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## **DOCTOR OF PHILOSOPHY**

**An exploratory study of the linguistic and cognitive skills of Welsh-English bilingual children with moderate learning difficulties in Welsh-Medium education**

Lye, Catrin

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**An exploratory study of the linguistic and cognitive skills of  
Welsh - English bilingual children with Moderate Learning Difficulties in  
Welsh-Medium Education**

**Catrin Bethan Lye**

**PhD**

**2015**

**School of Education  
College of Business, Law, Education and Social Sciences  
Bangor University**

*In memory of Nino*

*Betty Vaughan Davies*

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## **ABSTRACT**

The aim of this research was to explore the impact of Welsh-English bilingualism on the linguistic and cognitive skills of children with moderate learning difficulties (MLD). Despite there being an abundance of literature about the linguistic and cognitive abilities of typically-developing children, little is known regarding bilingual children with moderate learning difficulties. Therefore, the overarching aim of this research is to make a significant contribution to knowledge about the linguistic and cognitive abilities of bilingual children with MLD.

Research into the linguistic abilities of typically developing bilingual children often demonstrates that their vocabulary development is slower than that of monolinguals but ‘catches-up’ with increased experience and exposure and literacy research suggests there is no detrimental effect on literacy skills as a result of bilingualism. Research into the executive functioning (or cognitive) abilities of typically developing bilingual children has often demonstrated that bilingual children benefit from executive functioning advantages, not only in linguistic tasks but also in non-linguistic tasks. However, little is known regarding bilingual children with moderate learning difficulties, particularly in the Welsh-English context.

Children in this study were either Welsh-English bilinguals from one of three home language backgrounds (L1 Welsh, L1 English or simultaneous bilinguals) attending Welsh-medium education or English monolinguals attending English-medium education in Wales. Children with moderate learning difficulties were compared to typically developing chronologically age matched peers (10-11 year olds) and developmentally age matched peers (7-8 year olds) from each of the home language backgrounds; the monolinguals used as the control group.

All of the bilingual children were tested on a range of standardised vocabulary and reading measures, in English and Welsh, and on a number of executive functioning measures (inhibition, switching and attention) that were adapted from the current literature most often discussed in relation to the cognitive effects of bilingualism.

The findings of the research were mixed with regard to the impact of bilingualism but indicated that bilingual children with moderate learning difficulties perform at

developmentally appropriate levels in both linguistic and cognitive domains, and in some tasks performed better than the developmentally age matched children. Similarly to research into typically developing Welsh-English bilingual children, these findings suggested that home language does impact Welsh and English language development and that bilingual children with MLD do not necessarily ‘catch-up’ with their monolingual peers by age 11. The executive functioning findings indicated no consistent advantage for the bilingual children over the monolingual children. The findings of this research did however indicate that children with moderate learning difficulties possibly responded ‘qualitatively’ differently on the executive functioning tasks which may have implications for education.

The findings contribute to the field of bilingualism and moderate learning difficulties. They may also be of use to parents and schools regarding the impact of Welsh-medium education on children who are experiencing difficulties with the curriculum (i.e. children with moderate learning difficulties) and may be of use to educational professionals in planning support for bilinguals with moderate learning difficulties.

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## TERMS AND DEFINITIONS

**Balanced bilingualism** Individuals that have developed approximately equal competence in both languages

**Dominant bilingualism** Individuals that have greater proficiency in one language.

**Dual-stream immersion education** An education system that provides approximately 90% of the instructions in the minority or second language which is less supported by the broader society and 10% in the majority language or first language . The proportional use of both languages changes in the older years of primary schools (e.g. approximately age 9) The proportion of lessons taught in the majority language gradually increases until the curriculum is equally divided according to subject.

**Immersion education** An education system that instructs children through their second language for the biggest proportion of the time with the aim of them becoming fully proficient in the second language thus becoming bilingual.

**Key stage 2** A 'phase' of education for children in Primary schools between years 3-6 (age 7-11). Prior to this children in reception to year 2 (age 4-7) are considered to be in the foundation phase which follows a different curriculum.

**L1 English bilingual** Individuals who are attending WM education (or immersion education) and developing Welsh as their L2. They can also be referred to as a sequential bilingual or L2 Welsh.

**L1 Welsh bilingual** Individuals who are attending WM education who receive most, or almost all of their input through Welsh. They can also be referred to as sequential bilinguals or L2 English.

**Sequential bilingual** Individuals who have become bilingual after learning one language, and learning a second afterwards. This is often contrasted with simultaneous bilingualism.

**Simultaneous bilingual** Individuals who have become bilingual by learning two languages simultaneously or at approximately the same time i.e. have been exposed to two languages from birth.

## ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of variance
ANT	Attention Network Orient Task
BPVS	British Picture Vocabulary Scale
DA	Developmental age
DV	Dependent variables
DCELLS	Department for Children, Education and Lifelong Learning and Skills
DfES	Department for Education and Skills
EAL	English as an Additional Language
EM	English medium
EF	Executive functioning
FSM	Free school meals
GTCW	General Teaching Council for Wales
IQ	Intelligence quotient
IV	Independent variable
KS	Key Stage
L1	First language
L2	Second language
LD	Learning difficulties
LSA	Learning Support Assistant
MA	Mental age
MID	Mild intellectual disability
MLD	Moderate learning difficulties
NARA	Neale's Analysis of Reading Ability
OECD	Organisation for Economic Co-operation Development
PG	Prawf Geirfa
SART	Sustained Attention to Response Test
SEN	Special educational needs
TD	Typically developing
WAG	Welsh Assembly Government
WG	Welsh Government
WM	Welsh medium

# 1 INTRODUCTION

This study explores the language and literacy and executive functioning abilities of children with moderate learning difficulties (MLD) who attend Welsh-medium education in Wales.

## 1.1 BILINGUALISM AND BILINGUAL EDUCATION IN WALES

In Wales, primary education can be either through the medium of English (EM education) or through the medium of Welsh (WM education). Despite EM provision being the most popular (with 193,316 pupils enrolled in 2011/12), the number of pupils in WM education is increasing year upon year (see Table 1), with approximately 52,336 of children enrolled in 2011/12 (Welsh Government, 2012-2013). Traditionally WM education was for those children from Welsh-speaking homes, however the increase in WM uptake in recent times has meant that WM schools are now instructing those from home language backgrounds other than Welsh.

Table 1 Number of pupils in Welsh and English medium primary schools (statswales.Welsh Government, accessed 15/08/13)

	<b>2008/2009</b>	<b>2009/10</b>	<b>2010/11</b>	<b>2011/12</b>
<b>Welsh medium</b>	50,244	50,527	51,244	52,336
<b>English medium</b>	189,216	190,937	192,035	193,316

Research to date indicates that there are no detrimental effects of bilingualism on the linguistic and cognitive abilities of typically developing children, and that bilingual children also benefit in the economic, cultural and social domains. However, little is known regarding the situation in Wales regarding the impact of a minority language education system (Welsh-medium education) in a majority language environment (English) where children are from a range of home language backgrounds. To add to the complexity of this issue, much of the literature is on typically developing children with very little empirical research on children with special educational needs; and this despite an increasing number of children being recognised as having an SEN. The lack of research regarding SEN and bilingualism is



reflected in the literature with professionals being reported as advising parents to ‘stick to one language’ with their child, despite the lack of empirical evidence.

## **1.2 THE RELEVANCE AND IMPORTANCE OF THIS RESEARCH**

As mentioned in the previous section, Welsh-medium education is increasing, with little- to no- research documenting the impact of bilingual education on children with Moderate Learning Difficulties. This consequently leaves educational professionals working on intuition and experience alone and little evidence that’s grounded in literature on which to base their practice, and this in addition to inclusive practices in schools where teachers are expected to meet the needs of children with a range of learning and linguistic needs.

This research has decided to focus on the language and literacy and executive functioning aspects of a bilingual child’s ability as these are considered some of the fundamental aspects to educational success. Executive functioning co-ordinates and enables the execution of behaviour (see chapter 10) and language and literacy development is central to nearly all academic activities in school. The impact of bilingual education on these skills, particularly in relation to children with MLD, who have widely documented difficulties in these areas, is important for a number of reasons. First it is important that educational professionals are aware of the impact of bilingualism on children with MLD given that it is expected that they produce and present a differentiated curriculum which is relevant to all. Understanding some of the needs of children with MLD may therefore support their professional role. Second, anecdotal evidence suggests parents of children with SEN often question the language in which their child is raised and educated and this research is considered the first step in enabling parents to make informed decisions. Third, it is believed that this research will also begin to inform policy and practice in other ways such as how teachers are trained in relation to bilingual education, and how children with MLD with varying linguistic needs are best supported in the classroom given their possible cognitive and linguistic needs.

## **1.3 THE EXPLORATION OF LANGUAGE AND LITERACY AND EXECUTIVE FUNCTIONING IN THIS THESIS**

It is important to mention that while the areas of language and literacy and executive functioning are two separate entities, they were both explored in this thesis for the following reasons:

- (i) As mentioned in section 1.2 both language and literacy and executive functioning were explored due to their importance to educational success.
- (ii) Given the paucity in the literature with regards to children with MLD it was felt that more than one aspect needed to be explored to enable a clearer picture as to the impact of bilingual education on children with MLD.
- (iii) Literature on typically developing children frequently suggests that language and literacy and cognitive development are related (see chapter 6).
- (iv) Quantitative research in the field of SEN is considered difficult given the individual nature of every child's needs however it was felt that replicating the methodologies of the TD literature would enable a more robust study which enabled comparisons across populations (such as children with MLD and children without).

#### **1.4 AIMS AND OUTLINE OF THIS THESIS**

The aim of this research is to address some key issues regarding linguistic and cognitive abilities in the field of bilingualism and moderate learning difficulties (MLD) as, to the best of my knowledge, there is no research based on Welsh-English bilingual education and moderate learning difficulties. Internationally, there is also a lack of literature on bilingualism and SEN in general.

This research aims to explore the following research questions in relation to Welsh-English bilinguals attending WM education:

- (i) Are there any differences in the linguistic and cognitive development of bilingual children with Moderate Learning Difficulties from differing home language backgrounds who attend WM education?
- (ii) Are there any differences in the cognitive and linguistic development between bilingual children with MLD when compared with younger, typically developing developmentally age-matched children?
- (iii) Do the suggested cognitive advantages of bilingualism in typically developing children extend to children with moderate learning difficulties?

This research is a quantitative study based on WM primary schools in Wales. Experimental methods and standardised tests were used in order to gain an overall understanding of the impact of bilingual education on the linguistic and cognitive development of children with moderate learning difficulties.

This thesis is divided into four main sections: a general introduction which will begin with an introduction to the Welsh language and Welsh education followed by a discussion of complexities and issues surrounding ‘bilingualism’ and ‘moderate learning difficulties’ (section 1), vocabulary and literacy development (section 2), executive functioning (section 3) and a discussion of the overall findings and implications (section 4). It was decided to divide the thesis in this way as two very distinct concepts were explored (language and literacy and executive functioning) and it was felt that grouping the relevant language and literacy chapters and grouping the executive functioning chapters would enable the reader to read and interpret the findings in light of the literature in a very focused way. Therefore, the sections and chapters of the thesis are as follows:

## **SECTION 1**

The first section aims to provide an overview of this research and its contribution to the area of interest followed by the aims and outline of this research. The chapters are as follows: Chapter 1 provides an overview of the Welsh language and Welsh education system regarding typically developing and non-typically developing children. This is then followed by the aims of this research.

Chapter 2 aims to convey the complexity of bilingualism and establish a working definition that will be used throughout this thesis. It will also provide a definition of bilingualism in Wales and ensure that informed comparisons are made between bilingualism in Wales and other kinds of bilingualism.

Chapter 3 discusses key characteristics of moderate learning difficulties whilst also highlighting the issues and complexities regarding this special educational needs category. A working definition of moderate learning difficulties will then be presented that will describe the population on which this thesis is based.

Chapter 4 discusses the historical context and trends in bilingual research.

## **SECTION 2**

The second section aims to explore the linguistic development of children with Moderate Learning Difficulties in Welsh-medium education from differing linguistic backgrounds. Historically people have assumed that the difficulties children with MLD have with education are compounded by being bilingual. Indeed anecdotal evidence suggests that children with MLD (and other types of SEN) are encouraged to use only one language (Baker, 2007) and some past research has referred to culturally and linguistically diverse students with SEN as being under a “triple threat” because they were presumed to be on the ‘back foot’, even before beginning school (Rueda and Chan, 1979). There appears to be very little research evidence to support this conception of bilingualism and MLD.

The chapters are as follows:

Chapter 5 examines the literature in relation to language and literacy development in populations with and without special educational needs. Aims and hypotheses which relates to the language and literacy focus of this thesis will be presented.

Chapter 6 describes the research methodology of the entire thesis (i.e. describes the sample, the background measures, pilot study) and then goes on to describe the language and literacy tests. The executive functioning tests are not discussed in this section as they are discussed in the executive functioning section (chapter 10 of section 3).

Chapter 7 details the language and literacy findings

Chapter 8 discusses the language and literacy findings.

## **SECTION 3**

The third section aims to explore the metalinguistic and executive functioning abilities of bilingual children with MLD. The literature regarding typically developing (TD) bilinguals suggests that there may be a benefit to their EF skills over the skills of monolinguals (see Bialystok, 2001 for a review) The literature on MLD suggests that executive functioning is a particular area of difficulty for children experiencing MLD (e.g., Danielsson, Henry, Rönnerberg and Nilsson, 2010). Therefore the third aim of this research is to contribute to the bilingualism and MLD literature and explore the impact of bilingualism on the EF skills of

children with MLD within a Welsh-English context. The importance of these EF skills lies in the applicability of executive functioning to education due to the reliance on EF for the higher-order thinking which is believed to underlie educational success (Meltzer, 2007). The chapters are as follows:

Chapter 9 examines the literature in relation to executive functioning in bilingual populations with and without special educational needs. Aims and hypotheses which relates to the executive functioning focus of this thesis will be presented.

Chapter 10 describes the executive functioning measures in detail.

Chapter 11 details the executive functioning findings

Chapter 12 discusses the executive functioning findings.

#### **SECTION 4**

The fourth section aims to pull both sections 1, 2 and 3 together and discuss the findings and implications in a cohesive manner. The limitations of this research and implications for further research will also be discussed.

Therefore, this research into the linguistic and cognitive (executive functioning) abilities of children in WM education who are experiencing difficulties with the curriculum would be the first step in Welsh research in responding to some key issues in bilingual education and SEN. First, it will inform educational professionals' abilities to respond to the linguistic and cognitive needs of children experiencing moderate learning difficulties. Second it will support teachers and educational professionals in disentangling a learning difficulty from linguistic proficiency (noted in section 1.3.1) and finally, support parents in making an informed decision regarding the education of their child. The chapters as as follows:

Chapter 13 discusses both the language and literacy, and executive functioning results of this research in greater detail and further interprets the findings in relation to other research endeavours. Limitations of the research are also discussed.

Chapter 14 concludes with a consideration of the practical implications of this research and the implications for further research.

## **1.5 MY BACKGROUND**

Quantitative or psychological research studies have typically not identified factors which affect the lens through which the researcher plans, conducts, analyses and interprets their research (Harvey, 2013) but this is considered by many qualitative researchers to be fundamental to conducting objective, and transparent research, free from bias. This subsection aims to critically discuss some key areas which must be considered.

First, I am a Welsh-English bilingual who attended a Welsh-medium school and was raised in South Wales in an English dominant area in an English dominant household (though both parents are able to speak Welsh). I consider myself to be culturally and socially affiliated with the Welsh language and am conducting my research in Bangor University, an area with the highest number of Welsh speakers and the only University with a Welsh-English bilingual policy. With this, I have recognised the importance to be balanced and objective through all stages of this research and put the following measures in place to ensure this:

- (i) To avoid sampling bias all schools were targeted in Gwynedd and all children who fit the selection criteria were given a questionnaire which was distributed by the teacher. Schools in other counties, where they were included in the research, were a convenience sample and questionnaires were distributed if the headteacher consented. Schools were not targeted on specific criteria other than language of the school (i.e. Welsh-Medium or English Medium).
- (ii) The procedure was consistent for all children and (iii) Measurement bias was avoided through discussing the findings with others and listing possible alternatives in the discussion.

Second, it should be noted that all literature searched was considered for the literature review based on relevance to the aims of this thesis however publication bias may have affected the range of literature sourced.

## **2 THE WELSH LANGUAGE AND WELSH-MEDIUM/BILINGUAL EDUCATION IN WALES**

### **2.1 OVERVIEW**

This chapter provides the historical context of the Welsh language and Welsh education and an overview of the Welsh language and Welsh education as it now stands. This will be considered in the context of typically developing (TD) children and children with special educational needs (SEN).

To explore these areas the following databases were thoroughly searched:

19<sup>th</sup> Century UK Periodicals Online, Annual Reviews, Archives Wales, ASSIA , Bibliography of British and Irish History, ERIC, Google Scholar, House of Commons, JSTOR, Parliamentary Papers, People’s Collection Wales, PsycArticles, PsycINFO, Web of Science, Theses Collection Wales, Welsh Journal Online.

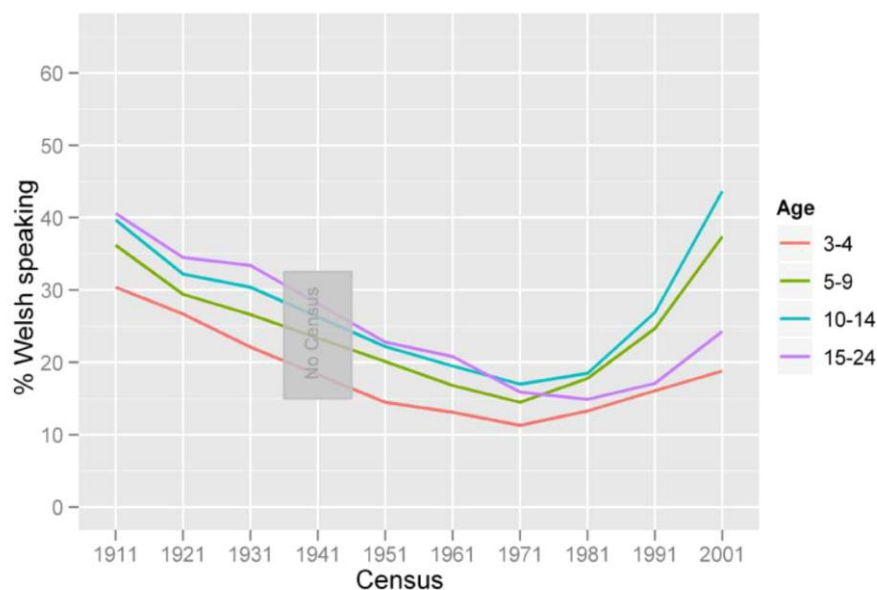
The following search terms were used: Language, education, politics, children, school(s) and were each searched with the following terms Welsh, Wales, bilingual, two languages.

### **2.2 THE WELSH LANGUAGE**

Welsh is a language that has evolved from the Celtic branch of what linguists term Indo-European. It is probable that the Celts were the first Indo-European people to spread across Europe and two forms of ‘insular’ Celtic have been identified, namely ‘Goidelic’ and ‘Brythonic’ (of which Welsh is a descendant). Of the languages spoken in Britain today, Welsh is by far the oldest – going back at least 2,500 years and possibly 4,000 years. Welsh has a rich and varied cultural and literary tradition that dates back to the early heroic poetry of the sixth century. However, with the increase in Germanic tongues that gave rise to the English language following the battle of Hastings, the rise of the Normans, the colonisation of Wales by England following the Act of Union in 1536 which legislated that English would be the only language in Wales, and the influence of industrialisation and migration in the 18th and 19th centuries, Welsh became the minority language “*in terms of power and status*” (Lewis, 2009, p.70) and its prominence gradually decreased.

The 1911 census recorded approximately 1 million Welsh speakers however numbers of recorded speakers steadily declined until the 2001 census when an increase in both the absolute number of Welsh speakers and the percentage of Welsh speakers in the population as a whole was recorded, particularly amongst children and young adults aged 3-24 years (see figure 1.1).

Figure 1 Percentage of Welsh speakers under 25 years, 1911-2001 (Jones, 2012)



The decline in numbers of Welsh speakers between 1911 and 2001 has been attributed to numerous social, political and economic factors such as tourism and inward migration of English speakers, increased availability of English Medium sources (e.g., media, books), transport and communication (see Lewis, 2009 or Jones and Martin-Jones, 2004 for a more extensive list), however the suppression of the Welsh language and Anglicisation of the education system in the 19<sup>th</sup> Century are often noted as being two of the key contributors towards the decline in numbers of Welsh speakers.

