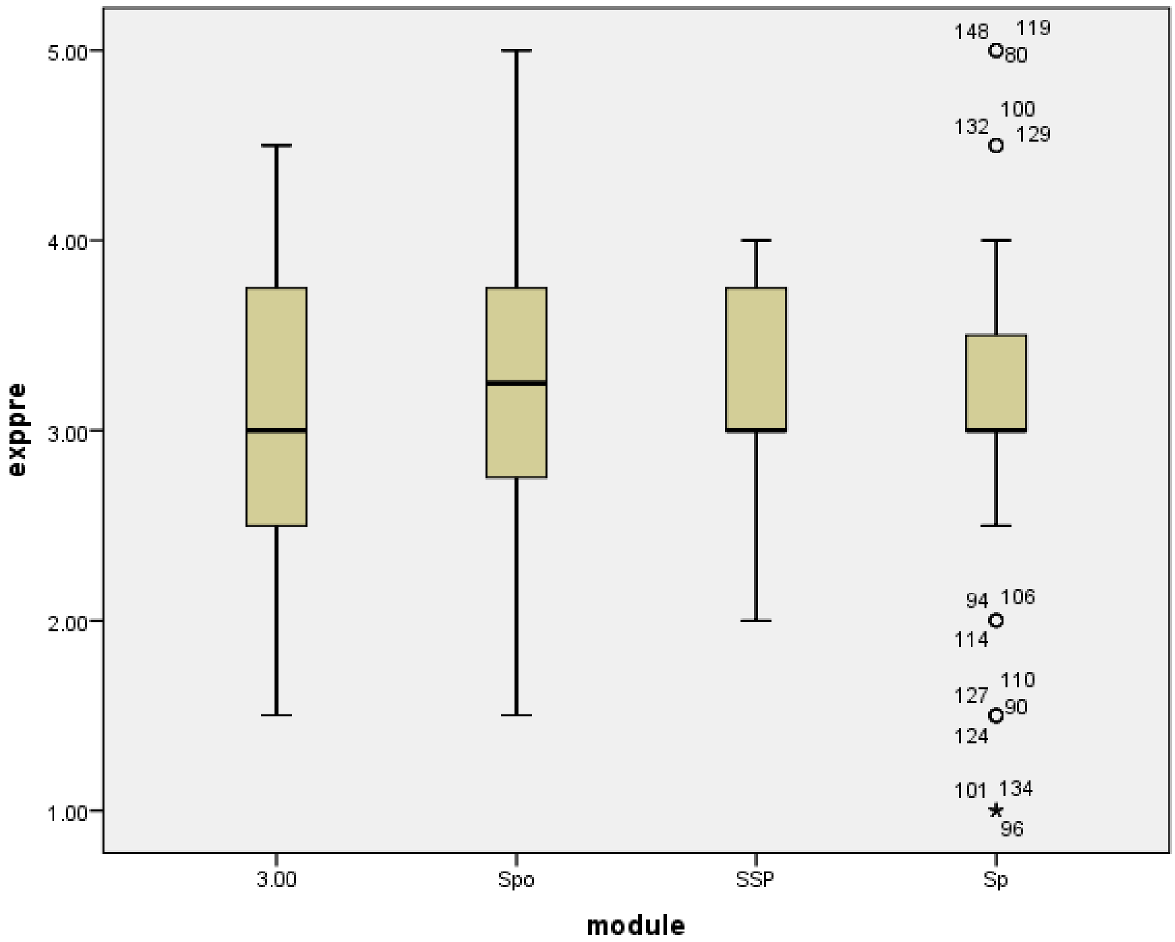



150
134
5.00
4.00
3.00
2.00
1.00
evopre
3.00
Spo
SSP
Sp
module

Subjective Knowledge



Experience of Knowing



Appendix 5.3

Levene's Test of Equality of Variance

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Certpre	2.792	3	171	.042
Evopre	1.810	3	171	.147
subjpre	3.039	3	171	.031
Exppre	1.455	3	171	.229

Appendix 5.4

Course outlines SHES modules

Sporting Identity Module

Aims

The module aims to provide students with an opportunity to explore how perceptions of the self as a sportsperson are acquired and maintained and how these perceptions affect participation

Course content

The development of self-understanding from infancy through to adulthood, focusing on periods of development where major changes occur. These are studied using a number of developmental theories to provide a framework for understanding. Three particular topics (perceptions of competence, motivation and sex stereotyping) are explored in relation to self-concept and physical activity. Recent research into adult sporting identity forms the basis for an understanding of how individual factors interact with environmental factors to affect participation.

Intended learning outcomes

Successful completion of the module is indicated by the ability to:

- Apply knowledge of a number of different developmental theoretical perspectives to an explanation of how sporting identity is constructed throughout childhood and adolescence;

- Explain how perceptions of competence, motivation and gender role stereotyping are acquired and affect physical activity behaviours and how practitioners might manipulate these perceptions to benefit participation;
- Indicate how a salient research paper of choice supports your understanding of one of the areas studied in the module;
- Effectively communicate research findings and your understanding of the chosen topic in an oral presentation.

Module structure

A weekly lecture and seminar (both one hour duration), and regular formative assessments that do not contribute toward the overall module mark**.**

Assessment methods

Two summative assessments:

- An oral presentation to a small group of peers and a member of staff which will be tutor and peer assessed.
- A written one and a half hour examination, with pre-released questions supported by a submitted portfolio of work completed throughout the duration of the course.

Biomechanics Module

Aims

This module covers definitions of biomechanics; qualitative and quantitative motion; description of motion; Linear motion - vector and scaler quantities, sports projectiles, musculoskeletal joint systems, resolving forces; Newton's laws of motion; Angular motion - levers and moments, centre of gravity determination; Rotation – angular analogues of Newton's laws of motion; Conservation of angular momentum.