Despite this decline in numbers of Welsh speakers, the Welsh language continued to receive public support in conjunction with support from rising organisations such as the nationalist political party, Plaid Cymru (from 1925) and Cymdeithas yr Iaith Gymraeg (Welsh Language Society) from 1962. As a result of these organisations' campaigns, a succession of legislation followed. Following the 1967 Welsh Language Act that granted the right to testify in Welsh in court and to have official forms in Welsh, the 1993 Welsh Language Act and Government of Wales Act (1998) guaranteed that Welsh and English would be treated equally in the



public sector as far is reasonable and practical. A plan for Wales (WAG, 2001) noted that the two main ambitions of the Welsh Assembly Government were to stabilise the proportion of Welsh speakers and sustain the growth of Welsh amongst young people and increase the number of Welsh speakers. This ambition was set out in the Welsh Assembly Government's Dyfodol Dwyieithog: A Bilingual Future (2002) document where their vision of fostering Wales' unique and diverse identity and the benefits of bilingualism were noted and a commitment was made to provide an action plan to achieve a bilingual Wales. Iaith Pawb (2003), was published in response to 'A Plan for Wales' and 'Dyfodol Dwyieithog: A Bilingual Future', outlining WAG's three-pronged strategy: to provide a national policy framework, to focus policies and actions which are economically and socially sustainable and to focus on the rights and responsibilities of the individual.

It wasn't until the 2011 Welsh language measure that Welsh became an officially recognised language in Wales and the use of 'bodies/organisations' were emphasised to monitor and promote Welsh language provision. The main points of the Welsh language measure were to:

- Place duties on bodies to provide services through the medium of Welsh;
- Create a Welsh Language Commissioner with strong enforcement powers to protect the rights of Welsh speakers to access services through the medium of Welsh;
- Establish a Welsh Language Tribunal;
- Give individuals and bodies the right to appeal decisions made in relation to the provision of services through the medium of Welsh
- Create a Welsh Language Partnership Council to advise Government on its strategy in relation to the Welsh language;
- Allow for an official investigation by the Welsh Language Commissioner of instances where there is an attempt to interfere with the freedom of Welsh speakers to use the language with one another.

By the 2001 census, the number of recorded Welsh speakers had increased to approximately 20.8% of the population with the greatest proportion of Welsh speakers being amongst children (40.8% in children 5-15 years) (Office for National Statistics, 2001). Lewis (2009) noted this increase to be a reflection of the increase in Welsh Medium (WM) education, introduction of the National Curriculum, and the 1988 Education Reform Act which made

Welsh a core subject for those attending WM schools and a foundation subject to be learned by all other children between 5 and 16 years old.

There are however some caveats to the overall number of Welsh speakers, as recorded by the 2001 census and Language Use Surveys (WAG, 2004-2006):

- (i) The proportion of Welsh speakers varies according to county, with some areas such as Gwynedd having a higher proportion of Welsh speakers than others e.g., Flintshire (see Figure 2, p.66).
- (ii) While many people report the ability to speak Welsh, only 58% of these reported themselves as fluent (WAG, 2004-2006).
- (iii) Fluency across literacy skills is also known to vary. For example, the 2001 census reported that while 20.8% of the population could speak Welsh only 20.2% were able to read Welsh and 17.7% were able to write Welsh.
- (iv) Language use in the home and socially is also known to vary. The Language Use Surveys (WAG, 2004-2006) reported that only 57% of fluent Welsh speakers spoke Welsh all or most of the time. This varied according to age e.g., only 18% of fluent Welsh speakers age 3-15 years and 22% age 15-29 years spoke Welsh at home. Thomas and Roberts (2011) also note that language transmission into the social domain is limited with many children, particularly those from L1 English homes attending WM education favouring English.

### **2.3 THE DEVELOPMENT OF WELSH MEDIUM EDUCATION AND ITS CURRENT STATUS**

This section provides a brief overview of the development of WM education from the early 19<sup>th</sup> Century to its current status in 2013.

After the British state intervened in Welsh public life in the early 19<sup>th</sup> Century, there was a considerable impact on the Welsh language, particularly due to the changes made to the Education system. Governmental documents used terms such as “*backwardness*” (Davies, 1999, p.43) and “*evil effects*”, and described the Welsh language as a drawback to Wales. This in turn promoted English-medium (EM) education which was eventually made compulsory for all children in Wales from age five.

After decades of public resistance to the Anglicization in Wales, the language continued to have a low status and the economic migration of Welsh speakers out of Wales in the 1930s also impacted the language. A succession of events followed which in turn promoted the language and the education system. Welsh language movements such as the Urdd Gobaith Cymru in 1922, and Plaid Genedlaethol Cymru in 1925 were established and in 1938 people signed a petition for the Welsh language to be given equal status in public administration and the courts. These were followed by a group of parents who successfully established the first Ysgol Gymraeg (Welsh School) in 1939. By 1944 the Education Act stated that the local education authorities (LEAs) were to meet parental demand and open Welsh-medium (WM) schools that were primarily aimed at those from Welsh-speaking (L1 Welsh) homes. However, from the 1960s, first language English speakers were beginning to be attracted to WM education for various reasons such as Welsh being the family's heritage language, the high quality education offered in WM schools and the increasing status of the Welsh language in industry (Williams and Morris, 2000; Jones and Martin-Jones, 2004). By the 1970s WM and bilingual education was firmly rooted and widely established (with regional variation) in Wales (Jones and Martin-Jones, 2004).

The 1980 Education Act 'obliged' LEAs to allow for parental choice which, according to Reynolds et al (1998) cited in Jones and Martin Jones (2004), ensured that responding to the wishes of parents for WM education went from being 'permissible' to 'obligatory'. The 1986 Education Act then gave head teachers and governing bodies more financial control and parents and local communities some power on governing bodies. The Education Reform Act (1988) made Welsh a core subject for those attending WM schools, and a foundation subject to be learned by all other children between 5 and 16 years old. By the end of the 1980s Welsh had a firm place in the Education system, with WM schools increasing and the Welsh language introduced in the majority of non-WM schools.

The Welsh Assembly Government is committed to supporting and promoting the Welsh language. Our vision of a truly bilingual Wales is a bold one. A truly bilingual Wales means a country where people can choose to live their lives through the medium of either or both Welsh and English and where the presence of both languages is the source of pride and strength to us all

(Iaith Pawb, 2003)

Welsh-Medium education is now embedded into the Welsh education system (Lewis, 2009) with 51,244 children attending WM education in the 419 WM primary schools in Wales in 2010 (Welsh Assembly Government, 2010/2011). Primary education in Wales is now banded according to five categories by the language of instruction (See Table 2):

- (i) Welsh-medium primary school: Welsh is the medium of instruction for at least 70% the curriculum and the day-to-day business of the school. The expectations are that pupils will transfer to Welsh secondary provision, regardless of home language, and by Key Stage (KS) 2 will have reached standards in English equivalent to pupils in EM schools. There are 434 of these schools in Wales.
- (ii) Dual stream primary school: WM and EM medium provision exist side-by-side. The WM provision aims to be equivalent to (i) and EM provision equivalent to (v).
- (iii) Transitional primary school: Welsh is the medium of instruction for between 50 and 70% of the curriculum. It is expected that some pupils, particularly those from L1 Welsh homes are able to transfer to WM secondary schools, and all children by KS 2 will have reached standards in English equivalent to those in EM schools.
- (iv) Predominantly English-medium primary school with significant use of Welsh: Pupils experience both Welsh and English in the Foundation phase with greater emphasis on English. English is the primary medium of teaching and learning with Welsh used for 20-50% of the overall curriculum. It is expected that pupils transfer to EM secondary provision and will have enhanced Welsh language skills.
- (v) English-medium primary school: English is the main language for teaching and learning and Welsh is taught as a second subject at KS 2. It is expected that the pupils transfer to EM secondary provision and continue Welsh as a second language.

(Welsh Assembly Government: Department for Children, Education, Lifelong Learning and Skills (DCELLS), 2007, pp.12-14)

Table 2 Number of schools across Wales according to each of the 5 categories (Welsh Government: StatsWales, 2012-2013, accessed 29/5/14)

<b>School Type</b>	<b>Welsh-Medium</b>	<b>Dual-Stream</b>	<b>Transitional</b>	<b>Predominantly English</b>	<b>English-Medium</b>
Number	434	212	6	44	1,043

According to the Welsh Government’s strategy to create a “bilingual Wales”, WM education (and the WM stream in the dual stream category) is considered effective in producing fully bilingual pupils in WM schools. There is however an increasing body of research questioning and exploring the efficacy of WM education in producing fully fluent Welsh-English bilinguals (e.g., Thomas & Mayr, 2010) and the practices that are adopted by schools to achieve this bilingual goal (e.g., Lewis, 2009).

As noted previously, WM education was originally established to serve L1 Welsh speakers, however schools now serve children from diverse linguistic backgrounds. Many children, particularly in South-East and North-East Wales come from homes where English rather than Welsh is their first language (L1). By contrast, in Gwynedd, approximately 50% of children attending WM education receive Welsh at home (Lewis, 2009). Lewis (2009) also notes that the ratio of L1 to L2 Welsh speakers in WM schools across Wales varies within counties throughout Wales which has implications both for teaching methods (e.g. language maintenance or language immersion) and for teacher training.

According to Lewis (2009) policies and practices designed to achieve bilingual proficiency vary from area to area across Wales. Lewis, Jones and Baker (2012) argue that such variation in practices is necessary to meet the linguistic experiences of the children and the linguistic profile of the area. Lewis, Jones and Baker (2012) also argue that variation in policy and practice is likely to be necessary to meet any other additional needs the children may have (e.g. cultural needs, special educational needs), but they note that there is as yet almost no research in Wales on this issue.

### **2.3.1 Efficacy of Welsh Education**

Local education authorities and the Welsh Government often note that bilingual education is effective in producing bilingual individuals, as have a number of researchers cited its efficacy (Williams, 2002; Gathercole, Mueller, Thomas, 2009). Martin-Jones (2004) however notes that Welsh education works when the linguistic structure of the school (Welsh) reflects the linguistic structure of the area e.g. Gwynedd or Anglesey where there is a high percentage of Welsh speakers whereas other instruction techniques such as ‘translanguaging’ may provide strategies which incorporate the ‘natural use’ of language into the classroom for areas with fewer L1 Welsh speakers.

There are however a number of factors beyond education which influence Welsh-English bilingualism such as the home language of the child, their social circle, language use outside of school; all of which are areas which need further research exploration. The aim of this thesis is to explore the impact of home language on the linguistic and cognitive skills of children with moderate learning difficulties, in the hope of providing evidence towards evidence-based practice in Welsh-medium education.

### **2.3.2 Welsh Medium Education and Special Educational Needs**

Since the establishment of the first Welsh school in 1947, Welsh-medium (WM) education has grown rapidly and is open to most children between the ages of 5 and 16 years. By 2011/2012, 419 of the 1435 primary schools were classed as WM (29%) which is an increase of 17.7% since 1999. Welsh Medium education now has a firm place in Wales and is at the heart of many Welsh language policies and legislation to promote and stabilise the number of Welsh speakers. The Welsh Assembly’s (2001) ‘Plan for Wales’, for example, not only aimed to stabilise the proportion of Welsh speakers and sustain growth but also to increase the number of Welsh speakers with the sharpest increase aimed to be amongst young people.

WM education now serves children from diverse linguistic backgrounds; that is, children from Welsh speaking homes (L1 Welsh), English speaking homes (L1 English) and children where other languages are spoken at home (e.g., those with English as an Additional

Language (EAL)). However, in addition to this linguistic diversity, teachers must also respond to the diverse educational needs of students in WM education.

Wales' inclusion policy calls on schools to "*adopt as a matter of law or policy the principle of inclusive education, enrolling all children in regular schools, unless there are compelling reasons for doing otherwise*" (Welsh Assembly Government 2006, cited from UNESCO, 1994). Children with SEN are therefore included in WM mainstream school if the mainstream setting can accommodate their needs, and the parents wish for them to do so. Conversely, WM special education provision is far less available than WM mainstream provision which may have implications for the parents' decisions as to the education of their child. Parents may consequently find themselves in a situation where they must decide whether their child attends a WM mainstream school (and is therefore raised bilingually) or attends an EM special school for specialist provision. The SEN code of practice (Welsh Assembly Government, 2002, p.4) states that "*specialist services should be provided for children with SEN who speak Welsh or are educated through the medium of Welsh*", however, the document goes on to note that L1 Welsh speakers who attend EM special schools should be provided with a Welsh speaking Learning Support Assistant (LSA). Not only does this policy potentially exclude children (who are not L1 Welsh) in EM special schools from receiving a bilingual education, but this may also have implications for the diversity of educational needs in Welsh mainstream education whereby parents are forced to make a decision based on whether their children receives their education in a special school which is most often English.

In addition to this, despite an ever growing emphasis on inclusive practices in mainstream education, particularly in WM education, it is well attested that educational professionals in England and Wales feel there is a lack of sufficient resources and training in mainstream education to effectively manage the diverse needs of their pupils (GTCW, 2012). This in conjunction with the diverse linguistic needs in WM education may consequently impact upon the ease of which teachers meet the needs of pupils within their classroom, particularly those with SEN.

In spite of growth in the number of children attending WM education the Welsh Assembly Government's 2001 document, 'Acknowledging Need' acknowledges a lack of similar increase in SEN services through the medium of Welsh to the growing needs of WM

education. For example, the document notes a need for professionals that are able to complete the statutory statementing in Welsh, particularly as there were some cases where parents were advised to change the language of the home, or to consider Welsh as an additional part of their child's 'problems'. The lack of WM testing materials and lack of professionals sufficiently qualified to use them was also raised as an issue. A number of recommendations regarding bilingualism and SEN were made, however a key recommendation in the Acknowledging Need paper was the need for increased reesearch into this area which would inform policy and practice (p.18).

In the past decade it has become clear that the lack of appropriate bilingual resources is not just an issue for Wales, but also for other bilingual nations; and the lack of adequate testing materials based on bilingual/cultural norms, suitably qualified professionals and lack of empirical evidence has particularly impacted the identification of children within the MLD category. Literature from the U.S. often notes the over- and under- representation of bilinguals who are believed to have an intellectual disability (ID), and this quite often due to the lack of research or suitable testing materials which are based on monolingual norms. For example, Rodriquez (1988) suggested that Mexican Americans are likely to be over-represented in the Mild ID category whereas Donovan and Cross (2002), following the analyses of U.S. Government surveys suggest that Latino students are under-represented in this category. More recently in the U.K, Lindsay et al (2006) cited evidence that Irish travellers or Roma heritage pupils are over-represented in this category and concluded that these kinds of disproportinality are a symptom of "cultural and historical processes" and that these areas should be used to inform policy making, educational practices and lead to significantly improved educational outcomes for students from these groups.

To inform practice and the categorisation of children with an SEN, the literature frequently acknowledges that the assessment of bilingual proficiency should be considered in the assessment of SEN (Cline and Frederickson, 1999). The SEN code of Practice (2002, p.45) states that the exposure a child has had to both languages should be considered, as does the National Assembly for Wales' Policy Review of Special Educational Needs (2004) note that

when children and young people who have English and Welsh make slow progress, it should not be assumed that inadequate language proficiency is the only reason; they may have some form of learning difficulty (p.36)



Older literature from the U.K however suggests that this is not happening in practice and there is less recent empirical evidence to suggest that it has been happening in recent times. An analysis by Curnyn et al (1991) cited in Cline and Frederickson, (1999) noted that in 35 school reports on children with MLD and EAL, only half of those mentioned language whilst describing the child's difficulties. Only two thirds of psychologist reports mentioned EAL or bilingualism in their reports, only in half of the cases did the psychologists indicate that they had assessed the child's first language and only one fifth mentioned that the child's difficulties should be interpreted in light of their 'bilingual and bicultural status'. Similarly, Desforges (1995) cited evidence that over 90% of the Educational Psychologists in the study used standardised tests whilst fewer than 30% of them made reference to the difficulties in interpreting the results on bilingual children. It appeared that even though the Educational Psychologists were aware of the difficulties in bilingual assessment, few of them used this knowledge to inform their practice. In one US study, it was also noted that issues such as educational attainment and behavioural difficulties in bilingual children took precedence in multi-disciplinary meetings, yet language issues often remained unconsidered or not discussed (Harry and Klinger, 2006). On the other hand, Cline and Shamsi (2000) in a literature review titled 'Language Needs or Special Needs' document throughout that academics often cite the need to take language background and cultural experiences into account however, Cline and Shamsi go on to acknowledge that important background information, such as the child's L1, is frequently omitted.

It is therefore evident from this brief introduction that little is known about the impact of bilingualism and SEN, and to ensure informed practice more research is needed. This is particularly true of all bilingual nations and those with bilingual education systems however the emphasis of this thesis will be placed on Wales and the Welsh-English education system (referred to as WM education). The number of WM students is increasing, as is WM education being endorsed in line with Welsh language strategies to increase the number of Welsh speakers. This thesis will consequently explore some key issues regarding SEN and and Welsh-English bilingualism.

To explore these issues a number of databases were systematically searched and a comprehensive list will be provided at the beginning of every relevant chapter.

## **2.4 SUMMARY**

Welsh and English now co-exist in a minority-majority relationship in Wales with English being the more dominant of the two. Nevertheless, WM education uptake is increasing and children are being immersed in the Welsh language across all aspects of their education, except English language instruction which begins at year 3 (age 6-7). Despite this, little is known about how bilingual education in Wales affects children with MLD which may consequently impact upon teachers' and parents' abilities to respond to the needs of these children in WM Education.

This chapter has outlined the rationale for the research reported in the remainder of this thesis, and detailed the development of the Welsh language and the Welsh-English education system in Wales. The following two chapters will provide working definitions for bilingualism and moderate learning difficulties as both concepts are complex, inconsistent and used with interchangeable terminology.

## **3 AN OVERVIEW OF BILINGUALISM AND BILINGUAL EDUCATION**

### **3.1 OVERVIEW**

The aim of the following, brief chapter is to discuss some core issues and complexities regarding the definition of bilingualism and bilingual education and to provide a working definition of bilingualism. The ultimate aim is to provide a clear outline of bilingual education in Wales.

The following terms related to bilingualism were searched: dual-language, EAL, bilingual(ism), second language, immersion, first language, second language, transitional, English as an additional language (EAL), Hispanic, two languages. The following terms related to bilingual education were searched: bilingual education, immersion, transitional, dual-stream, education,

Using these search terms, the following databases were searched: ERIC, Linguistics and Language Behavior Abstracts, PsychARTICLES, PsycINFO, Web of Science, Google Scholar, JSTOR Archives, Harvard Graduate School of Education, CINAHL. Local authority websites were also included such as those of Gwynedd Council, Flintshire Council, and the Vale of Glamorgan Council to explore education policies of relevant counties as was the Welsh Government website.

### **3.2 THE COMPLEXITY OF BILINGUALISM**

Bilingualism is a complex and multifaceted construct that varies between individuals, communities, and countries. While there is a general agreement that bilingualism involves the acquisition of two languages, there are a number of related factors which dictate the degree to which both languages are acquired and there are a number of different approaches to classifying bilingualism.

The impact of bilingualism and bilingual education on cognitive, linguistic, educational, social and cultural development are matters that are widely researched and have undergone

significant shifts in perspectives since the beginning of the 20th Century. While concerns exist regarding the impact of bilingualism on the individual, their close environment and society, Gajo and Serra (2002) noted that there are four main questions facing bilinguals which are often discussed in the literature. All of these are pertinent issues in bilingual education and answers to these questions would enable parents to make informed choices and schools decisions based on teaching and learning practices in bilingual schools.

- “1. The L1 Problem: Will the first language develop normally despite a significant amount of instruction time being conducted in another language?
2. The L2 Problem: Will the second language really develop better if a significant amount of instruction time is conducted in it?
3. The Subject Problem: Does the second language complicate the subject learning and slow down progress in the curriculum subject?
4. The Sociopsychological Problem: Is bilingual education appropriate for all students?”

(Gajo and Serra, 2002, p.3)

To enable questions regarding bilingualism to be answered they must be answered in relation to particular ‘kinds’ of bilingualism and take into account variables which may affect the development of issues being explored between individuals. For example, to measure bilingual language development one must take into account factors such as language exposure, language use, and age of acquisition as it cannot be assumed that all bilinguals (or likewise monolinguals) have the same linguistic ability or proficiency.

This issue of controlling for factors that influence ‘bilingualism’ becomes increasingly complex when considering variables between the individual, environment, and schooling, all of which are complex issues facing all bilinguals today. Bilingualism in Wales is just one example of a complex linguistic situation and it is felt that to truly appreciate the research and the implications of the research within this field, the worldwide complexity of this field must be considered.

### 3.3 BILINGUALISM

Bilingualism works along a continuum with over-lapping and interacting dimensions such as language ability and use, language dominance, age of acquisition, and language typology.

Bialystok (2005) notes that bilingualism is not a “categorical variable” and there is no formal assessment of bilingualism which enables us to classify it on an “*absolute scale*” (p.19).

Grosjean (2008, pp.34-35) describes 6 functional categories that incorporate some of the most important dimensions in describing a bilingual: (i) Language history and language relationship, (ii) Language stability, (iii) Function of languages, (iv) Language proficiency (v) Language modes (vi) Biographical data. All of these interact to form particular ‘kinds’ of bilinguals and are factors which should be considered in bilingualism research.

Baker (2011) notes that if an individual is asked whether they speak two languages, the question is mostly ambiguous, as the individual may well be able to speak two languages but may only use one as part of everyday use. Similarly, someone else may only be able to speak fluently in one language and read and write in another. This is where the distinction between language ability (or proficiency) and language use (function) is important. Some bilinguals may be equally proficient in their receptive and productive abilities in both languages, whereas others may be stronger in one than the other, which is often referred to as language dominance. This language use and ability debate is quite often at the root of definitional issues. While Grosjean (2010) suggests that a definition of bilingualism should place emphasis on the use of languages rather than ability in the languages, others suggest that language proficiency is more important as this delineates the boundary between a bilingual and a ‘language learner’. This definitional issue becomes particularly apparent in the educational literature whereby some researchers, refer to young immigrant children (from minority home language settings) attending a majority language school as having ‘English as an additional language’ (EAL) whereas the psychological literature is more likely to refer them as early or late ‘sequential bilinguals’ where they have developed/are developing an L2 after their L1.

Similarly, the functional use (domain specificity or contextual use) of languages may result in vocabulary specificity. This contextual issue is particularly relevant for children being educated through a minority language (e.g., Welsh) where a majority language (e.g., English) also exists. For example, in the classroom, the child’s use of Welsh may be greater for

educational purposes whereas the majority language may serve best in social surroundings, such as the playground or in social activities with friends. When assessing bilingual children's linguistic abilities it is frequently reported that the areas of assessment should accurately reflect the settings in which the languages are used.

Age of acquisition also plays a part in the continuum of bilingualism and interacts with related factors such as language ability, and contextual issues. Simultaneous bilinguals are described as having learned both languages at the same time from birth whereas sequential bilinguals learn a second language after approximately age 3. Some research also uses age of acquisition to differentiate between a proficient bilingual and a child with EAL or ELL (English Language Learner).

Regardless of definitional issues, it has long been debated whether there is a critical period for first and second language development (e.g., Birdsong, 1999; Bialystok and Hakuta, 1999) a number of studies have indicated that native-like abilities are achieved with sufficient exposure before the age of 6. After this age, some decline may be found in grammatical ability, a foreign accent may be evident and neuroimaging studies have indicated that there may be a "*neural signature*" or differential brain activation based on the age of acquisition (Hernandez, Martinez and Kohnert, 2000; Hernandez and Li, 2007). Nevertheless, measuring the (successful) acquisition of two languages is done in different ways with some arguing that equal proficiency in both languages is important whereas others argue that functional use is most important, meanwhile some believe that reaching monolingual-like abilities is most important to the successful acquisition of both languages.

It is therefore clear that bilingualism is a multi-dimensional construct working on a continuum and its impact on the individual varies according to individual, social and linguistic variables. It has become increasingly evident that research on bilinguals needs to embed factors such as age, proficiency, and the linguistic functions they are required to carry out.

### **3.4 A WORKING DEFINITION OF BILINGUALISM**

For the purpose of the literature review, a broad brush approach will be adopted which is inclusive of all kinds of bilingualism and bilingual education, where the individual has

acquired but may or may not be using two languages frequently in various contexts (e.g. socially/educationally). It is relatively uncommon for researchers to consistently give sufficient detail about the bilinguals in their research along the dimensions noted in the former section, however where details are given they will be included in the literature review. The terms used in the cited papers will be used during this literature review to ensure clarity and consistency.

### **3.5 BILINGUAL EDUCATION**

Baker (2011, p.207) describes 'Bilingual Education' as a "simplistic label for a complex phenomenon" that does not distinguish between (i) an education that uses and promotes two languages, (ii) a monolingual education in a child's second language (i.e. language minority situations), (iii) a classroom that fosters bilingualism or (iv) education where bilingual children are present but does not promote bilingualism.

To accommodate such variability in bilingual education Baker (2011, p.209) summarises 10 kinds of bilingual education (see Table 3) according to language use in the classroom and the language background of the child, Table 3 Different forms of bilingual education (adaptation from Baker (2011). Garcia (2009) however notes that there are other situational (i.e., political, economic, linguistic, cultural and social factors) and operational (i.e., curriculum, parental involvement, attitudes and resources) factors which may direct the bilingual education programme that is most appropriate and may reflect qualitative differences in the way bilingualism is 'treated' (or not treated) in the classroom. In Welsh-medium schools in Wales, for example, the WG defines these schools according to Welsh language provision however anecdotal and some research evidence suggests that these situational and operational factors dictate qualitative differences in the provision of both languages. For example, despite Welsh-medium education adopting a primarily monoglossic approach to education for a range of situational reasons (see section The Welsh Language2.2 on the history of the Welsh language), the number of children from English home language backgrounds may dictate the amount of English used in the predominantly Welsh language classroom. Williams (1998) in his study of Welsh-medium schools in the North-West and South-East also found evidence to suggest that English was introduced at different times in schools according to the language situation in their locality. Situational and operational factors are also evident elsewhere; for example, language policy in certain states of the USA such as California, Arizona and Massachusetts mean bilingual education is illegal.-In other countries, limited

bilingual education is offered outside of particular areas (e.g. only certain states of Canada offer bilingual French-English education), and others are “*indifferent*” i.e. bilingualism is largely ignored (e.g. in England) (Garcia, 2009, p.300). While these factors are important to note as they account for the variability between educational programmes, this topic is extensive and beyond the scope of this research. For more information, these situational and operational factors are discussed in depth in Garcia (2009, pp. 294-320).



Table 3 Different forms of bilingual education (adaptation from Baker (2011))

<b>Type of Bilingual Education'</b>	Typical Type of Child	Language of The Classroom
<b>Mainstreaming/Submersion (structured immersion)</b>	Language Minority	Majority Language
<b>Mainstreaming/Submersion (with withdrawal classes/sheltered English/content- based ESL</b>	Language Minority	Majority Language with minority language pull-out L2 lessons
<b>Segregationist</b>	Language Minority	Apartheid
<b>Transitional</b>	Language Minority	Moves from Minority to Majority language
<b>Mainstream with Foreign Language Teaching</b>	Language Majority	Majority language with L2/FL lessons
<b>Separatist</b>	Language Minority	Minority Language (out of choice)
<b>Immersion</b>	Language Majority	Bilingual with initial emphasis on L2
<b>Maintenance/Heritage Language</b>	Language Minority	Bilingual with initial emphasis on L1
<b>Two way/Dual language</b>	Mixed Minority and Majority	Minority and Majority
<b>Mainstream Bilingual</b>	Language Majority	Two Majority Languages Pluralism

### 3.6 WELSH EDUCATION IN WALES

As noted in section 2.3, primary schools in Wales are categorised into five categories according to language provision (i) Welsh-medium education (ii) Dual stream (iii) Transitional (iv) Predominantly English medium provision with significant use of Welsh (v) Predominantly English medium provision. In the first three categories, the expectation is that the children will be able to transfer easily to Welsh medium secondary provision and will have reached a standard in English equivalent to that reached by pupils in predominantly English medium schools despite receiving 70% or more of the curriculum through Welsh. For those in the last two categories, the expectation is that the children will readily transfer to an English medium secondary and continue to learn Welsh as a second language as a compulsory stand alone subject (Welsh Assembly Government, 2007). It is generally accepted that based on Welsh education in these English-medium schools, the pupils do not leave school as fluent Welsh speakers.

To add to this complexity, not all categories of school are present in all counties in Wales. Gwynedd in North West Wales, for example, only provides Welsh medium instruction until the end of primary school which they believe develops “*balanced, age related bilingualism, to enable them to be full members of the bilingual society of which they are part*” (Gwynedd, 2011) and a similar policy operates in the neighbouring county of Môn (Anglesey). Conversely, Conwy, and Powys, which also border Gwynedd, and other counties around Wales (e.g. Flintshire, Denbighshire, Vale of Glamorgan) provide the choice of both, Welsh-medium or English-medium instruction.

As noted in the previous chapter, in Wales all parents are entitled to choose the language of their child’s education<sup>1</sup> and as a consequence, children from a range of linguistic backgrounds attend Welsh medium education – with the ratio of L1 to L2 Welsh speakers varying around schools in Wales. Lewis (2008) details the complexity of Welsh medium education and highlights that teachers in Welsh medium schools are expected to meet the linguistic needs of children from variety of language backgrounds, all within the same classroom. The extent to which teachers are meeting the needs of pupils in the bilingual

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<sup>1</sup> This statement conflicts with the earlier statement that parents only have the option of primary Welsh-medium education in Gwynedd however, parents may choose to send their children to English-medium primaries in near by counties.

classroom is unknown, but research on linguistic and cognitive development is beginning to inform this issue (e.g. Gathercole and Thomas, 2010; Rhys and Thomas, 2012). See chapter 6 for more information.

### **3.6.1 Welsh-English Bilingualism**

The Welsh Assembly Government's (2007) document 'Defining schools according to Welsh Medium provision' states that children in receipt of Welsh-medium instruction of more than 70% should reach a "standard English equivalent to that reached by pupils in predominantly English medium schools" (p.8.) however; no mention is made of the expected Welsh language levels that should be achieved. While it is assumed that pupils achieve competency in both languages no known research prior to this document being released explored the Welsh or English language abilities of those in Welsh-medium education. On the other hand, the English-medium schools are believed to develop fluent English language skills in pupils and only second language abilities of Welsh language. Again, there is little- to no-research in this area.

As a result of the different types of schools based on language provision, Welsh-English bilingualism varies significantly across Wales, with pupils achieving Welsh-English bilingualism to differing degrees. It is also accepted that other factors such as home language, environment and the media affect linguistic development.

Consequently, one important aspect of this research is to explore the Welsh and English linguistic abilities of typically-developing children and children with MLD, in Welsh medium education, from varying home backgrounds to reflect the diverse nature of Welsh medium schools.

The next chapter discusses moderate learning difficulties as this, along with bilingualism, is another key focus of this research. The chapter will aim to convey the complexities related to this area of SEN and provide a working definition which will be used for this research.

## 4 AN OVERVIEW OF MODERATE LEARNING DIFFICULTIES

### 4.1 OVERVIEW

Many pupils labelled as MLD have no known organic cause for their learning difficulties. There have been relatively few systematic studies of the learning characteristics of these pupils and problems in defining this pupil group have been widely acknowledged.

(Lewis & Norwich, 2000, p.2)

Moderate Learning Difficulties (MLD) is estimated as being the most common learning difficulty. Approximately 34% of children assessed as having an SEN in Wales are registered as having MLD. This is a far larger proportion than for any other individual disability (e.g. Dyslexia (5.4%) severe learning Difficulty (0.8%), Behavioural and Emotional Difficulty (10.8%)) (Wales.statswales, 2010/11). Despite the prevalence of MLD, research into this field is limited and database searches return a limited number of hits compared to those for other (sometimes less prevalent) learning difficulties. For example, a search for “moderate learning difficulties” on the science direct database (19/01/2010) returned 130 articles compared to that of “downs syndrome” which returned approximately 727 articles.

There are a number of issues discussed in the literature that may account for the lack of research, issues such as: the lack of consistent terminology and definition, unknown cause of MLD and the variability of needs associated with MLD, lack of agreement between professionals as to the factors that are used to identify MLD and the association with socio-economic status (SES) (Johnston, 1998). Therefore, the aim of this chapter is to discuss some core issues regarding the definition of MLD and to establish a working definition to be used in this study. This is seen to be an essential first step, as the definition adopted will potentially affect both the range of literature reviewed, and who is included in the study.

#### **4.1.1 International Variation in Categorising and Defining Moderate Learning Difficulties**

In a large body of research, the Organisation for Economic Cooperation and Development (OECD) undertook a survey of incidence and indicators used by different countries to classify children with disabilities, difficulties and disadvantage. Their findings indicated that countries, internationally define special educational needs (SEN), not only as those who “may be included in the handicapped categories” but also those “who are failing in school for a wide variety of reasons” (OECD, 2000, p.8; 2008). The OECD recognises three new categories of SEN which are summarised below:

- (i) Category A: educational needs where there is substantial normative agreement, such as blind or deaf, severe and profound mental handicap...In organic pathologies.
- (ii) Category B: educational needs of students who have difficulties in learning which do not appear to be directly or primarily attributable to factors which lead to categories A or C.
- (iii) Category C: educational needs of students which are considered to primarily arise from socio-economic, cultural and/or linguistic factors.

(OECD, 2000, p.9; 2008)

The OECD (2000) indicated that definition and categorisation of moderate learning difficulties (MLD) differs between countries. Of the three categories, some countries such as France, considered moderate mental handicap to be in a category where there was normative agreement, similar to severe and profound intellectual disabilities (Category A) while others (e.g., Hungary) considered MLD to be within Category B (see pp.31-34 for further discussion of countries’ classifications).

The OECD report also noted variations in the IQ range included within the category, with some countries considering MLD to be between 50 and 70 and others between 50 and 85. Some countries (i.e. USA) also place more emphasis on the use of cognitive measures such as IQ to identify children with MLD, a method which has widely reported to, alone, have a number of limitations. Since the 1960s, the use of IQ as a measure of MLD has been a topic of controversy due to the assumption that IQ is innate, consistent for each individual and a

testable characteristic. Norwich & Kelly (2005) in their book list nine criticisms over the use of IQ as a method of identifying children with learning difficulties which reduce the credibility of IQ testing.

1. *IQ tests have a limited measure of the functioning of people with intellectual disabilities (Ryan 1972), leading to the measures of social competence – a version of the wider criticism about abilities that IQ tests do not measure*
2. *IQ tests assume innate fixed intellectual abilities that ignore development of acquired abilities from genetic-environmental interactions.*
3. *IQ tests are not measures of abstracted cognitive abilities; they measure performance, which is determined by the interaction of contextual and personal factors, with cognitive as one of several factors – leading to the development of dynamic or assisted forms of assessing intellectual abilities (Feuerstein, 1979; Haynes, 1971). This is a version of the wider criticism that IQ tests have been misinterpreted as measuring innate intellectual abilities.*
4. *IQ tests assume general intellectual abilities and ignore distinct areas and kind of intelligence – leading to multi-dimensional models of abilities (Guildford, 1967; Gardner, 1993).*
5. *The historic standardisation of IQ tests did not include children from less advantages and ethnic backgrounds, so identifying disproportional numbers for these groups as below thresholds*
6. *IQ test reliability (the margin of error in IQ score and the consistency of scores over time) and validity in predicting future learning outcomes have been exaggerated.*
7. *IQ tests depend on quantification that required the use of standard procedures outside ‘real’ contexts – leading to contextual and teaching assessment methods based on qualitative descriptions of abilities (Vygotsky, 1978; Feuerstein, 1979; Gardner, 1993).*
8. *IQ tests have been used for high-stakes decisions about placements in stigmatised special schooling based on biased and erroneous assessment of potential for future attainments.*
9. *IQ tests provide limited useful and practical evidence about how to teach children with learning difficulties – leading to the development of curriculum based assessment methods (Ainscow and Tweddle, 1978; Solity and Bull, 1987).*

*Norwich & Kelly (2005, p26)*

In the UK at present the measurement of cognitive ability for special education policy and practice are not used however whereas MLD is defined in more practical terms such as ‘child has difficulties understanding concepts’ (DfES, 2003). For educational psychologists however, the measurement of cognitive ability still plays a key role in the assessment of SEN in Britain and contributes to a statement being issued.

Although cognitive measures such as IQ tests are used as a method of identification by some countries such as the USA this may cause inconsistencies and difficulties in interpreting the literature particularly in relation to Britain where standardised measures of assessment are

less frequently used for identifying children with MLD, and there is more reliance on the identification of children with MLD due to underachievement across most areas of the curriculum.

### Terminology

Another notable feature of the OECD (2000) paper, and the literature in general, is inconsistencies in terminology used for the same (similar) group of children. Internationally there appears to be an overlap between the use of mild and moderate to refer to Britain’s category of MLD (see Table 4. Examples of some international classification systems). For example, children referred to as having ‘moderate learning difficulties’ in England and Wales would be regarded as having mild learning difficulties in Ireland. Similarly, until recently the USA referred to those with learning difficulties as having a mental retardation which has since been changed to intellectual disability. Other terminologies noted in the OECD (2000) paper were mild mental impairment, mild mental handicap, and educable mentally handicapped and light mental handicap (see OECD, 2000, pp.31-34 for more terminologies).

Table 4. Examples of some international classification systems

	<b>England and Wales</b>	<b>Republic of Ireland (ROI)</b>	<b>DSM-IV</b>	<b>ICD-10</b>
<b>Mild</b>	70-75 to 85	50 to 69	50-55 to 70	50 to 70
<b>Moderate</b>	50 to 70-75	35-49	35-40 to 50-55	35 to 49

The OECD paper shows clearly the international inconsistencies in this category which add to the difficulties in identifying these children. This variation is likely to be a result of a number of issues related to moderate learning difficulties; these are discussed in the next section.

## 4.2 ISSUES ASSOCIATED WITH MODERATE LEARNING DIFFICULTIES AS A CATEGORY

Despite moderate learning difficulties (MLD) being widely recognised within a special educational needs context (Fletcher-Campbell, 2004), this is an area that, in recent years has attracted less interest than other difficulties such as emotional and behavioural difficulties, autism and specific learning difficulties (Norwich and Kelly, 2005). This is reported to be due to this area being poorly defined and the lack of agreement between professionals (Norwich

and Kelly, 2005; Male, 2010). At the root of this issue is believed to be whether these individuals have organic impairments more closely related to severe and profound learning difficulties or whether they are more like those who are underachieving for social-cultural reasons. A clear difficulty in the literature is disentangling the risk factors associated with MLD to indicate a causal relationship which may aid in the definition, classification and professional interventions for this group of children. Of the number of risk factors indicated in the literature, some 'genetic' factors will be discussed but the focus will be predominantly environmental issues as they are most prevalent in the literature and considered most relevant to this thesis.

#### **4.2.1 Risk Factors Associated with Moderate Learning Difficulties**

There is much argument surrounding the aetiology of moderate learning difficulties (MLD), reflecting that this is indeed a complex issue with little agreement. A number of factors however have been identified which correlate with the occurrence of MLD. These are heavily centred around social and environmental factors such as socio-economic status, cultural and familial factors.

#### **4.2.2 Socio-Economic Status and Familial Factors**

Research has consistently demonstrated that individuals of low socio-economic status are over represented in the moderate learning difficulty category (Cooper and Lackus, 1984; Kiely, 1987; Yeargin-Allsopp, Drews, Decoufle and Murphy, 1995) and this is consequently considered a significant risk factor for moderate learning difficulties. While no countries in the OECD study placed MLD within Category, C (difficulties arising from socio-economic, linguistic and cultural factors), there is extensive research to indicate a strong relationship between mild to moderate learning difficulties (LD) and poor attainment and social deprivation (Emerson, Hatton, Robertson, *et al* 2011). For example, approximately 55% of children with MLD in England in 2009 were eligible for free schools meals compared with the national average of 18.11% (DCSF, 2009a, 2009b) (unfortunately no comparable data is available for Wales).

Croll (2002) in his analysis of social deprivation and special educational needs collected data from 46 primary schools in England. The data revealed a positive correlation between poverty and levels of SEN and a significant positive relationship between social deprivation and educational attainment. It was found that the schools with the highest proportions of



children receiving free school meals (FSM) were also achieving the lowest levels (e.g., at year 6 children had not achieved level 4 in their SATs). Croll (2002) also notes that while social deprivation is a strong predictor of attainment and a moderate predictor of SEN, it cannot address causality. However, Mortimore & Whitty (1997) in an extensive review of data concluded that even when attempts were made by teachers and schools to compensate for social disadvantage and raise achievements, the relative differences between children from poor and more affluent families remained the same. While the extent to which these factors can be dissociated from socio-economic status is unknown, maternal education (Decoufle and Boyle, 1995) has also been found to be associated with MLD.

Research has also highlighted the inequalities in the representation and provision for MLD compared to other areas of SEN. Mittler (1999), with a more specific focus on special needs suggested that although there is a large body of parents and professionals representing sensory and movement difficulties, dyslexia and autism, there is little representation in regard to children with MLD who are the largest group of those with special needs. Furthermore, Croll & Moses (2000) found that areas which were recognised as socially deprived were ill-equipped to effectively input into the LEA's policy making. The inequality in provision and representation however has also been portrayed at a financial national level. Evans, Bronheim, Bynner, Klasen, Magrab and Ranson (no date) graphed the proportion of children in the OECD's 'Category C' (i.e., where difficulties arose from socio-economic, linguistic and cultural factors) who received additional resources to access the curriculum. Across the 19 countries observed, the UK allocated no money to children in Category C but instead the children in category B (i.e., difficulties in learning but where no particular reason can be identified) were allocated 83% of the overall 'additional resources'. Arguably, the OECD (classification system (OECD, 2000) does not reflect the UK's non-categorical system sufficiently, but on the other hand it may be indicative of particular groups of SEN being categorised in different ways. Norwich and Kelly (2004) also argue category B to be an amalgamation of the medical and social models of SEN which has a place in the provision for MLD – as opposed to the medical model alone (Category A) or social model alone (Category C).

As a result of these social-environmental influences, Tomlinson (1982) argued that MLD is a socially constructed judgement made by professionals as opposed to an innate quality within the child. This was primarily concluded by Tomlinson because of the disproportionate

amounts of children from working-class and Afro-Caribbean homes labelled as educationally sub-normal. It was on this basis that Tomlinson rejected the notion that children with MLD (or 'educationally subnormal', at that time) could be assessed objectively with standardised measures such as IQ tests.