Course content

- Definitions of biomechanics units of measurement;
- dimensional analysis);
- Vectors (basic vector operations;
- Linear motion and Angular Kinematics (position,
- displacement, velocity and acceleration; projectile motion,
- applications to human movement and sports);
- Laws of Motion (force, work, power; applications to human
- movement and sports);
- Kinetic energy and Potential energy, Elastic energy
- (applications to human movement and sports);
- Free body Diagram;
- Torque, Momentum;
- Static and Dynamic Analysis;
- Running, Jumping and Throwing.

Intended learning outcomes

Students successfully completing this module are able to:

- Indicate how the principles of elementary mechanics may be applied to human movement;
- Apply mechanical principles to calculate relative musculoskeletal forces involved in movement;
- Observe and describe human movement associated with selected modes of physical exercise;
- Demonstrate scientific report writing skills.

Module structure

Weekly lecture and seminar, laboratories or practical’s (each 1 hour duration)

Assessment methods

One final written 2 hour examination

Sports and Exercise Physiology Module

Aims

This module aimed to develop students' understanding of generic topics within sports and exercise physiology through discussion of current issues and practical application of measurement techniques.

Course content

The measurement and prediction of metabolic rate during rest and exercise; computation of energy, work and power to calculate economy and efficiency of exercise; cardiovascular measurements – heart rate, oxygen uptake, blood pressure, double product and rating of perceived exertion during various forms of ergometry; methods of quantifying exercise intensity to improve aerobic performance using heart rate, percentage VO2 max, blood lactate and the rating of perceived exertion; measurement of VO2 max; scaling techniques for analysis of anthropometric and performance-based data.

Intended learning outcomes

Students who successfully complete this module will be able to:

- Identify and prescribe target levels of exercise intensity from RPE, heart rate, blood lactate and VO2;
- Demonstrate an understanding of the principles of ergometry;
- Select and use an appropriate scaling technique for interpretation of a data set;
- Select and use an appropriate VO2 max test for a given population; and
- Effectively communicate one of the laboratory 'practicals' in a written report in which the results must be discussed in the context of current knowledge and research.

Module structure

Weekly lecture, laboratory and practical sessions (2 hours in total each week)

Assessment methods

- Laboratory report (30%)
- Written examination (70%)

Physiology Module

Aims

The aim of this module is to provide the students with core knowledge of human physiology necessary to understand the physiological aspects of exercise and sport covered in subsequent modules (SHES).

Course content

In this module, physiological mechanisms, responses and assessments will be taught and demonstrated to enhance understanding of the topic. The students will be introduced to the acute physiological responses to exercise and physiological assessment techniques during practicals for better understanding human physiology and as a foundation for future modules. Lectures will contain essential physiological mechanisms and systems for understanding the human physiology and response to exercise.

Intended learning outcomes

Explain the fundamentals of cell biology; Describe and explain basic human physiology; Discuss some of the body's acute physiological responses to exercise; and selected disease mechanisms; Demonstrate that they can solve physiological problems; Locate relevant scientific literature; Write a laboratory report; Use of equipment for measurement of physiological parameters; Record and analyse physiological data

Module structure

Practical classes and workshops teaching physiological assessment methods and performing experiments on humans; collecting and analyzing, as well as reporting and interpreting data – 12 hours in total.

Private study supported with lecture slides on Blackboard and recommended literature; MCQ assignments will support private studies – 140 hours in total.

Lectures with demonstrations will enable students to learn essentials of human Physiology and relation to exercise and sport – 48 hours in total.

Assessment methods

A series of multiple choice question tests (5 in total), and laboratory assessments (3 in total).

Appendix 6.1

Course Outlines Psychology Modules

Research Methods and Statistics Module

Course content

The Research Design and Statistics course subsumes ways of designing and analysing psychological research, with a particular focus on experimental design, analysis of parametric data, and use of Analysis of Variance (ANOVA) techniques. The aim of the course is to help students follow some basic and advanced procedures of data analysis used in Experimental Psychology, and then use them for their own research. It is therefore oriented to the design, analysis and write-up of their final year research projects.

Teaching and learning strategy

The teaching and learning strategy within this module of study involves weekly lectures and small group sessions which include 'Mac lab' seminars where students undertake practical exercises involving statistical analysis.

Desired learning outcomes

The desired learning outcomes for this particular course of study are that students will have the ability to:

- Design and implement a variety of experiments;
- Analyse the data (using SPSS) resulting from these experiments;
- Interpret the results;
- Understand the logic behind the use of different statistical strategies and data analyses;
- Critically review scientific research;

- Demonstrate an understanding of the theoretical and empirical background for a specific project in psychology;
- Demonstrate the ability to consider the ethical implications of research projects; and
- Demonstrate the ability to write succinctly and clearly to APA guidelines

Assessment methods

The assessment methods include a series of four formative multiple choice questionnaire (MCQ) examinations which count 24% toward the final mark; a final examination, 16% of the final mark; coursework, 15% of the final mark; and a research project proposal, 45% of the final mark.

Memory and Perception Module

Course content

The Memory and Perception course provides an overview of psychological theories and research in the field of Cognitive Psychology. The aim of the course is to provide students with the opportunity to investigate memory systems and aspects of perception in general.

Teaching and learning strategy

The teaching and learning strategy is a weekly two hour lecture.

Desired learning outcomes

Students will have the ability to:

- Evaluate the major theories and distinguishing features of the principle memory systems; and
- Demonstrate an understanding of how memory research has contributed to the improvement of memory and the accuracy of eye witness testimonies

Assessment methods

The assessment methods for this particular course are a MCQ examination at the end of the semester.