Although these issues were raised decades ago, Norwich and Kelly (2005, p. 2) note that these socio-economic issues are challenges that still face social and educational policy and practice. More recent research for example notes cultural affiliation to be a significant factor in being identified as having a MLD. According to Artiles, Rueda, Salazar, and Higuera, (2005) in the USA black Americans have been over-represented in the MLD (or mild intellectual disability) group throughout the last four decades, despite speaking English, and in a British context Lindsay, Pather and Stand (2006) noted children from Irish traveller or Roma Heritage (Lindsay et al., 2006) to be over-represented in this category.

Evidence from intervention projects can be cited as evidence for the environmental influence on MLD. Zigler and Hodap (1986) for example noted that early social and educational intervention may enhance intellectual development but perhaps more importantly, researchers frequently note that with appropriate educational intervention and scaffolding children with MLD meet the requirements of the curriculum (Fletcher-Campbell, 2004).

### **Genetic or Organic Factors**

On the other hand, some researchers have considered genetic and organic factors to be a central part of MLD. That is, genetic factors may limit intellectual development thus affecting socioeconomic attainment (Weisz, 1995 cited in Weisz, 2014). Researchers also question the extent to which organic factors are attributable to MLD, similarly to severe and profound learning difficulties (Norwich and Kelly, 2005). Norwich and Kelly (2004) note that these perspectives are prevalent in international definitions with many of those countries who classify MLD in 'category A' reflecting this.

In this thesis, however, it is only intended to highlight issues and complexities surrounding the definition of MLD, in depth discussion of the aetiology/risk factors associated with MLD is an ongoing issue and beyond the scope of this thesis. Arguably, however, this group has 'no clear identity unlike those with genetic bases for their difficulties such as Fragile-X syndrome, and Down's syndrome.

### 4.2.3 Development or Difference

With no clear identifiable organic basis for moderate learning difficulties (MLD), researchers often question whether those with MLD develop similarly to their typically developing peers, only slower (i.e. developmental approach) or whether they develop differentially based on intrinsic/qualitative qualities (i.e. difference approach) which are beyond cognitive delay. Despite the developmental approach to learning difficulties dating back to the 1960s, researchers are still (to some degree) exploring how children with learning difficulties develop across cognitive, linguistic and behavioural domains. And while research into this approach most commonly focuses on genetic syndromes such as Down's syndrome, Williams syndrome and Fragile X syndrome (see Dykens and Hodapp, 2001 for a short review), this approach is arguably the most 'accepted' approach in the literature for children with "non-specific mental retardation" (i.e. moderate learning difficulties).

Zigler (1967, 1969 as cited in Hodapp & Burrack, 1990) when introducing the developmental approach initially only applied it to this "*non-specific*" group (which he called cultural-familial) and reasoned that children with "non-specific mental retardation" would develop in the same piagetian sequence of development as typically developing children, only slower (see Hodapp, 1990 for a review in support of this hypothesis) and therefore, if children with, and without learning difficulties were developmentally age-matched, similar cognitive/developmental abilities would be evident. While contemporary research into moderate learning difficulties is limited, this hypothesis has been supported in relatively recent research areas such as language development (Fazio, Johnston, and Brandl, 1993; Rosenberg and Abbeduto, 1993), mental health (Glick and Zigler, 1995) and executive functioning (Danielsson et al, 2012) who all found children with moderate learning difficulties to be performing at developmentally-age appropriate levels.

Second, Zigler (1967; 1969) reasoned those children with learning difficulties will not demonstrate particular weaknesses (or deficits) beyond their general lower levels of functioning when compared with developmentally-matched peers. This hypothesis has also largely been supported in earlier research (e.g. Kasari, Sigman, Mundy & Yirmiya, 1990; Weisz, 1990 cited in Weisz 2014) as children with MLD have been suggested to have 'general difficulties' in their adaptive and cognitive behaviour, but it has also been criticised

for its extreme position that piagetian stages of development are ‘horizontal’. That is, if a child showed stage IV object permanence, the child was also expected to show Stage IV levels on symbolic play and vocal and gestural imitation. Research by the 1970s showed that typically developing children had strengths and weaknesses in varying areas (Fischer, 1980) and indeed, research into the cognitive abilities of children with MLD has demonstrated that the abilities of children with MLD are comparable to those of their developmentally-age matched peers, but these findings become increasingly nuanced with the increasing exploration of sub-cognitive processes with children with MLD showing strengths and weaknesses in some areas when compared to developmentally-age matched peers (Danielsson et al, 2010).

### **4.3 MODERATE LEARNING DIFFICULTIES IN WALES**

Moderate learning difficulties (MLD) in Wales falls under the ‘Cognition and Learning’ category of SEN Code of Practice (2004). Though no definition appears in the SEN Code of Practice (Wales, 2004), the DFES’ (2003) document on ‘Data Collection by type of SEN’ noted five predominant features the child with MLD may present:

- greater difficulties than their peers;
- their needs aren’t met by the curriculum alone;
- other associated needs (e.g., social problems, language and communication);
- significantly lower attainment;
- they must be receiving additional support.

Though it is commonly reported in the literature that children with MLD will also have a standardised IQ score of between 50 and 70, little emphasis is placed on this measure in the UK unlike the USA where more emphasis is placed on such normative measures (Davis and Florian, 2004).

Children with MLD are predominantly identified in mainstream primary education, and of the 19,352 identified in Welsh mainstream schools, 3,976 had received a statement of needs, 4,539 were on school action plus and 14,241 were on school action (Welsh Assembly Government, 2010/11). The audit commission (2002) also noted that over a 5 year period the number of children identified as having MLD was not decreasing, like some other areas of SEN, however the number of statements for children with MLD had reduced by 13%.

Seventy-three per cent of the children with MLD in Wales are on school action and will have received an individual education plan from the teacher or special educational needs coordinator (SENCO). On one hand this is promising as it suggests that children are making adequate academic progress as a result of the adjustments made by the school but on the other hand it suggests that a large number of those children are on the lowest level of special educational needs support.

The distribution of children with MLD across educational programmes (i.e. school action, school action plus and statements) and the reduction of statements may have implications for the identification of children with MLD. That is, those on school action are identified primarily by those within the school (teachers or SENCOs) and do not receive external support. Norwich and Kelly (2004) note that leaving the identification of MLD to school professionals causes inconsistencies in the category between schools and between LEAs as children are most frequently compared to the peers in their school as opposed to the national norm. For example, in a more socially advantaged area where academic performance may be higher in some schools, those academically behind by 2-3 years may be labelled as having an MLD. However, a more socially deprived area may find that their schools' averages are similar to those children labelled with MLD in the suburban area.

Thomas and Davis (1997) claim that there is evidence that the assessment of professionals who are responsible for statementing are less norm-referenced and more within-school referenced than one would hope. As LEA SEN funding to schools is based on the number of children with statements, there is the possibility that resources are diverted from those who most need it. It is possible, they suggest, that children in higher achieving schools, which are usually more affluent socio-economic areas, may be more likely to be statemented than those whose overall performance is lower, but who are in lower-achieving schools, potentially in lower socio-economic areas thus displacing funds from those who need them (Thomas and Davis, 1997).

In addition to the identification inconsistencies within schools, Norwich and Kelly (2004) also found variation in the terminology used across LEAs in England and Wales. Their survey of 33% of the LEAs in England and 56% of LEAs in Wales found that only 79% of those LEAs used the term MLD and the others used a wide variety of terms such as learning difficulty, general learning difficulty, complex learning difficulty, developmental or learning

delay. They also found that LEAs used different criteria to define MLD. For example, 33.3% of the LEAs made reference to 'IQ or general cognitive ability' in their definitions and of the 33% only 13% of the LEAs made reference to only cognitive ability and none of the LEAs made reference to attainment. Twenty per cent of the LEAs defined MLD in terms of slow progress across all areas of the curriculum and of those, 11% mentioned that cut-offs were used whereby children's general attainment had to fall within the lowest 2-5% or 1-2% (see Norwich and Kelly, 2004, pp 140-141, 149-150 for more details).

The identification of MLD in Britain is complex and varies according to schools and LEAs. This variability in definition and terminology is not just limited to Britain; it has also been noted internationally. This will be taken into account when reviewing the literature.

#### **4.4 SUMMARY**

This chapter has identified the complexities associated with 'moderate learning difficulties' (MLD) as a category of special educational needs. It is evident that there is lack of clear and consistent definition with regards to this group for a number of reasons, such as unknown aetiology, unclear definitions and terminology – and this is one contributory factor in the lack of current and empirical research into this area of special educational needs.

Despite such complexities associated with this category of special educational needs, the development vs. difference argument of MLD is on-going, with much of the current (but limited) literature being most likely to discuss MLD from a developmental perspective. This perspective suggests that children with MLD perform comparably to their developmentally age-matched peers on cognitive and linguistic tasks - this is hypothesis underlying some of the methodology used in this research.

#### **4.5 WORKING DEFINITION**

For the purpose of the literature reviews, the following terminologies were included in the searches: Moderate learning difficulty, mild intellectual disability, moderate intellectual disability, mild mental retardation, developmental delay, learning disability, global delay general learning difficulty, special educational needs; and only literature referring to those who were reported to have (i) an IQ between 50 and 85 (ii) be underachieving across most

areas of the curriculum was included in the review. However in this thesis ‘moderate learning difficulties’ will be the term used as this is the term used in the SEN code of Practice for Wales (2002). Because socio-economic status is a significant risk factor in relation to MLD, this will be considered throughout the thesis.

In this research, children were classified as having an MLD in relation to the code of practice (2002) and current practices in schools. Therefore, children with MLD were included in this research if they were (i) identified by schools as having MLD as their primary need for being considerably behind their peers across most areas of the school’s curriculum, (ii) there were no other known disabilities/difficulties and (iii) were on an intervention programme (school action, school action plus or were statemented) (iv) had an IQ between 50-85. As not all schools in Wales use IQ scores to put a child with MLD on an intervention programme, schools were not asked for this information; this was measured independently by the researcher. See methodology for more details.

Chapter five details the historical background to the linguistic and cognitive research, which is the focus of this research. This is important because it provides the foundation for which this research is build upon. This is also important because there are clear trends in the literature when discussing the “impact of bilingualism”.

## **5 HISTORICAL CONTEXT OF BILINGUAL RESEARCH**

### **5.1 OVERVIEW**

Exploring the impact of bilingualism has long been a focus of research. While researchers concluded in the early 20<sup>th</sup> Century that there were significant disadvantages to intelligence as a result of bilingualism, current research is more likely to discuss the cognitive advantages (see section 10.4 for more details) and its linguistic impact (see chapter 6 or more details). This is likely to be due to advances in research methods.

The shifts in perspective in the literature will be discussed in the following section in relation to three stages: a period of negative effects, neutral effects and positive effects. Almost all of the researches in these areas were conducted on typically developing children and none on children with MLD with the exception of Rueda (1983).

### **5.2 A PERIOD OF NEGATIVE EFFECTS**

Early research into bilingualism mostly concentrated on the non-linguistic skills of bilinguals, with the exception of Leopold's (1949) research that logged linguistic development through diary keeping. Early research into bilingualism concluded that bilingualism had a negative effect on self-esteem, L1 academic abilities and caused mental confusion. Research between the 1900s and 1980s most frequently discussed the detrimental effects on cognitive development (e.g. Laurie, 1890; Saer, 1923; Smith, 1923; Darcy, 1953) with researchers such as Jespersen (1922 cited in Ivanova and Costa, 2008) stating that bilinguals had reduced brain power due to the management of two languages.

Saer (1923), in an early example of research into the effect of bilingualism, compared bilingual Welsh and monolingual English speaking children using the Stanford Binet test. Bilingual children were found to score lower on this measure of verbal intelligence test and were consequently branded with "mental confusion" and a stunted development of intelligence. Closely following Saer, Yoshioka (1929) tested a small sample of Japanese-American children on the National Intelligence test in English and Japanese and concluded "*bilingualism in young children is a hardship and devoid of apparent advantage*" (p.479).



These early research studies have however been criticised on a number of levels, and it has been noted that these methodological weaknesses can account for the negative findings. First, bilingual children were often tested in their weaker language and this quite often due to the limited availability of testing materials in a variety of languages or materials suited for bilingual populations. This issue is still a prevalent feature in the bilingualism literature with many bilinguals being tested using monolingual-norms. Although there has been considerable progress in assessing bilingual learners, there is still a disproportionality of bilingual children in SEN categories (Rodriguez, 1988; Artiles et al, 2005; Strand and Lindsay, 2009). Second, Baker and Prys-Jones, 1998) note that background factors such as socio-economic status were not controlled in bilingual research of that time which may have resulted in cognitive differences emerging that were less likely to be a result of bilingualism and more to do with the background of the children. Bialystok (1999) also notes that a number of bilingual children came from low-socio-economic backgrounds that were compared with children from more socially affluent backgrounds. In a more recent review, Bialystok, Craik, Green & Gollan (2009) also acknowledges that there is a strong association between parental-support and academic achievement and socio-economic background. All of which, are just some of the factors that should be considered as background variables when testing bilingual children.

Despite these limitations, which were not recognised at the time, bilingualism was seen to be a disadvantage and it was not until the 1970s that an overlap of negative and neutral research findings were being indicated.

### **5.3 PERIOD OF NEUTRAL EFFECTS**

During the period of negative effects, research methodologies were being refined to control for background differences and cognitive measures were beginning to indicate no differences between bilinguals and monolinguals. Although the period of neutral effects was small, this was felt to be a turning point for bilingual education (Baker, 2011) which indicated that bilingualism was not necessarily detrimental to students.

Subsequently Peal and Lambert (1962) explored cognition beyond ‘intelligence’ and controlled for socioeconomic status and language proficiency in French-English children from Montreal. In this research they, demonstrated that the bilingual children were superior on various cognitive measures such as mental flexibility, and symbolic reorganisation. Peal

and Lambert concluded that bilingualism may encourage flexibility of thought and that the acquisition of flexible perception was a result of describing and understanding that the world can be viewed in two ways. This research however was criticised on a number of methodological grounds (Diaz, 1983).

First, it is considered to have low ecological validity as all 110 participants were from middle-class backgrounds. Second, 254 subjects were lost than retained from the results, and no reason given as to why. Third, despite the researchers controlling for socioeconomic status, home-language and socio-cultural backgrounds were not controlled for, which may have meant that Peal and Lambert were not in a position to allow for subtle differences between the participants (Home language and exposure has since been demonstrated to influence differences found in bilingual research, Baker and Jones, 1998). And fourth, the bilinguals scored significantly higher on the non-verbal IQ than the monolinguals (Bilinguals  $M=27.15$ ; Monolinguals  $M=22.12$ ) which makes it difficult to distinguish between higher cognitive functioning as a result of bilingualism or increased cognitive functioning as a result of a higher IQ. Despite these weaknesses, this research is considered the turning-point in the literature which led to more rigorous controls and superior research methods in the literature.

#### **5.4 PERIOD OF POSITIVE EFFECTS**

Research since the 70s has extended bilingualism research into other domains and a number of social, economic, cognitive and cultural advantages have been suggested. However, a clear difficulty with this research is relating such advantages to children who have an SEN or who are experiencing difficulties. This is due to the contrast between the dearth of research with bilinguals with MLD, and the considerable volume in relation to typically developing bilinguals. Therefore, the aim of subsequent chapters is to critically discuss recent bilingual literature in relation to typically developing populations and populations with MLD.

Literature in relation to typically developing populations was felt to be relevant because developmental age-matching was considered to be the only way to assess the impact of bilingualism on children with MLD in this quantitative study, due to the requirement for a control group which would be indicative of 'expected' linguistic and cognitive skills (as measured in this research).

The second section of this thesis will discuss the literature, research methodology, results in relation to the language and literacy aim of this thesis.

## **6 LANGUAGE AND LITERACY DEVELOPMENT**

### **6.1 OVERVIEW OF LANGUAGE AND LITERACY DEVELOPMENT**

An evident difference between bilinguals and monolinguals is the constant need for bilinguals to develop and manage two language systems, and historically it was believed that simultaneous bilinguals developed both languages like monolinguals (Volterra and Taeschner, 1978). However, more recent research suggests both languages develop differentially (Genessee, 2009; Bialystok, 2009) depending on a number of factors such as language exposure, language experience, home language, language status, developmental age (see below for more details).

Based on these observed and empirically demonstrated developmental linguistic differences, it is understandable that enrolling a child in bilingual education raises a number of parental concerns as to the linguistic development of their child (Ruuskanen and Gupta, no date; Garcia, 2009); a particularly pertinent issue considering both language and literacy are central to most aspects of school life. The typically developing literature suggests that the pattern of language development in bilinguals is similar to monolinguals, but slower and with increased exposure, bilinguals eventually reach monolingual-like levels. However, a question that remains unanswered in the literature is the impact of bilingualism on the language and literacy development of those with moderate learning difficulties (MLD).

It could be intuitively argued that bilingualism places a greater cognitive load on those who are already struggling academically which may bring into question the ease with which two languages are developed. And indeed, Rueda and Chan in 1979 described culturally and linguistically diverse students with SEN as being at a “triple threat” because not only was their learning difficulty thought to be a threat to their educational outcomes, but so was language proficiency and socio-economic status (much of the bilingual research focused on bilingual non-native children). Unfortunately however, unlike the TD literature on bilingualism, the literature into bilingualism and special educational needs (SEN) is little further forward than it was in the 1970s and parents, educational and clinical professionals are none the wiser because of limited systematic empirical evidence.

Building on the strengths and working with additional needs of children is a key feature in current educational provision in Britain, but to be able to achieve this, the impact of bilingual education on the language and literacy abilities of children with moderate learning difficulties should be critically examined. Therefore, one aim of this thesis is to explore the vocabulary and literacy abilities of bilinguals with MLD. To achieve this, this is the first chapter in a series of four chapters which deals with the language and literacy aspect of this thesis. This chapter will begin with an overview of the literature regarding vocabulary and literacy development in typically developing (TD) bilinguals as there is a considerable volume of research (Zigler, 1967, 1969; Dykens and Hodapp, 2001) suggesting that children with MLD may be expected to perform at a level equivalent to TD children of a similar developmental age. Therefore the TD literature may be of relevance to children with MLD and should be considered. This chapter will therefore discuss what is known about bilingualism in relation to children with moderate learning difficulties and children who are typically developing.

A number of databases were searched to source the literature about to be discussed. The following psychology, education, bilingualism and special educational needs databases were searched using the terms considered to be most relevant to linguistic skills (linguistic, language, vocabulary, literacy, reading, comprehension): PsycINfo, PsycARTICLES, ScienceDirect, Google Scholar, Applied Social Sciences Index and Abstracts, Educational Research Abstracts Online, Springer Archives, Cempbell Collaboration, EProQuest, ERIC, JSTOR, Linguistics and Language Behavior Abstracts, Web of Science, Wiley-Blackwell Journals, American Association on Intellectual and Developmental Disabilities.

The results were then filtered through using the term 'bilingual'. This process was most likely to return findings for typically developing children.

In the search for literature in relation to children with moderate learning difficulties the above process was replicated but also included terms most relevant to MLD (intellectual disability, learning disability, mental retardation, developmental delay, exceptionality, learning difficulty, special needs). The abstracts were read to identify those that were potentially relevant, and the methodology was used to identify those papers that included children with MLD.

## **6.2 VOCABULARY DEVELOPMENT IN BILINGUAL TYPICALLY DEVELOPING POPULATIONS**

Bilingual vocabulary development is a complex issue and the findings of research in this area are mixed. Research by Ben-Zeev (1977) indicated that bilinguals are disadvantaged when compared with monolinguals because a bilingual's vocabulary knowledge is inferior to the vocabulary knowledge of monolinguals. This pattern has since however been attributed to the "Distributed Characteristic" which recognises these differences between bilinguals and monolinguals to be a feature of the contextual way in which bilinguals develop their vocabulary. That is, bilinguals will know some words in one language and other words in another language and the same word in both languages depending on the environments and situations in which they learn both languages (Oller, 2005). The 'Distributed Characteristic' however is believed to disappear with experience (Bharick, Hall, Goggin, Bharick & Berger, 1994; Oller, 2005; Gathercole, Mueller & Thomas, 2009) and it has been argued that bilinguals benefit from a wider vocabulary when considering the total sum of their vocabulary knowledge in both languages (Bahrick et al, 1994). This distributed characteristic has been suggested to be most evident in relation vocabulary and literacy development (Oller, Pearson and Cobo-Lewis, 2007) however, as noted earlier; there are a number of factors that affect vocabulary development beyond contextual use alone. This next section aims to detail the factors that are discussed in the literature, and evidence relating to each of these factors is explored.

### **6.2.1 Factors affecting vocabulary development**

Studies exploring language acquisition have identified that bilingual children's rate of acquisition is slower than that of monolinguals (e.g. Ucelli and Paez, 2007; Bialystok, Luk, Peets and Yang, 2010; Rhys and Thomas, 2012) yet their pattern of acquisition is the same (e.g. Genesee, 2001). However, it has been suggested that with increased exposure and experience with the language(s), the receptive vocabulary differences between monolinguals and bilinguals disappear (e.g. Umbel and Oller, 1994; Bialystok, 2006). The literature has however identified a number of factors that potentially affect bilingual children's vocabulary development including: language exposure in the home and in school, the relative status of the L1 and L2 and the dominance of the L1 and the L2 in the environment.

## **Linguistic Exposure in the Home and School**

The impact of linguistic exposure in the home and in school is increasingly being explored in the literature. Both the language of the home and the language of the school have been identified as factors which are key to the development of language.

Duursma et al (2007), for example, noted that linguistic exposure in the home impacted upon vocabulary (and reading) skills of Spanish-English bilinguals despite their being educated primarily through English. That is, Spanish bilinguals performed best in Spanish tasks which Duursma et al noted to be interesting given the dominance of English in the ‘Spanish’ bilinguals’ environments.

Exposure in the home and at school was also suggested to be a key factor in the development of Welsh language abilities in Gathercole and Thomas’ (2009) study on Welsh-English bilingual children attending Welsh medium education; but was less important in their development of English language abilities. Their findings suggested a clear effect of home language exposure, with the L1 Welsh children performing best on tests of Welsh abilities and the L1 English children performing least well thus indicating that Welsh acquisition is “highly dependent on continued exposure to the language” (p.234). Gathercole and Thomas went on to report that by 7;0 years old, all bilinguals (L1 Welsh, L1 English, Simultaneous) performed equally well in English and acquired a “mature command of English independent of exposure at school or at home” (p.213). These findings were interpreted in light of the school of thought that suggests that situations where a language holds majority status, and sometimes over another language (as with English in Wales), its acquisition is believed to be more guaranteed than the acquisition of a minority language (e.g. Welsh in Wales; Basque in the Basque Country).

## **Majority Language Status and Environmental Exposure**

Evidence to support the importance of language status in the role of ‘language competence’<sup>2</sup> was also found by Baetens, Beardsmore and Swain (1985) who compared the French competence of two bilingual populations in two kinds of immersion programmes. The first

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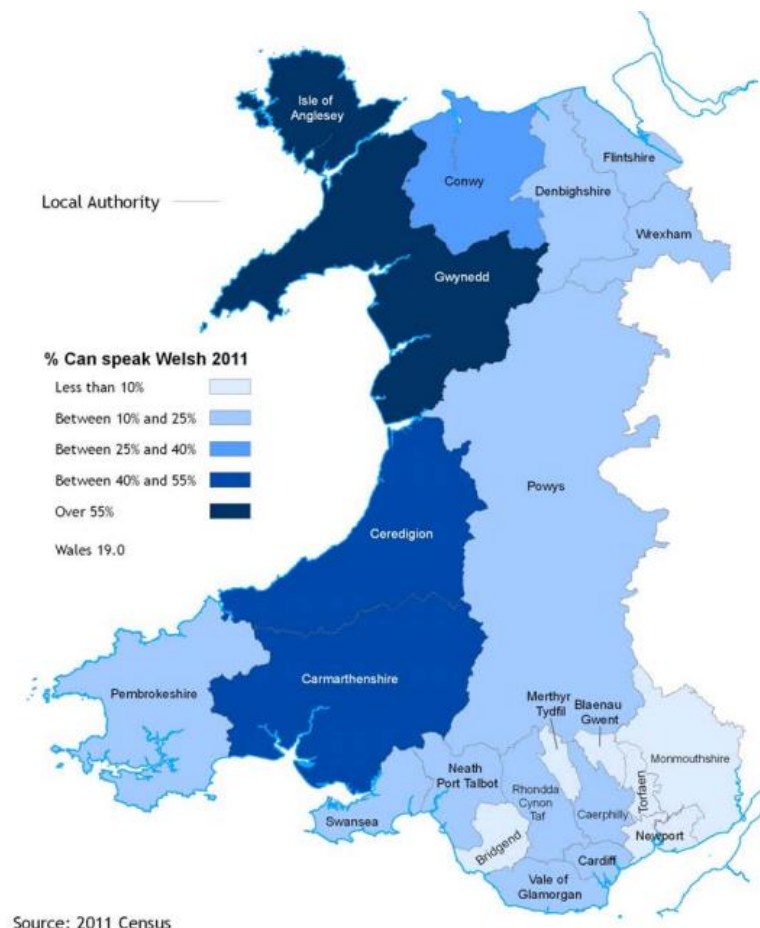
<sup>2</sup> French competence is defined as “*the ability to use the target languages effectively and appropriately for authentic personal, educational, social, and/or work-related purposes*” (Genesee, 2004, p.3)

was L1 English speakers in French immersion in Canada; the second group was comprised of teenagers (13-14 year olds) living in the French speaking area of Belgium who were being educated through their L1 (Dutch, English, German, Greek, Italian or Spanish) via the language maintenance model of instruction and who only received a few hours of French despite it being the majority language of the area. In both instances (Belgium and Immersion in Canada) the L2 French speakers reached similar levels of French competence despite receiving differing amounts of French in school and none in the home. As the French competence of the L2 Belgium sample was comparable to those speakers in Canada, despite French exposure in school being less - Baetens, Beardsmore and Swain (1985) noted that L2 development was possibly related to French being the most dominant/majority language in Belgium. The extent to which environmental exposure plays a part however is particularly important, and an area that is un-discussed in the paper. Arguably, majority language status and environmental exposure are inextricably linked.

By contrast, recent research in Wales and the Netherlands has found evidence to suggest that children's vocabulary does not 'catch-up', even at age 11 and this despite research that suggests bilinguals 'catch up' with their monolingual peers with increased exposure (Oller and Eilers, 2002; Hammer, Miccio and Rodriguez, 2004; Gathercole and Thomas, 2009). Rhys and Thomas (2012) found significant differences in the English receptive vocabulary of L1 Welsh bilinguals who had yet to catch up with their L1 English bilingual peers at age 11. Not only did Rhys and Thomas' findings demonstrate a clear effect of language experience based on the home language but also indicated that acquisition of the majority language is less guaranteed than initially thought (c.f. Gathercole and Thomas, 2009). This may be explained by the dominance of Welsh in the area in which the children were tested, as Gwynedd (the county in which the L1 Welsh speakers were tested) has the largest proportion of Welsh speakers in Wales and the only policy that provides only Welsh-medium primary education. Arguably Welsh is also the majority language in that area of Wales.



**Figure 2 Proportion of people able to speak Welsh across Wales (2011 Census, Stats Wales accessed 29/5/14)**



Leseman (2000) found evidence to suggest that L1 Turkish immigrant children (age between 3; 8 and 4;2), who were immersed in Dutch education did not make the same improvement in their receptive and productive vocabulary in Dutch as their socio-economically and cognitively matched L1 Dutch peers. Leseman interpreted the findings as a result of the L1 Turkish children being immersed into Dutch education too early (3 years old) which had not given chance for their L1 to be developed sufficiently to enable linguistic transfer between Turkish and Dutch. Cummins' threshold hypothesis (1979) however is dated and has been criticised on both methodological (MacSwan, 2000) and theoretical grounds (Takakuwa, 2005) and there are a number of alternative reasons for why there were differences in the acquisition of Dutch in the L1 Turkish children. First, this result could well have been a result of the time divided between two languages for the L1 Turkish immigrant children, where Turkish was spoken at home and

Dutch in school which is contrary to their matched Dutch peers where effectively, double the time was spent speaking Dutch at home and in school thus giving the L1 Turkish children less exposure time to Dutch. Intuitively, linguistic development in a given language will be less if exposure to the language is less. Second, it could also be argued that testing children at such a young age, where Dutch education had only begun between 1-2 years prior to testing was unfair given that the Turkish children had not had time to catch-up. Gathercole and Thomas (2010) and Rhys and Thomas (2012) note that sequential bilingual acquisition should be followed up once the children reach approximately 10 years old to enable sufficient time for the children to 'catch-up' in their L2. And third, Leseman (2000) claimed that the children had not reached sufficient proficiency in their Turkish L1 despite failing to provide 'monolingual norms' for monolingual Turkish children of a similar age. This does not allow the reader to reliably assess whether the L1 Turkish children had reached monolingual norms for the expected age.

Interestingly however, this study does have implications for the impact of language status on bilingual acquisition as it is often assumed that children will naturally acquire the more dominant language in the environment (Rhys and Thomas, 2012). In this study however despite Dutch being the majority/dominant language, the Turkish children did not catch-up or perform at similar levels to their monolingual Dutch peers by age 4.

### **6.3 LITERACY DEVELOPMENT IN BILINGUAL TYPICALLY DEVELOPING POPULATIONS**

There are far fewer studies that are concerned with the impact of bilingualism on literacy than those that are concerned with language development. Bialystok (2002) notes that of the research that exists regarding bilingual literacy, the research can be grouped into three categories:

- (i) The acquisition of literacy by bilingual children and adults in a "weak" language
- (ii) The acquisition of literacy by monolingual children in different languages
- (iii) The cognitive and linguistic components of fluent reading in a second language

Although all categories contribute to our knowledge of bilingualism and literacy, only the first is considered relevant to the impact of bilingualism on literacy skills, thus relevant to this research. Most of the studies in this first category detail the sociolinguistic factors that play a role in literacy development and may depend on (i) individual differences irrespective of

language (Geva, Wade-Woolley and Shany, 1997), (ii) social and educational support and (iii) exposure or linguistic experience (Oller and Eilers, 2002; Durunoglu and Verhoeven, 1998).

The acquisition of bilingual literacy in a “weak language” in the U.S.A mostly concerns children whose language of education (English) is different to the language of the home (most often Spanish). Research based on these bilinguals has demonstrated that children typically achieve lower levels of reading competence than their monolingual peers (August and Hakuta, 1997; Bialystok, 2002) and take between four to seven years to reach educationally expected levels in academic and literacy achievement (Cummins, 1991; Hakuta, Butler and Witt, 2000). Bialystok (2002) notes that these findings are not necessarily representative of others learning a ‘weak’ language due to the lack of social and educational support often associated with the Hispanic students in these studies.

Research in other immersion contexts which are deemed more socially and educationally supportive have also indicated that children are not reaching monolingual-like levels, and that linguistic exposure impacts literacy development. Oller and Eilers (2002) explored the exposure issue with regards to literacy development on children in French-English two-way immersion elementary bilingual education, immersion and monolingual education and found comparable literacy scores for the bilinguals in the two immersion programmes, however the monolinguals scored significantly higher than either bilingual group (see also Oller, Pearson and Cobo-Lewis, 2007). Durunoglu and Verhoeven (1998) also indicated the importance of language experience but noted that “proficiency and opportunities to use the language” also contribute to literacy development (cited in Bialystok, 2006, p.162).

The immersion studies cited above are set in a context where both French and English are considered majority language, and there are considered to be a number of qualitative differences which restrict the applicability of such research in majority-minority contexts, and more specifically a Welsh context:

- (i) There are high levels of attrition in early Canadian Immersion due to academic and behavioural issues (Cummins, 2000)
- (ii) Support for poor readers in immersion education has been reported as being restricted to moving the children to monolingual-education (Halsall 1994; Obadia and Theriault 1997).

- (iii) The linguistic organisation of schools is typically different from Welsh-medium and Irish-medium education in that Canadian immersion education offers dual stream schooling within the same institution. That is, within the same school in Canada parents choose whether to enrol their child in the bilingual/immersion stream or monolingual stream. Parsons and Lyddy (2009) note that this type of schooling makes attrition an easier option than having to move the child into a new school altogether (as is often the case in the Welsh-medium<sup>3</sup> and Irish-medium contexts).
- (iv) Both languages in Canada are considered majority/dominant languages; according to the literature the acquisition of fluency and literacy in such majority languages is considered to be more guaranteed than minority languages.

Research in minority-majority language contexts is also beginning to demonstrate that children do not reach monolingual-like levels in literacy – even in the majority language. Findings from Rhys and Thomas (2012) indicated that the L1 Welsh bilinguals outperformed both their L1 English and simultaneous peers in the Welsh reading test which also supports the notion that exposure/language experience impacts literacy development. Similarly, the L1 Welsh and simultaneous bilinguals performed significantly lower than their L1 English and monolingual peers on the English reading test and did not catch up by age 11.

Parsons and Lyddy (2009) in their comparison of children from 4 school types ('Irish-medium schools' that introduced English literacy first, Irish-medium schools that introduced Irish literacy first, Gaeltacht Schools and a monolingual English school) found evidence to suggest that those in Irish medium (>L2 Irish) and Gaeltacht schools (>L1 Irish) performed comparably to those in monolingual schools in their English word-reading skills at senior infants (Age 5-7); and this despite the Irish-medium and Gaeltacht children being introduced to Irish first. This was suggested by the researchers to be a function of the variability of the home language of this group (i.e. a range of L1 Irish and L1 English speakers) within the same classroom, resulting in a concentration on oral language skills, not decoding. However, by fourth class, both Irish-medium school children and Gaeltacht children performed significantly better than monolingual English children in Irish decoding. In the English real- and non-word reading tasks the Gaeltacht children scored lower than the other

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<sup>3</sup> There are some dual stream schools in Wales, especially at secondary level but there are significantly fewer in Wales. See **Table 2**.

three groups at senior infants (age 5-7) and second class (age 7-9) but reached similar levels by fourth class (age 9-11). Though the researchers offer no reasons for the parity in results for English real- and non-word reading by fourth class, there are two possible explanations for this. First, these results are similar to vocabulary literature that indicated that increased exposure enables bilingual children reach monolingual-like levels by age 11, particularly in a majority or second language, it is possible that the English measure was not sufficiently difficult to demonstrate differences across the groups as all groups of children scored approximately 90% correct mean scores which may be indicative of a ceiling effect .

Research in minority language contexts appears to demonstrate the importance of sustained bilingual exposure to achieve monolingual-like vocabulary and literacy abilities however Thomas and Roberts (2011) also indicate that there are other environmental/experiential factors which may play a part (e.g., the social use of the minority language). Thomas and Roberts (2011) note that exposure and experience effects of language may have significant implications for language and literacy development in Welsh-English bilinguals given the wide acknowledgement that the social use of Welsh inside and outside the classroom for pupils is significantly lower than might be hoped thus reducing proficiency and confidence in the language (Thomas and Roberts, 2011). This issue is particularly pertinent given that in minority language situations, pupils are less likely to be exposed to the language in their environment and should pupils (especially L1 English) not actively use it beyond the classroom or have a network of people surrounding them who use Welsh (i.e., L1 Welsh children), they are less likely to be exposed to a variety of contexts in which the language is used. Even in North-West Wales, where the majority of the population is Welsh-speaking, children are exposed to a considerable amount of environmental English such as in shops, and television programmes.

#### **6.4 SUMMARY: LANGUAGE AND LITERACY IN BILINGUAL TYPICALLY DEVELOPING POPULATIONS**

Research regarding the vocabulary and literacy development of bilinguals appears to be conflicting; with some suggesting that language and literacy abilities reach monolingual-like levels with increased exposure and others suggesting that they do not. There are also thought to be a number of factors which mediate this development, ranging from language experience and exposure (Rhys and Thomas, 2012; Parsons and Lyddy, 2009), the relationships between

the two languages and possible inadequate development of the L1 prior to learning the L2 (Leseman, 2001).

Research on the Welsh-English situation in Wales is however limited with less than a handful of studies exploring the impact of home language and exposure on language and literacy development. Of particular relevance to the topic of this thesis there is no research on Welsh-English bilingualism and moderate learning difficulties. The following section aims to discuss the international literature regarding bilingualism and moderate learning difficulties.

## **6.5 LANGUAGE AND LITERACY DEVELOPMENT IN BILINGUALS WITH SPECIAL EDUCATIONAL NEEDS**

Prior to the 1990s, despite no empirical investigations of the issue having been carried out, leading figures in the field of bilingualism suggested that the ‘exceptional child’ is able to learn more effectively in the language the child understands and is less likely to fall as much behind as if they were learning purely through their L2 (Cummins, 1989; Garcia, 1982). Rondal (1984) also without citing any empirical evidence in support, suggested that that for a child with “mild mental retardation” to successfully acquire an L2, they should be introduced to their L2 a few years later than their typically developing peers thus allowing their L1 to fully develop (consistent with Leseman’s belief for typically developing children cited in section 6.2). Children with moderate and severe “mental retardation” were discouraged from L2 immersion programmes or “second language training” until late adolescence or adulthood (Rondal, 2000).

More recent research, however, and anecdotal accounts provide some evidence which suggests that children with learning difficulties are able to develop functional bilingualism contrary to the earlier beliefs of Cummins, Garcia and Rondal. Therefore, the aim of the subsequent sections is to detail this evidence in relation to language and literacy development.

## **6.6 LANGUAGE ABILITIES IN BILINGUALS WITH LEARNING DIFFICULTIES**

An extensive search of the literature found a total of 653 articles that covered bilingualism and search terms that related to moderate learning difficulties i.e. intellectual disability, learning disability, mental retardation, developmental delay, exceptionality, learning

difficulty, special needs, underachieving. Many of the articles were related to bilinguals with learning disabilities or whose learning difficulties were the result of other disabilities such as speech and language impairment (SLI) and were therefore discarded. Three articles were found that focused on Down's syndrome (DS) and two on autistic spectrum disorder (ASD). Three studies were found that focused on moderate learning difficulties and vocabulary development, two of which (Glumikj and Bozhinovikj, 2005; 2006) were sourced through google scholar and were not found in the initial 653 articles.

### **Moderate Learning Difficulties**

Very little research has been done on vocabulary development alone and only three studies were found that related to this issue. Two empirical research studies by Glumnikj and Bozhinovikj (2005; 2006) that explored semantic fluency in children age 12 to 15 years (e.g., how many words a child can recall that begin with a particular letter) found that monolingual children with "mild mental retardation" performed significantly better than their cognitively- and age- matched bilingual (Romany-Serbian) peers in both studies suggesting that bilingual children with "mild mental retardation" do not reach monolingual-like levels . These findings are similar to findings for bilingual typically-developing children (Bialystok, Craik and Luk, 2008) and for more details the reader should refer to the metalinguistic section of the Executive functioning chapter (section 10.4.2). Glumnikj and Bozhinovikj's findings should however be interpreted with caution as exposure, linguistic proficiency and socio-economic status were not controlled; features that have been shown to be important in the typically developing literature. Recent anecdotal evidence also brings into question the validity of the "Mild Mental Retardation" category of this research due to high number of Czech Romany children being enrolled in Special Education as a result of low socio-economic status and 'unpreparedness' for school (Daily Monitor Online, Accessed 28/08/2013).

Verhoeven and Vermeer (2006) in a study that controlled for social-communicative competence and non-verbal reasoning ability (but not socio-economic status) measured lexical semantic skills ("reading vocabulary") in non-native Dutch children with a "mild intellectual disability" (MID). The children were compared with three other groups: native Dutch children with a MID, typically developing non-native Dutch children and typically developing native Dutch children, and it was found that the non-native Dutch children with MID performed significantly worse than the native Dutch children with MID. These

vocabulary findings are similar to Verhoeven and Vermeer's literacy findings which will be discussed in a latter section. See section 6.7 for a discussion of its applicability to this current research.

### **Down's Syndrome and Autistic Spectrum Disorder**

Three studies on language development in bilingual children with Down's Syndrome (DS) (Woll and Grove, 1996; Kay-Raining Bird, Cleave, Trudeau, Thordardottir, Sutton, and Thorpe, 2005 and Feltmate and Kay-Raining Bird, 2008) and two studies of language development in bilingual children with autistic spectrum disorder (ASD) (Seung, Siddiqi, and Elder, 2006; Kay-Raining Bird, Lamond and Holden, 2012) were also found.

The children with DS in all three studies were simultaneous bilinguals and had acquired functional bilingualism to some extent and Woll and Grove (1996) reported that their twin girls used both languages in appropriate contexts. Feltmate and Kay-Raining Bird (2008) suggest that there was variability in the level of L2 proficiency developed by the children in their research and that some children with DS may be more successful in acquiring two languages than others. These results however should be treated with caution as these studies involve relatively small samples and Kay-Raining Bird et al (2005) advise caution in giving advice to parents until further research has been completed.

Only two studies were found on ASD. Seung, Siddiqi and Elder's (2006) single case study intervention and Kay-Raining Bird et al's (2012) questionnaire survey. Seung, Siddiqi and Elder's (2006) single case study intervention reports a two-year intervention study in the USA with a young boy whose parents spoke Korean and English. The intervention was initially provided in Korean (the child's L1) and then gradually introduced in English. Seung, Siddiqi and Elder (2006) suggested that the child made considerable progress in both languages and the positive results demonstrate the importance of using the child's L1 initially. A view often supported in the EAL literature:

Bilingualism is an asset, and the first language has a continuing and significant role in identity, learning and the acquisition of additional languages

(Primary National Strategy, 2007)



Kay-Raining Bird et al (2012) received 49 responses to their questionnaire survey of parents of which 37 indicated that their children were exposed to two or more languages on a regular basis. No significant differences in L1 fluency were reported between the bilinguals and monolinguals but significant variability was reported in L2 fluency. Although these findings mirror the findings of studies with children with Down's syndrome, these findings must be treated with caution as they are based on parental reports and a small sample.

## **6.7 LITERACY DEVELOPMENT IN BILINGUALS WITH A LEARNING DIFFICULTIES**

### **Moderate Learning Difficulties**

Genesee's (1976) study on children with "below average levels of academic ability" (IQ below 85) in elementary/early immersion education, compared the language (reading, speaking, listening) and academic performance (mathematics) of L1 English students being educated through their French L2 with non-immersion monolingual students. No differences were found between early French immersion and non-immersion students on their English language and academic achievement. As might be expected due to less exposure, children in immersion education were also seen to be performing better in French than the non-immersion students who were learning French as a second language.

The below average students in early French immersion were also compared to their average and above average peers in French immersion on literacy (reading and writing), and speaking and listening. Children of above average ability were found to perform better than those of average ability, and those of average ability performed better than those with below average ability in their literacy skills, however this pattern, did not follow for speaking and listening skills where children of below average ability in early French immersion performed equally as well as average and above average students.

In the same study Genesee also compared early immersion and late immersion students (children who enrolled in French education at the beginning of secondary age), who were of above average, average and below average ability (i.e. "a-risk") on literacy, speaking and listening skills. The results indicated that early and late immersion students, based on ability, showed the same pattern in their literacy skills but a different pattern in their speaking and listening skills. Further analyses with the groups sub-divided according to ability, indicated that the early immersion below-average ability group performed similarly to their other early

immersion average and above average peers on speaking and listening but the late immersion low-ability group performed worse than their late immersion average and above average peers. This finding suggests that late immersion into bilingual education may be more disadvantageous than early immersion with regards to speaking and listening skills.

This effect was thought to be due to the more “cognitively-demanding” nature of secondary school whereas primary schools call on language skills which reflect “natural language learning that all students possess during their formative years” (Genesee, 2007, p. 11). Genesee concluded that although early immersion may provide more of an advantage in the development of ‘speaking and listening’ skills than late immersion, no disadvantage was found for early or late at-risk immersion children when compared with similar children in English only education, but in fact benefitted with bilingual proficiency to differing degrees (Genesee, 2007). Genesee however continued that there are studies which demonstrate that children who transfer from immersion education to English-only education show improvement in their performance and self-esteem. Nevertheless, none of the studies cited by Genesee included a comparison between similar students who remained in immersion and left immersion which brings into question whether increased support would have resulted in the same performance- and self-esteem increases in immersion education.

Verhoeven and Vermeer (2006) explored the sub literacy skills (word-decoding, vocabulary, syntax and text) of four groups of children; Dutch and non-native children with intellectual disability (ID) and Dutch and non-native children without intellectual disability who were all between the ages of 10-12 years old. The results indicated that no differences were found between the native and non-native children with and without ID for word decoding, however there were differences found for lexical semantic skills (vocabulary measure), syntax and text between the native and non-native children in regular and special education. The differences between the native and non-native children in the same kind of education were almost as big as the difference between children in regular versus special schools which Verhoeven and Vermeer suggests puts the bilingual children with ID at a “double disadvantage”.

Verhoeven and Vermeer’s results are contrary to Genesee’s literacy results however, there are a number of limitations to the interpretation and comparison of these studies. Genesee’s research focuses on immersion education in Canada where the bilingual situation of the children in the research is comparable to children from English speaking homes attending

WM education in Wales in that children they are being educated through their L2 in an immersion setting (though see below). Verhoeven and Vermeer's (2006) samples, however, are particularly different from the bilingual situation in Wales and Canada as the research focuses on non-native children in Dutch education where Dutch is the majority language and children are from a mixture of minority linguistic backgrounds (Turkish and Moroccan Arabic), and, probably, cultures at home. This is particularly important as it is thought that the pattern of acquisition depends on the pair of languages being learned (Genesee, 2006) and the learning context of populations studied (Zhu and Dodd, 2006). Two similar languages, for example French and English, may develop at a different rate and following a different pattern than two syntactically and orthographically different languages such as Chinese and English. The wider community is also an influencing factor and must be considered in relation to bilingual acquisition. In Canada, for example, though French is the majority language in Montreal, there is a dual language stream where English is often spoke in the wider community. In Verhoeven and Vermeer's study however, exposure to the Dutch non-native children's L1 may only be received from their parents or small community surrounding them.

## **6.8 SUMMARY: LANGUAGE AND LITERACY IN BILINGUAL NON-TYPICALLY DEVELOPING POPULATIONS**

The empirical studies regarding bilingualism and special educational needs are few compared to the TD literature however the evidence regarding literacy does seem to be conflicting. On one hand Genesee's work in Canada suggests that bilingualism in immersion education comes at no cost to children who are underachieving whereas Verhoeven and Vermeer's work suggests that non-native Dutch children with MLD are at a "double disadvantage" falling behind both their TD non-native peers and their native peers with MLD. These conflicting results may however be a feature of the 'kinds' of bilingualism researched; with Verhoeven and Vermeer researching bilinguals with differing L1s and Genesee researching only French-English bilinguals. Similarly to the TD literature, language status may also be a factor with both French and English in Canada being two majority/dominant languages when compared with the L1 of the non-native Dutch children which were the minority/less dominant language in the environment.

Given the paucity of literature in this area, and the ambiguity in the literature that does exist, and the lack of literature on the Welsh-English situation regarding moderate learning difficulties, there is a need for research. While the aforementioned literature is partly relevant

to bilingualism in Wales and immersion education, there is no literature that explores the impact of immersion education where two languages hold a majority-minority relationship, as in Wales. Neither does it explore the impact of linguistic exposure/home language differences on bilingual development - children in WM education come from a range of backgrounds where their L1 may be Welsh, English, both Welsh and English (simultaneous bilinguals) or another language (e.g., children with English as an additional language) - which has been shown to be a potentially important issue for TD populations (see section 6.2.1 and 6.3).

## **6.9 VOCABULARY AND LITERACY RESEARCH AIMS AND HYPOTHESES**

The main aim of this part of the research is to explore the effect(s) of Welsh-medium (WM) education on children with moderate learning difficulties (MLD) from differing home language backgrounds.

It was predicted that children with MLD would perform similarly to their developmentally age matched peers who were matched on home language backgrounds. This would indicate that children are reaching developmentally-age appropriate levels. To respond to the main aim, there are also two sub-aims to respond to the differences in the children's differing home language backgrounds.

- (i) To explore the impact of WM education on the Welsh language abilities of children with MLD.

In line with the main research aim, it was predicted that:

- the L1 Welsh, simultaneous and L1 English children with MLD would score similarly to their developmentally age matched peers on the Welsh language measures
- there would be a clear effect of exposure with the L1 Welsh children with MLD achieving higher scores than L1 English children with MLD.

- (ii) To explore the impact of WM education on the English language abilities of children with MLD.

In line with the main research aim, it was predicted that:

- the L1 Welsh, simultaneous and L1 English children with MLD would perform similarly to their developmentally age matched peers on the English language measures

- there would be a clear effect of exposure with the L1 English children with MLD achieving higher scores than L1 Welsh children with MLD.
- The L1 English bilinguals would perform similarly to their monolingual peers given the dominance of English in Wales and that any differences based on exposure (across all bilinguals) would be greater in Welsh.

## **7 RESEARCH METHODOLOGY**

This chapter outlines the ethical considerations and methodology for the whole of this thesis and the reader will be referred back to this chapter in the later chapters on Executive Functioning. This is because this research is split into sections and the research aims and tasks will be discussed within the relevant chapters i.e., the Executive functioning aims and tasks in chapters 10-11.

### **7.1 OVERVIEW**

Data was collected in five counties in Wales (Gwynedd, Flintshire, Anglesey, Conwy and the Vale of Glamorgan) in two types of school; Welsh-medium (WM) where children are educated solely through Welsh (with the exception of English language lessons) and English medium (EM) education where children are educated solely through the medium of English (with the exception of some incidental Welsh lessons). All children in Wales learn some Welsh (see school categories in section 3.5) however the time dedicated to Welsh lessons in EM medium schools can be compared to modern foreign language lessons in schools in England.

As noted in chapter 3, bilinguals are measured and defined by a number of factors. Age of onset is one category by which a bilingual is measured, and they are consequently defined as early or late bilinguals or sequential bilinguals whereby the L1 was learned prior to the L2 or simultaneous bilinguals whereby both languages were learned simultaneously. Other features are the frequency of exposure (home language vs. school language vs. environment) and proficiency (balanced vs. dominant).

In consideration of the various ways of defining and categorising bilingualism, it was decided that the bilinguals in this study would be categorised in line with other Welsh-English research (Gathercole and Thomas, 2009; Rhys and Thomas, 2012) which takes into account language of schooling and home language as follows:

- (i) Monolinguals: Children attending EM education and speaking only English.
- (ii) L1 Welsh: Children attending WM education and speaking only Welsh at home.

- (iii) Simultaneous: Children attending WM education and speaking both English and Welsh equally at home.
- (iv) L1 English: Children attending WM education and speaking only English at home where Welsh was acquired solely in school.

Children with any other language at home were excluded from the research through requesting that the teachers did not distribute the questionnaires to those children.

The children were further subdivided by age and whether they had a moderate learning difficulty or not. All typically developing (TD) children were between 7-8 and 10-11 years old and the children with MLD were between 10-11 years old.

The 10-11 year olds with MLD were chosen for the following reasons (i) children had been in WM education for up to 8 years and were coming to the end of their primary education and (ii) being at the end of their primary education enabled them to be developmentally- and chronologically age matched with TD children in WM education. This also ensured consistency across testing as the same standardised materials were able to be used for all children between 7-11 years old.

The comparison of the TD children with the children with MLD may present some confounding variables (i.e., socio-economic status and parental education) given that there is a high association between MLD and social disadvantage. This was addressed through an extensive questionnaire that was modified from Kennedy (2012) in his investigation of Irish-English immersion education. The questionnaire was designed to mainly control for (i) socio-economic status and (ii) language background and use. More details will be provided in subsequent sections.

## **7.2 COLLABORATION**

The methodology (i.e. ethical considerations, instrument design, school and participant recruitment, data collection and data input) was planned and conducted alongside another researcher for the purpose of another project to explore the cognitive and linguistic differences between monolingual and bilingual 7-8 and 10-11 year olds from different home language backgrounds. Data collected for the typically developing children was used in both

projects, and the two researchers shared in the collection of the data for the TD children. All data for the children with MLD was collected by the researcher for this project and only used in this project and all data analyses were conducted by the researcher of this research project only.

### **7.3 ETHICAL CONSIDERATIONS**

Prior to seeking ethical approval from Bangor University College of Education and Lifelong Learning Ethics Committee, all ethical concerns were considered in relation to the:

- (i) Aims and objectives of the study,
- (ii) Times,
- (iii) Locations
- (iv) Testing materials and the reasons for using them,
- (v) Confidentiality and anonymity of the schools and participants, i.e., the data was stored in a locked cabinet in Bangor University and when the data was input into the computer codes were used instead of.
- (vi) Child protection i.e. a criminal Record Bureau check was carried out on the researchers to ensure their suitability.

Following ethical approval, head teachers were contacted for their participation in the study, letters asking parental consent for their child to participate and assent forms were given to the children prior to conducting the research.

All children were made aware that they could stop participating at any point during the testing and to facilitate this they were given two laminated cards - a happy face that would continue the testing or a sad face that would stop the research until they were happy to continue at a later date, or not at all. This was seen to be particularly important for the children with MLD given the variable nature of MLD and possible social and emotional difficulties children may also have. Appendices 1 -17 are examples of the consent/assent forms.

Given the familial association of MLD, the questionnaires and consent forms were written as clearly and simply as possible in plain English and avoiding jargon. Telephone numbers were



provided on the form should the parent need an explanation of the research or clarification of any particular aspect.

And finally, throughout the research, the position of the researcher was a carefully considered. As mentioned in section 1.5, the researcher is a Welsh-English bilingual who attended a Welsh-medium school and was raised in South Wales in an English dominant area in an English dominant household (though both parents are able to speak Welsh). The researcher considers herself myself to be culturally and socially affiliated with the Welsh language and conducted the research in Bangor University, an area with the highest number of Welsh speakers and the only University with a Welsh-English bilingual policy. With this, the importance of being balanced and objective through all stages of this research was recognised and the following measures were in place:

- (i) To avoid sampling bias all schools were targeted in Gwynedd and all children who fit the selection criteria were given a questionnaire which was distributed by the teacher. Schools in other counties, where they were included in the research, were a convenience sample and questionnaires were distributed if the headteacher consented. Schools were not targeted on specific criteria other than language of the school (i.e. Welsh-Medium or English Medium).
- (ii) The procedure was consistent for all children and
- (iii) Measurement bias was avoided through discussing the findings with others and listing possible alternatives in the discussion.

## **7.4 RESEARCH DESIGN**

This research is a quantitative based study where scores and questionnaires were used to meet the research aims. Due to the lack of research with regards to children with SEN in these areas, it was felt that utilising the methodologies used in the field of bilingualism would be most appropriate for the following reasons:

- (i) As this research is similar to bilingual research based on TD children, using tried and tested methodologies as the basis for the methodology in this study would enable the researcher to limit flaws in the methodology i.e. through collecting more detailed background information to categorise the bilinguals more clearly.
- (ii) Relatively consistent methodologies have been used in most of the TD bilingualism literature and it was felt that to enable comparison with these findings, similar methodologies would strengthen the conclusions.

- (iii) This research is underpinned by the conception that MLD is based on a delay in development as opposed to fundamental difference in development. Based on this theoretical underpinning, it was felt that the TD literature would provide a useful control for this research.
- (iv) A mainly quantitative approach was adopted for the questionnaire to support the parents of the children with MLD. Due to the possible familial association with MLD and socio-economic deprivation, it was considered that the parents may find the questionnaire easier to complete, increase the likelihood of receiving data relevant to the study and increase the return rate.

## **7.5 PILOT PROJECT**

The pilot project was conducted in collaboration with another researcher. There were two of us at all times in the room testing one child each, at a time. A small pilot project was conducted (n=5) in a small Welsh medium school in Anglesey. A consent form was signed by the Head teacher and the Head teacher distributed parental consent forms to the children in years 4-5 only because children in year 3 and 6 were unavailable that time. The participants came from a range of home language backgrounds (L1 Welsh (n=1), L1 English (n=2) and simultaneous bilinguals (n=2). One child (L1 English) was noted as ‘underachieving across the curriculum’ by the Head teacher and had a standardised IQ of 80.

The purpose of the pilot was to explore the administration of the tasks and refine any problems that arose such as timing issues, observed task difficulty and whether the children enjoyed taking part; factors that would affect data collection and analyses.

The research and each task was introduced to the children and they were given the opportunity to return to the classroom if they wished. It was also made clear that they could leave at any point. All tasks were administered in Welsh except the British Vocabulary Picture Scale (BPVS) and the fluency task. Written instructions were used to guide the children through the tasks and to ensure consistency for all. The researchers used a script when conducting the tasks with the children to ensure consistency.

All children completed the tasks (see sections 7.11 and 7.12 for details of the tasks) and appeared to enjoy them – especially the computerised tasks. There appeared to be no

qualitative differences in the way the child who was experiencing ‘difficulties across the curriculum’ completed the tasks, though eye-balling the data indicated that the child did perform less well than the other typically developing children; but there were no observed floor effects. All tasks were consequently included in the final study except for the Dimensional Card Sort Task (DCCS)<sup>4</sup> as all children reached ceiling levels on this task. This task was excluded from the final procedure.

No data was analysed as the main aim of the pilot was to ensure a clear and refined process. The sample was also too small to have indicated any significant implications.

## **7.6 PROCEDURE**

The final procedure was as follows.

Two researchers were involved in collecting the data for this project. At each time there were four children in the room, two children per researcher. While one child worked on the measures that needed to be done with a researcher (Prawf Geirfa, Fluency, British Picture Vocabulary Scale, Stroop, reading accuracy and comprehension in both languages), the other child worked on the measures that could be done independently.

All tests were explained in the language of the child’s choice however the administration of the tests was conducted in the language of the test being used and will be detailed in the information about each task.

A script was used to explain the tasks (appendix X) however if the child did not understand, the researcher re-phrased the explanation but incorporated all the information from the script.

All tests were conducted in a quiet setting, were presented in counter-balanced order reduce the potential effects of testing fatigue on the results as far as possible. The testing lasted approximately 2.5 hours per child with school breaks also taken.

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<sup>4</sup> The Dimensional Card Sort Task (DCCS) is a card sorting activity where the children were asked to sort a set of cards into two piles according to colour (red, and blue). The children were then asked to re-sort the cards according shape (circle and square). This task has been hypothesised to require the inhibition of a pre-potent response when sorting the cards the second time according to a different rule.

## 7.7 PARTICIPANTS

### Typically Developing Pupils

A total number of 326 of the typically developing pupils returned the consent forms and took part in the study however only 209 of those returned the background questionnaires. Of those 209 questionnaires only 198 of those mentioned whether the child did or did not receive free school meals (FSM). As this was the main method of controlling for socio-economic status, this information was considered crucial and those 11 pupils were excluded from the study.

One hundred and ninety eight pupils made up the final typically developing sample that was included in this research.

In total there were 92 typically developing 7-8 year olds of which there were 44 males (mean age (MA)=7;07) and 48 females (MA=7;06). There were also 117 typically developing 10-11 year olds; of which were 59 males (MA=10;5) and 58 females (MA=10;04). None of the children had any recorded special educational needs or were on any educational intervention plans.

### Pupils with Moderate Learning Difficulties

In total 82 children returned consent forms and were tested. Only 13 of these returned the background questionnaires which would have provided crucial background information regarding socio-economic status and language background. The method for controlling for this background information was consequently amended for this group (discussed further in section 8.2) and schools were also asked whether the child received free school meals (FSM). Once information was received from schools regarding FSM, the children were included in the study. The final sample comprised of 77 children. Of these, 51 were males (MA=10;06) and 26 were females (MA=10;07). If no information was received regarding FSM for any child they were excluded from the data analyses as it was important to have a comparable SES measure between the TD and MLD group.

Table 5 Number of children who received school meals according to gender and age/ ability grouping

		Free School Meals		Total Known
		Yes	No	
TD 7-8	Males	3	41	44
	Females	6	42	48
	Total	9	83	92
TD 10-11	Males	8	50	59
	Females	13	45	58
	Total	21	95	117
10-11 MLD	Males	23	28	51
	Females	13	13	26
	Total	36	41	77

Table 6 Details of numbers for the final sample according to home language group.

Group	Home language	Level of SEN	N	Mean age	Std.deviation
7-8 TD	Monolingual	No Learning Difficulty	24	7.7348	.46773
	L1 English	No Learning Difficulty	24	7.5514	.50505
	Simultaneous	No Learning Difficulty	18	7.6385	.48320
	L1 Welsh	No Learning Difficulty	26	7.6689	.48529
10-11 MLD	Monolingual	School Action	18	10.5117	.49380
		School Action Plus	1	11.0200	.
		Statement	6	10.8600	.37261
	L1 English	School Action	13	10.5154	.50327
		School Action Plus	5	10.8560	.42271
	Simultaneous	School Action	16	10.6344	.50404
		School Action Plus	6	10.5583	.55409
	L1 Welsh	School Action	6	11.0583	.02563
School Action Plus		6	10.5717	.55449	
10-11 TD	Monolingual	No Learning Difficulty	22	10.5255	.50294
	L1 English	No Learning Difficulty	36	10.6200	.49291
	Simultaneous	No Learning Difficulty	22	10.3282	.44161
	L1 Welsh	No Learning Difficulty	37	10.4020	.46575

## **Parents**

For every child in the study, a background and attitudes questionnaire was distributed to the parents. From the questionnaire there were four main themes:

- (i) Language use which allowed the researchers to categorise the bilingual children into language groups according to Gathercole, Thomas and Hughes' (2008) study (i.e. L1 English, L1 Welsh, Simultaneous bilinguals). This took into account the language that was used by the main caregiver(s) to the child and the language used by the child to the main caregiver(s). This also considered the language use in the community, clubs that the child attended, religious activities.
- (ii) Socio-economic status questions included gross household income, free school meals, main caregivers' education.
- (iii) Child's special educational needs required information about any known SEN, any intervention the child had received that was known to the parents
- (iv) Parent attitudes towards the Welsh language and Welsh Education

In the initial stages of participant recruitment, the consent form and questionnaires were distributed together which meant that background information for 100% of the consenting parents was received. However, due to the low response rate from parents with children with MLD, the questionnaires were distributed after consent was received. This significantly reduced the amount of background information that was available for the children with MLD because not all parents returned the background questionnaires. Parents were not required to complete and return the questionnaire in order for their child to be included in the research, as long as they gave written consent to the child's participation. This did increase the number of children with MLD in the study.

## **7.8 COUNTIES**

The sample came from a range of counties across Wales. The initial aim of the study was to focus on counties in North Wales however the low response rate from the children with Moderate Learning Difficulties meant that the researcher had to target other more populated areas.

Five counties were targeted (Gwynedd, Anglesey, Vale of Glamorgan, Conwy, Denbigh). Data collection begun in Gwynedd and Anglesey and moved from North West (Gwynedd)

towards North East (Conwy, Denbigh) and then to South Wales (Vale of Glamorgan). The linguistic nature and education policy of each county varies slightly and will be detailed in the next section.

### Gwynedd

Gwynedd, in North West Wales, has the highest recorded number of Welsh speakers in Wales with a recorded 65% in 2011 (Wales.Stats Wales, 2011). Despite this there is significant variation between different areas in Gwynedd ranging from 32%-45% in Bangor, Barmouth and Tywyn to 79-87% in areas such as Caernarfon, Blaenau Ffestiniog and the Llŷn Peninsula. Gwynedd council has adopted the principle that Welsh and English receive equal treatment which is an integral principle to the Welsh medium Education Plan to promote Welsh as a first and second language.

Gwynedd's education policy states that all children in schools governed by the LEA receive Welsh-medium primary education. With approximately 10,000 children receiving primary Welsh-medium education in Gwynedd all children (except those in private schools) are immersed in the Welsh-language until English is introduced at the first year of Key Stage 2 (year 3, age 6-7).

### Isle of Anglesey

Anglesey, an Island in North West Wales, has over 60% of Welsh speaking residents (Wales.Stats Wales, 2011). Similarly to Gwynedd, there is significant variation in Welsh language speakers across Anglesey ranging from 24-53% in Holyhead and Beaumaris and 80% in Llangefni. Like Gwynedd, Anglesey has adopted the principle that Welsh and English receive equal treatment which is an integral principle to the Welsh medium Education Plan to promote Welsh as a first and second language.

Like Gwynedd, English is introduced at the beginning of Key Stage 2 (Year 3) however there is significant variation in the provision of Welsh education across areas of Anglesey. For example, some schools immerse all children into Welsh-medium education whereas others place less emphasis on Welsh and teach mainly through the medium of English. The Isle of Anglesey's aim is to ensure that all children learn Welsh as a first or second language with the emphasis on children's abilities to write, read and speak through the medium of Welsh at the end of Key Stage 2 (Isle of Anglesey Language Scheme, 2012).



## Conwy

Conwy adjoins Gwynedd to the east with approximately 28% of resident Welsh speakers (Wales. Stats Wales, 2011). Again, like Anglesey and Gwynedd there is significant variation in the number of Welsh speakers across this region due to immigration. Conwy too state that they treat Welsh and English equally. Conwy's Welsh Education Scheme (2008-2013) aims to ensure that Welsh-medium education is available to all children whose parents wish for them to receive their education through Welsh-medium.

English and Welsh medium schools are available in Conwy, and are categorised on a 5 point scale, below:

Table 7 Adaptation of school categories according to language of provision

Category	Definition of Category
1	Welsh-medium education
2	Dual-stream (Welsh medium or English medium)
3	Transitional: Welsh-medium with significant use of English
4	Mainly English medium, with significant use of Welsh
5	English-medium Education

Schools in Conwy and Denbigh and the Vale of Glamorgan were used for the English-medium sample. Only schools that were categorised according to category 5 were targeted for the monolingual sample.

## Denbigh

Denbigh, in North East Wales has approximately 24% Welsh speaking residents. Like Gwynedd, Conwy and Anglesey, there is significant variation in the distribution of Welsh speakers across the area. Denbigh notes that they aim to treat both Welsh and English equally within the community and emphasise their commitment to developing Welsh language skills in line with their Welsh education strategy. Twenty-three percent of the children in this area receive Welsh-medium primary education (Welsh medium Education Strategy, Denbigh, 2010).

Like Conwy, schools are categorised on a 5 point scale according to language provision (see Table 7). For the purpose of this research, only schools in category 5 (English-medium) were used in this study.

### Vale of Glamorgan

The Vale of Glamorgan, in South Wales has between 8.6% and 13.1% of resident Welsh speakers across the Vale. Like the other counties, the Vale of Glamorgan Council has adopted the principle that the Welsh and English languages should be treated equally in dealing with the public and in the administration of justice.

In the Vale there are only two types of schooling according to language: Welsh-medium or English-medium, with approximately 10% of children attending the county’s Welsh-medium primary schools. This county was used to collect data from Welsh-medium schools for the bilingual sample and the English-medium schools for the monolingual sample.

## 7.9 SCHOOLS

As mentioned in section 7.8, schools had to be targeted outside of North Wales due to the low response rate. Below is a break-down of the number of schools that were targeted from each county and language provision.

Table 8 Number of schools targetted according to language provision and county

<b>Counties</b>	<b>Welsh-medium school</b>			<b>English-medium schools</b>		
	Gwynedd	Anglesey	Vale of Glamorgan	Conwy	Denbigh	Vale of Glamorgan
<b>Number of Schools</b>	28	4	2	2	1	1

The schools in Gwynedd were much smaller than the English medium schools in Conwy, Denbigh and the Vale of Glamorgan and a larger sample was needed for the bilinguals as this sample was further divided into three groups according to home language – hence the larger group size for schools in Gwynedd.

## **7.10 IDENTIFICATION OF MODERATE LEARNING DIFFICULTIES**

Children with MLD were identified by the teacher as having MLD. If the teachers were unsure about the term MLD, other associated terms or descriptions were used to ensure clarity. The following terms/criteria were used to help enable teachers identify these children:

- Generalised/Globalised learning difficulty,
- Child is significantly underachieving compared to the majority of their peers by approximately 2-3 years across most areas of the curriculum
- Child is on school action, school action plus or has received a statement for having a generalised difficulty across most areas of the curriculum.

## **7.11 BACKGROUND MEASURES**

### **7.11.1 Parental Questionnaire**

#### **Background Information**

Bilingual questionnaires requesting information about the child and family's linguistic background socioeconomic situation (SES) and child's special educational needs and attitudes were distributed to parents. A range of 18 open and closed questions were included. The questionnaire was a modified version of that used by Kennedy (2012; modified from Robertson, Manly, Andrade, Baddeley and Yiend, 1997)-in research on Irish-English immersion education. The questions regarding SES were drawn from the national census website and Croll (2002). See appendices 11 and 12 for a copy of the questionnaire.

The questionnaire was designed to elicit as much information as possible regarding any factors that may impact the findings. The following subjects were included:

- child's date of birth, gender, and language use in home
- whether or not the child has a disability, attended a pre-school, attended a previous school to the one in which they were currently enrolled, and/or had lived in a different community than the one in which he/she currently lives;
- time spent on homework with children
- maternal and paternal education

- household income
- language use between the child and parent(s), friends and the wider community

### **Attitudes**

In addition to the background information questions, information on the parents' attitudes towards the Welsh language, bilingualism and Welsh medium education was included. This was included as a primary part of the 'other' researcher's research (see section 7.2) but was attached to all background questionnaires to ease the distribution process for the teachers and (despite this aspect being beyond the scope of this research) it was felt that this data may enrich the background information for the children involved in the study. This data was considered enriching as attitudes toward language and language learning has been suggested to affect language use (De Bres, 2010) and positive attitudes are believed to benefit the 'advocation' of minority language education (Bohner and Dickel, 2011).

### **Distribution of the Background Questionnaire and Attitudes Questionnaire**

In the initial stages of participant recruitment the consent form, background questionnaire and attitudes questionnaire were distributed together (as mentioned in 7.7). Although nowhere on the consent form did it require the questionnaire to be returned as part of the research for consent to be accepted, it was felt that the limited number of consent forms were returned for the children with MLD was probably due to the large amount of information being requested from the parents. Despite consent and the questionnaire return rate being higher for the typically developing pupils, the consent and questionnaire distribution procedure was amended for all participants because it was felt that procedures needed to be consistent for all pupils in the same class (i) to ensure consistency for the pupils (ii) to draw no attention to the children with MLD.

The procedure was then amended which meant that consent forms were sent out first. Following receipt of the consent forms, background and attitudes questionnaires were distributed.

Due to the low return rate of the questionnaire from children with MLD, controlling for socio-economic status was not possible. Therefore, an additional measure of socio-economic status was included in the research through asking all schools whether the children received

free school meals, or not. This was seen as an appropriate measure as it is commonly used in the educational literature, though it does only provide this research with two categorical variables and was less detailed than using the questionnaires.

### **7.11.2 Child's Language Use Questionnaire**

A child's questionnaire containing information about their use of Welsh/English with parents, siblings, friends and in school was filled in with the child (see appendices 9 and 10). The child read the questions while the experimenter simultaneously read them aloud. The responses were on a 5 point scale ranging from Welsh all the time, Welsh most of the time with some English, half Welsh and English, English most of the time with some Welsh and English all the time.

The information from the parents, children and the prafw geirfa (see Table 9) was used to divide the children into the home language groups.

Table 9 Table taken from the ‘Prawf Geirfa’ illustrating how the home language backgrounds of children were decided.

		Categorisation of the child’s home language		
Language Spoken by Parent 1 to child	Language Spoken by Parent 2 to child	Only Welsh Home	Welsh/English Home	Only English Home
Only Welsh	Only Welsh	X		
Only Welsh	Mostly Welsh	X		
Mostly Welsh	Mostly Welsh	X		
Welsh and English	Welsh and English		X	
Only Welsh	Only English		X	
Only Welsh	Welsh and English		X	
Mostly Welsh	Welsh and English		X	
Only English	Mostly Welsh		X	
Only English	Welsh and English		X	
Mostly English	Mostly Welsh		X	
Mostly English	Welsh and English		X	
Only English	Only English			X
Mostly English	Mostly English			X
Only English	Mostly English			X

### 7.11.3 Forward Digit Span

This task is a replication, with a minor modification, of Bialystok & Martin’s (2004) test of working memory and similar to that in the WISC-R (Wechsler, 1974) to ensure differences in Executive Functioning scores were not an artefact of differences in working memory.

Children were verbally presented with a string of 3 random digits between 1 and 9 and were asked to repeat them in the same order after the experimenter. If the child repeated the string of digits correctly the child was presented with a completely different string of digits with an additional digit (4 digits). If the child incorrectly repeated the string, he or she would be presented with a different string of digits - but the same amount. This process would continue until the child made two consecutive errors. The child’s digit span was recorded as

the amount of digits in the last correctly repeated string. This differs slightly to the task used by Bialystok & Martin (2004) as children in that study were allowed to re-try the same string twice. This task however used different strings to avoid the possibility of a practice effect.

#### **7.11.4 Raven's Colored Progressive Matrices (Raven et al, 2004)**

Due to the range of linguistic backgrounds of the children in this study, a nonverbal test was considered to be more appropriate as a test of general ability than a verbal test. Raven's Colored Progressive Matrices is a non-verbal test of reasoning ability for children between 4-11 years which claims to be suitable for children between 5;0 and 11;0 years old, children with SEN and those who come from different cultural backgrounds. Use of this test made it possible to control for cognitive ability and developmentally age match the children through using the 'developmental age' obtained by converting the standardised score using the manual provided by Raven's. The colored progressive matrices consists of thirty-six coloured diagrammatic puzzles with puzzles and shapes that were presented to children in 3 sets of 12. In each of the 36 puzzles a section is missing and children are required to select one of eight possible answers to finish the puzzle. Children completed this task independently however the examiner sat beside them to ensure that they were answering the correct questions on the response form.

The dependent variables for this test are the raw score (out of 36), standardised score, percentile rank and age equivalent.

## **7.12 RESEARCH MEASURES**

### **7.13 TEST SELECTION**

Standardised tests were used to measure receptive vocabulary, reading accuracy and comprehension, in both Welsh and English. The tests were chosen on the basis that (i) the same test would be able to be used for all children, tests which were only suitable for a narrower age range were excluded from consideration and (ii) they were financially viable. The tests were as follows.

#### **7.13.1 Vocabulary Measures**

##### **British Picture Vocabulary Scale (BPVS): 3<sup>rd</sup> Edition** (Dunn & Dunn, 2009)

This is a test of English receptive vocabulary for children between 3 and 16.11 years. This was used as an indicator of the individual's proficiency in the English language. There were 156 items and children were shown a card with 4 different illustrations grouped into 14 sets. The experimenter read aloud the word which corresponded to one of the illustrations and the child was expected to point to the correct picture or name a letter that corresponded with the picture. The children completed all items unless two or more items were incorrect in a set. No feedback was given by the experimenter.

The dependent variables for this test was the raw score, age standardised score band and percentile rank. Standardised scores were calculated for all the children together, on the basis of age alone.

##### **Prawf Geirfa** (Gathercole, Mueller & Thomas, 2007)

This is a test of Welsh receptive vocabulary for children between 7 and 11 years. This was used as an indicator of the individual's proficiency in the Welsh language. The test consists of 111 items and children are shown a card with 4 different illustrations. The experimenter read aloud a word which corresponded to one of the illustrations and the child was expected to point to the correct picture or name a letter that corresponded with the picture. The children completed all 111 items. No feedback was given by the experimenter.



The dependent variables for this test were the raw score, age, standardised score and a standardised score which takes 'home language' and age into account. This latter standardised score was not used for the purposes of this research however it provides standardised scores for practitioners who wish to track a child's progress that takes language background into account. Standardised scores were calculated for all the children, on the basis of age alone as it was intended to be used as a comparison across all children.

### **7.13.2 Reading Accuracy and Reading Comprehension Measures**

**Neale Analysis of Reading Ability (NARA) – 2<sup>nd</sup> Revised British Edition** (Neale, 1997)

This test is a measure of English reading accuracy and comprehension for children between 6-12 years. The children read graded passages and stopped once they reached the number of errors permissible per passage (see NARA manual for details). Following every passage was a set of comprehension questions the child had to answer.

The dependent variables for the comprehension and reading accuracy were the raw scores, standardised scores, reading age, percentile rank and stanine.

**Profion Glannau Menai** (Payne, 1998)

This test is a measure of Welsh reading accuracy for children aged 4-11 and comprehension for children between 4 to 14 years. The children read graded passages and stopped once they reached the number of errors permissible per passage (see manual for details). Following every passage was a set of comprehension questions the child had to answer.

The dependent variables for the comprehension and reading were the raw scores, standardised scores, reading age, and percentile rank.

## 8 VOCABULARY AND LITERACY RESULTS

### 8.1 OVERVIEW

The aim of this section is to explore the Welsh and English vocabulary, reading accuracy and reading comprehension abilities of bilingual children with MLD who attended Welsh medium education. Results are presented that compare the performance of chronologically- and developmentally- age-matched children who were from four different linguistic backgrounds:

Bilingual children attending Welsh-medium education who speak

- mostly Welsh at home (i.e., L1 Welsh),
- mostly English at home (i.e., L1 English)
- Welsh and English at home (i.e., simultaneous).

Monolingual children attending English medium education who only speak English at home (i.e. Monolinguals).

Section 8.3 present the results.

For all groups of children, background information and methodological issues that may impact upon the results are discussed first as they may influence the interpretation of the vocabulary and literacy findings.

#### **Analyses**

For all measures of linguistic ability a univariate analysis of variance (ANOVA) was used to investigate group differences. Differences were indicated when the p value was below 0.05 ( $p < 0.05$ ) as it is commonly considered the standard level of significance used to justify a claim of a statistically significant effect (Gray & Kinnear, 2012). A non-parametric Chi square was used to investigate differences between the children who were and were not receiving free-school meals.

## **8.2 METHODOLOGICAL ISSUES**

### **8.2.1 Background information**

Data collection began in Gwynedd and schools were targeted on the basis that they had children with MLD. To target the correct schools, an application for a list of children with MLD in Gwynedd was made to Gwynedd's Educational Psychologists and SEN team which was reviewed by them. Fifty-nine bilingual children in thirty-five schools in Gwynedd were identified by this method. Information was distributed to the head-teachers, however not all agreed to take part in the research. Unfortunately, in those schools that did agree to take part, very few parents returned the consent forms. It was considered that this was probably an effect of the sheer amounts of information being given to the parents (e.g., the letter, information sheet and bilingual questionnaire) affecting their desire for their child to take part. Recruitment methods were consequently modified to try and increase the number of participants with MLD: the background questionnaires were not sent with the consent form but were sent after consent forms had been received. Additionally, it was made clear on the background questionnaires that parental participation was optional and did not affect their child's participation in the research. This change was approved by the ethics committee. This improved the response rate at the cost of reducing the background information that was available to the researchers regarding the participants, particularly those with MLD. To enable the control of background variables (SES and language background) in this study, other measures had to be put in place.

### **8.2.2 Socio-economic status**

As little background information was available regarding children with MLD and this research intended to compare across TD and MLD groups, comparable background measures were felt to be important. Therefore, information regarding free-school meals (FSM) was collected from schools for children whose parents had not returned the background questionnaire. This meant that post data collection some schools had to be contacted for this additional information.

It was felt that the statistical analyses would be strengthened if children with MLD could be matched based on FSM and home language with TD children. However, only 29 of the children with MLD could be matched with the TD children once home language was taken

into account. It was therefore decided to keep all children with MLD in the analyses. Chi square analyses were conducted to explore whether there were significant differences between the groups that were compared in the analyses.

As expected, a Chi square ( $\chi^2$ ) analysis indicated that there were differences between the TD groups and children with MLD on the uptake of FSM ( $\chi^2 (1, N=275)=29.325, p=0.000$ ) due to the significantly higher proportion of children with MLD receiving FSM than TD children. No differences were found between the TD 7-8 year olds and the TD 10-11 year olds. The following table will provide a breakdown of the analyses to indicate where exactly there were differences once the groups were further divided according to home language.

Table 10 Chi square analyses according to group and home language<sup>5</sup>

<b><u>Differences in the proportions of children in different language and age groups receiving free school meals</u></b>			
<b>10-11 MLD</b>		<b>TD 10-11 year old</b>	<b>TD 7-8 year olds</b>
<b>L1 Welsh</b>	L1 Welsh	$\chi^2(1, N=49)=10.61, p=0.001^*$	$\chi^2(1, N=36)=5.074, p=0.054$
	Simultaneous	$\chi^2(1, N=34)=1.756, p=0.185$	$\chi^2(1, N=36)=7.95, p=0.005^*$
	L1 English	$\chi^2(1, N=48)=4.255, p=0.039^*$	$\chi^2(1, N=30)=10.729, p=0.001^*$
	Monolingual	$\chi^2(1, N=34)=0.48, p=0.827$	$\chi^2(1, N=36)=6.00, p=0.014^*$
<b>L1 English</b>	L1 Welsh	$\chi^2(1, N=55)=12.46, p=0.00^*$	$\chi^2(1, N=42)=5.215, p=0.022^*$
	Simultaneous	$\chi^2(1, N=40)=2.182, p=0.140$	$\chi^2(1, N=42)=7.905, p=0.005^*$
	L1 English	$\chi^2(1, N=54)=05.37, p=0.02^*$	$\chi^2(1, N=36)=10.754, p=0.001^*$
	Monolingual	$\chi^2(1, N=40)=0.056, p=0.812$	$\chi^2(1, N=44)=6.148, p=0.013^*$
<b>Simultaneous</b>	L1 Welsh	$\chi^2(1, N=60)=11.20, p=0.01^*$	$\chi^2(1, N=46)=6.123, p=0.013^*$
	Simultaneous	$\chi^2(1, N=44)=1.57, p=0.210$	$\chi^2(1, N=46)=8.862, p=0.03^*$
	L1 English	$\chi^2(1, N=58)=4.459, p=0.035^*$	$\chi^2(1, N=40)=11.911, p=0.001^*$
	Monolingual	$\chi^2(1, N=44)=0.00, p=1.00$	$\chi^2(1, N=48)=7.088, p=0.08$
<b>Monolingual</b>	L1 Welsh	$\chi^2(1, N=56)=10.99, p=0.001^*$	$\chi^2(1, N=43)=5.027, p=0.025^*$
	Simultaneous	$\chi^2(1, N=41)=1.418, p=0.234$	$\chi^2(1, N=43)=7.688, p=0.006^*$
	L1 English	$\chi^2(1, N=55)=4.277, p=0.039^*$	$\chi^2(1, N=37)=10.506, p=0.001^*$
	Monolingual	$\chi^2(1, N=41)=0.07, p=0.936$	$\chi^2(1, N=45)=5.954, p=0.05$

In all cases where significant differences were found, it was the group with MLD that had the highest FSM uptake. Any subsequent differences in data analyses should be considered in light of the socio-economic status differences.

### 8.2.3 Language use

The parental questionnaire also sought information on the home language background of the children, in terms of the proportions of Welsh and English used in the home, with friends and in social and community activities. The same information was collected from the children themselves via a child's language use questionnaire (Appendices 21 and 22) administered during the course of testing. In view of the low return rate for parental questionnaires for the

<sup>5</sup> Statistically significant differences at  $p < .05$  are indicated with an \*

MLD group, it was decided to use the information provided by the children themselves to categorise all children into home language groups in order to control for home language background. This was used for all children for consistency. This was not felt to be a problem because home language information from parents who returned the background questionnaire and the child's language use questionnaire were found to correlate.

#### **8.2.4 Age**

As it is imperative that the ages of the TD and children with MLD are reasonably similar to ensure a fair comparison, an analysis of variance (ANOVA) was conducted to explore if there were any significant differences between their chronological ages. No significant differences were found, with the exception of the L1 Welsh group ( $p=0.011$ ) where children with MLD were significantly older (Mean age: 10; 8) than the 10-11 year old TD children (Mean age: 10; 4) (although the difference only averaged around 4 months).

#### **8.2.5 Developmental age (DA; Raven's Progressive Coloured Matrices)**

An attempt was made to match the TD 7-8 and 10-11 year old with MLD based on developmental age (DA; Raven's Coloured Matrices) and socio-economic status (SES) within each language group; however, this was not possible as the children with MLD from low socio-economic backgrounds outnumbered the TD children. Neither was it possible to match all of the 10-11 year olds based on their developmental age alone. It was decided that using the matched pairs would reduce the numbers too significantly thus reducing the reliability of the findings. However, a univariate analysis of variance (ANOVA) was conducted to explore if there were any significant differences in DA scores between the 7-8 year old TD children and 10-11 year olds with MLD and between the different home language groups.

This indicated no significant differences between the DA of the TD 7-8 year olds and 10-11 year olds with MLD ( $p=0.744$ ) or home language groups ( $p=0.356$ ). Neither was there a significant interaction between age groups and home language groups ( $p=0.356$ ). Therefore it was concluded that any differences between the two groups in subsequent analyses in this chapter are unlikely to be due to differences in DA.

### **8.3 VOCABULARY AND LITERACY RESULTS**

For all of the measures (Vocabulary, Reading Accuracy and Reading Comprehension), univariate ANOVAs were conducted. For every analysis, 'group' was an independent variable (IV) with 3 levels: age 7-8 TD, age 10-11 with MLD, age 10-11 TD. Home language was another IV with three levels for Welsh literacy tasks (L1 Welsh, Simultaneous, L1 English) and four levels for English literacy tasks (L1 Welsh, Simultaneous, L1 English, Monolingual). All post-hoc analyses were based on Tukey's HSD, unless noted otherwise.

Given the differences in age between the TD 7-8 year olds and the 10-11 year olds with MLD, and the fact that the MLD group were deliberately selected to be atypical of 10-11 year olds, raw scores were used for the comparisons instead of standardised scores.

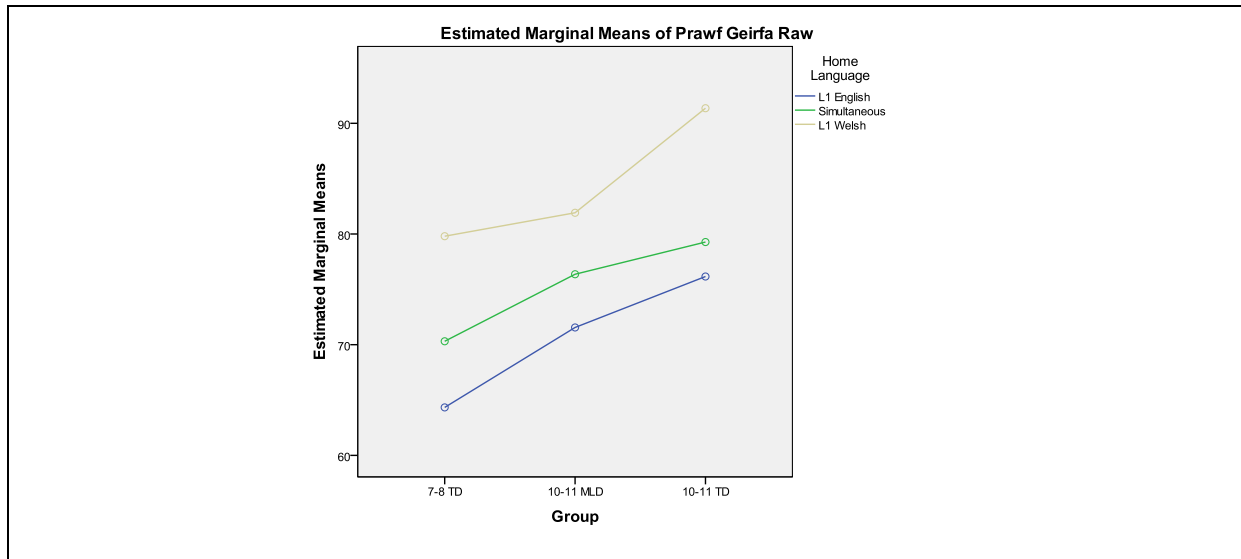
The size of each group is around the generally accepted number for statistical analyses with the exception of the L1 Welsh group with MLD (N=12) which must be considered when interpreting the significance of the findings in relation to this group.

#### **8.3.1 Welsh Vocabulary (Prawf Geirfa)**

A significant main effect of group was found ( $F(2,252)=21.85, p=0.00$ ). Post-hoc analyses indicated that the TD 7-8 year olds performed significantly less well than the TD 10-11 year olds ( $p=0.00$ ) and the TD 10-11 year olds scored significantly higher than the 10-11 year olds with MLD ( $p=0.02$ ). No significant differences were found between the TD 7-8 and the MLD 10-11 year olds ( $p>0.05$ ).

There was also a significant main effect of home language ( $F(2,252)=25.61, p=0.00$ ). Post hoc analyses indicated that the L1 Welsh ( $M=85.67$ ) performed significantly better than the Simultaneous ( $M=75.70; p=0.00$ ) and the L1 English bilinguals ( $M=71.60; p=0.00$ ). No interactions were found ( $p>0.05$ ).

Figure 3 Graph illustrating the Welsh Vocabulary scores according to age group and home language



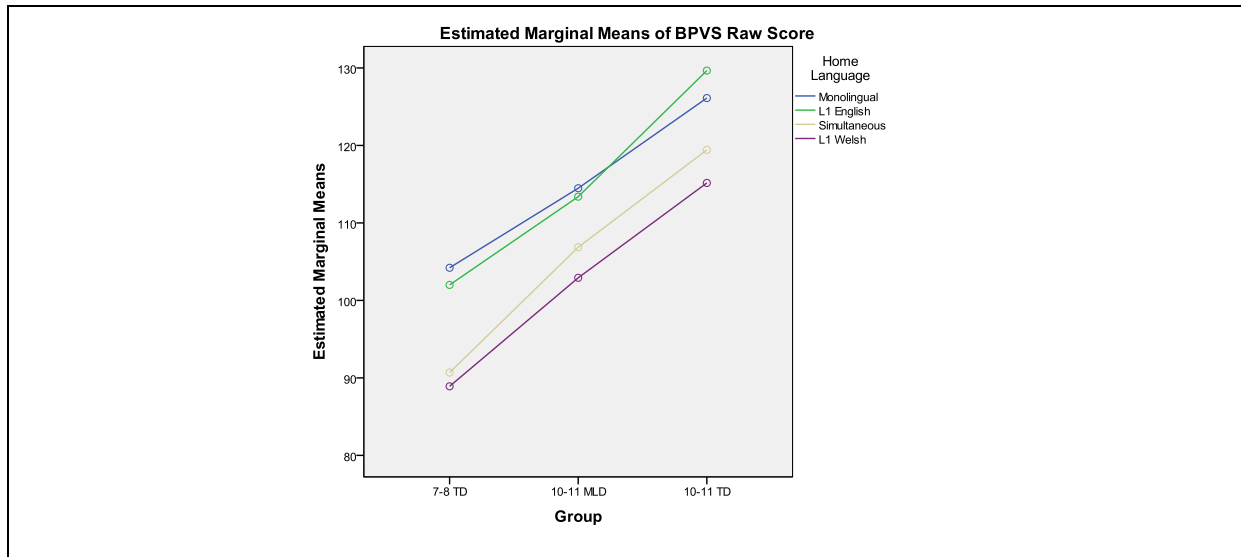
### 8.3.2 English Vocabulary (BPVS)

A significant main effect of group was found ( $F(2,351)=93.8, p=0.00$ ). Post-hoc analyses indicated that the TD 10-11 year olds scored significantly higher than the TD 7-8 year olds ( $p=0.00$ ) and the 10-11 year olds with MLD ( $p=0.00$ ). The 10-11 year olds with MLD scored significantly higher than the TD 7-8 year olds ( $p=0.00$ ). No other significant differences were found in relation to ‘group’.

There was also a significant main effect of home language ( $F(2,360)=10.54, p=0.00$ ). Post-hocs indicated that the Monolinguals ( $M=115.21$ ) scored significantly higher than the L1 Welsh ( $M=103.45; p=0.00$ ), and the L1 English ( $M=117.98$ ) scored significantly higher than the Simultaneous ( $M=109.69; p=0.005$ ) and the L1 Welsh ( $p=0.00$ ). No other significant differences were found or interactions ( $p>0.05$ ).



Figure 4 Graph illustrating the English Vocabulary scores according to age group and home language

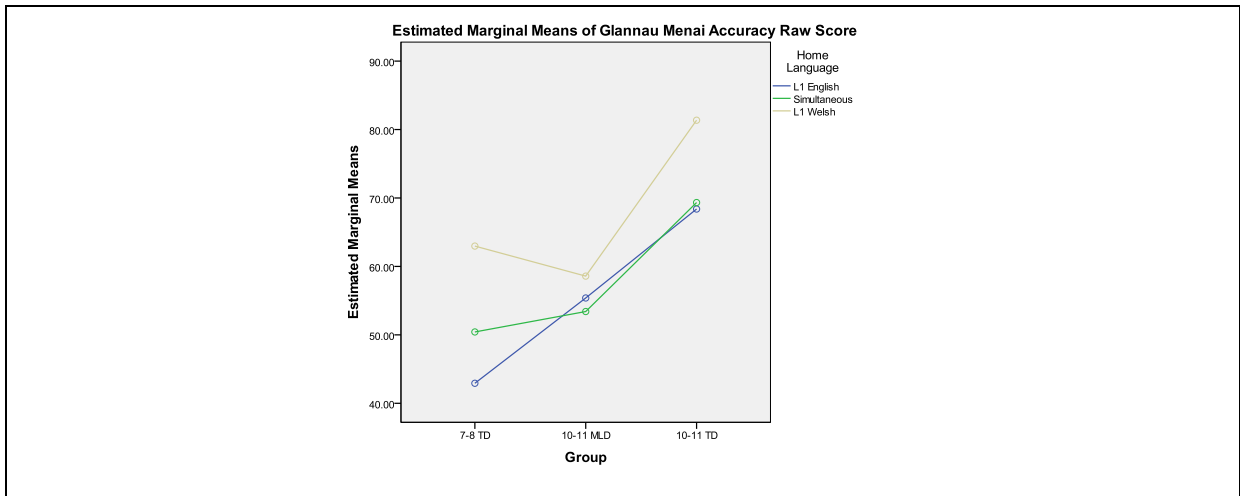


### 8.3.3 Welsh Reading Accuracy (Glannau Menai)

A significant main effect of group was found ( $F(2,252)=29.94, p=0.00$ ). Post-hoc analyses indicated that the TD 10-11 year olds scored significantly higher than the TD 7-8 year olds ( $p=0.00$ ) and 10-11 year olds with MLD ( $p=0.00$ ). There was no significant difference between the 10-11 year olds with MLD and the TD 7-8 year olds ( $p>0.05$ ).

There was also a significant main effect of home language ( $F(2,252)=7.08, p=0.001$ ). Post-hoc analyses indicated that the L1 Welsh group ( $M=71.29$ ) scored significantly higher than the L1 English ( $M=58.03; p=0.00$ ) and the Simultaneous bilingual groups ( $M=58.94; p=0.00$ ). No significant interactions were indicated ( $p>0.005$ ).

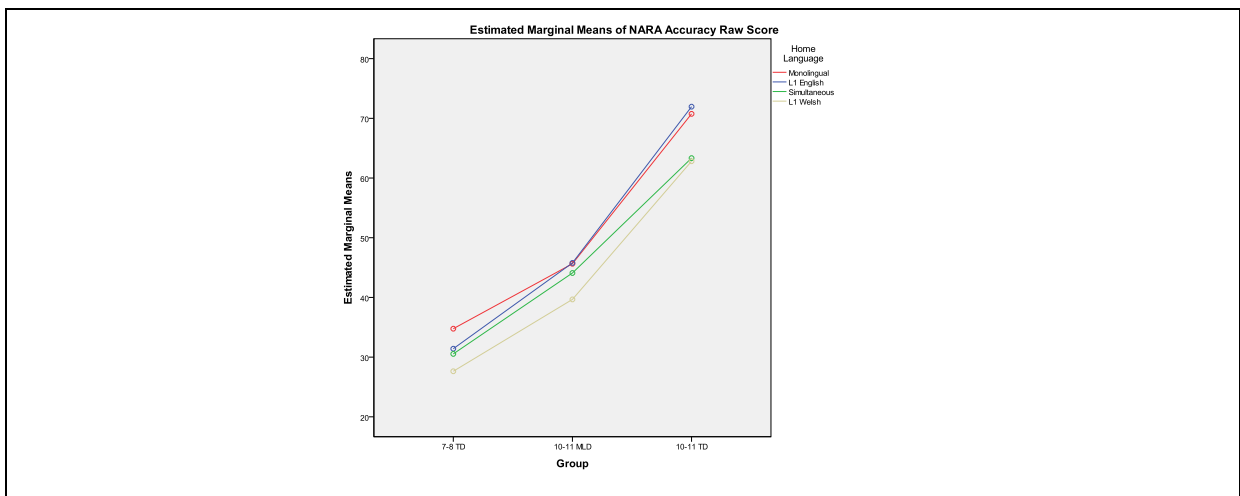
Figure 5 Graph illustrating the Welsh Reading Accuracy scores according to age group and home language



### 8.3.4 English Reading Accuracy (NARA)

A significant main effect of group was found ( $F(2,259)=106.25, p=0.00$ ). Post-hoc analyses indicated that the 10-11 year olds with MLD scored significantly higher than the TD 7-8 year olds. Similarly the TD 10-11 year olds scored significantly higher than the TD 7-8 and 10-11 year olds with MLD (all  $p$  values =0.00). No main effect of home language was found, or interactions (all  $p$  values >0.05).

Figure 6 Graph illustrating the English Reading Accuracy scores according to age group and home language

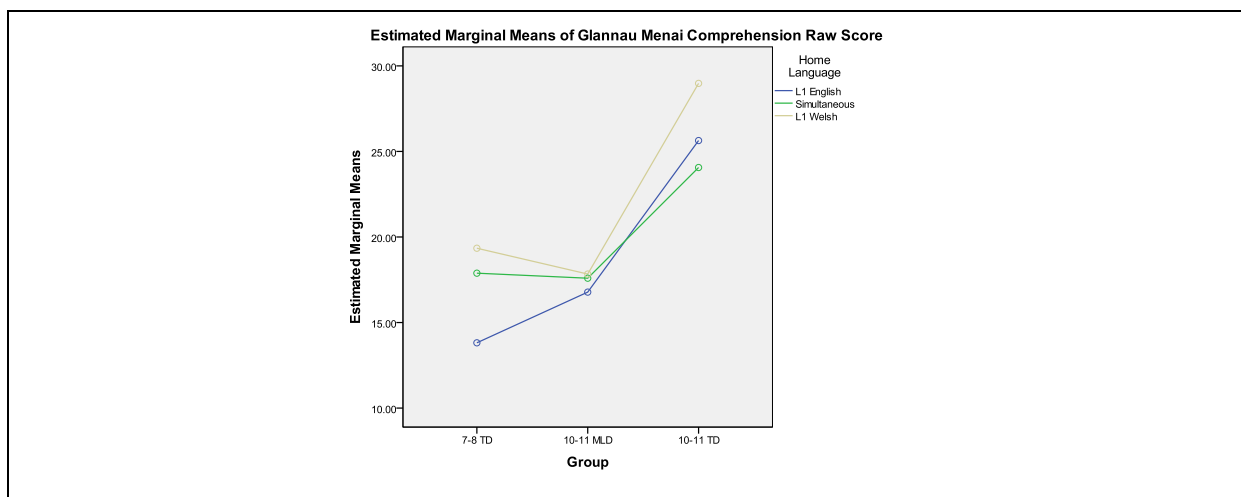


### 8.3.5 Welsh Reading Comprehension (Glannau Menai)

A significant main effect of group was found ( $F(2,252)=40.6, p=0.00$ ). Post-hocs indicated that the TD 10-11 year olds scored significantly higher than the TD 7-8 year olds ( $p=0.00$ ) and the 10-11 year olds with MLD ( $p=0.00$ ). There was no significant difference between the 10-11 year olds with MLD and the TD 7-8 year olds ( $p>0.05$ ).

There was also a significant effect of home language ( $F(2,252)=3.14, p=0.045$ ). Post-hocs indicated that L1 Welsh group scored significantly higher than the L1 English ( $p=0.009$ ) and the Simultaneous group ( $p=0.013$ ). No significant interactions were indicated ( $p>0.005$ ).

Figure 7 Graph illustrating the Welsh Reading Comprehension scores according to age group and home language

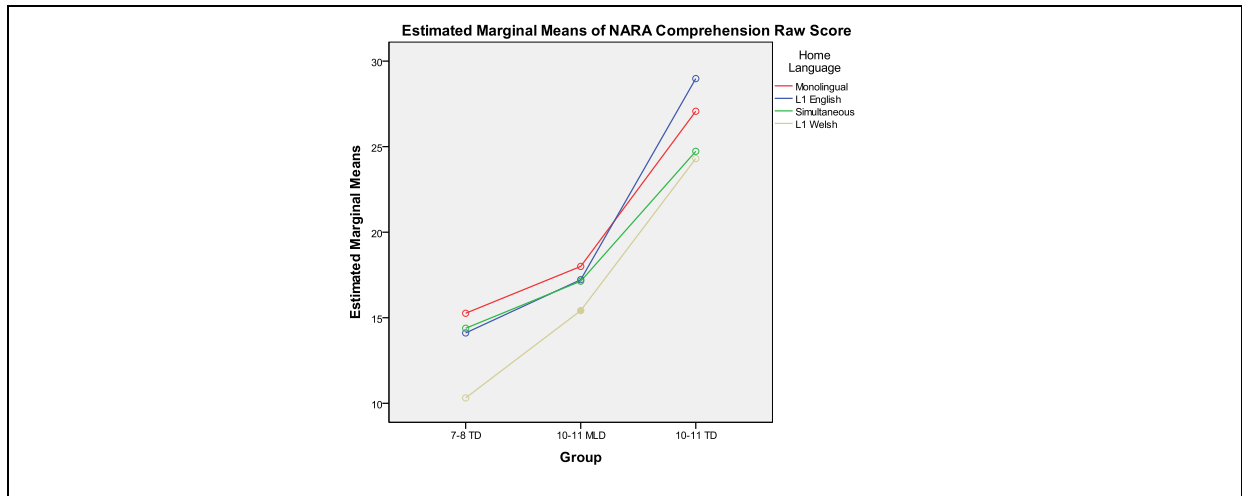


### 8.3.6 English Reading Comprehension (NARA)

A significant main effect of group was found ( $F(2,351)=2.84, p=0.00$ ). Post-hocs indicated that the TD 10-11 year olds scored significantly higher than the TD 7-8 year olds ( $p=0.007$ ) and the 10-11 year olds with MLD ( $p=0.00$ ). The 10-11 year olds with MLD also scored significantly higher than the TD 7-8 year olds ( $p=0.00$ ).

Home language was also significant ( $F(2,359)=2.84, p=0.038$ ). Post-hocs indicated that the L1 English scored significantly higher than the L1 Welsh group ( $p=0.002$ ). There were no other significant differences for home language. No significant interactions were indicated ( $p>0.005$ ).

Figure 8 Graph illustrating the English Reading Comprehension scores according to age group and home language



## 8.4 SUMMARY OF THE VOCABULARY AND LITERACY RESULTS

The following table presents an overview of children's performances on all of the literacy tests. The purpose of this is to provide a synopsis of significant group differences as measured by all tests used in the study measuring linguistic skills in Welsh and English.

Table 11 Overview of the statistical analyses on the Welsh and English vocabulary, reading accuracy and reading comprehension tasks

Measures		Chronological Age Match	Developmental Age Match
	Home language	TD 10-11 vs. 10-11 MLD	TD 7-8 vs. 10-11 MLD
<b>Welsh Vocabulary</b>	L1 Welsh > L1 English and Simultaneous	TD > MLD	No group differences
<b>English Vocabulary</b>	Monolinguals > L1 Welsh L1 English > Simultaneous L1 English > L1 Welsh	TD > MLD	MLD > TD
<b>Welsh Reading accuracy</b>	L1 Welsh > L1 English and Simultaneous	TD > MLD	No group differences
<b>English Reading accuracy</b>	No group differences	TD > MLD	MLD > TD
<b>Welsh Reading Comprehension</b>	L1 Welsh > L1 English and simultaneous	TD > MLD	No group differences
<b>English Reading Comprehension</b>	L1 English > L1 Welsh	TD > MLD	MLD > TD

Of the English and Welsh measures used in these analyses, all vocabulary and literacy measures indicated that the TD 10-11 year olds outperformed 10-11 year olds with MLD and the TD 7-8 year olds. This was consistent with what was expected and indicated validity of the data. None of the measures found children with MLD to have performed statistically less well than their developmentally age matched peers (MLD 10-11 v TD 7-8) but instead indicated that they performed significantly better than their developmentally-age matched peers on all three measures of English vocabulary and literacy.

These Welsh and English measures indicate that children with MLD's language and literacy skills do not appear to be negatively affected by bilingualism when compared with their bilingual developmentally age matched peers. The differences found between the Welsh and English measures where those with MLD did better than the TD 7-8 year olds on English measures, but not on the Welsh measures may have implications for the impact that language experience may have on bilingual vocabulary and literacy acquisition.

The impact of language experience will also be discussed in light of the 'home language' findings as the children who were tested in their L1 consistently performed better than those who were being tested in their L2 with the simultaneous bilinguals performing in between (with the exception of English reading accuracy). Interestingly however, no significant differences were found between the monolingual and L1 English groups on English measures despite the monolingual group receiving a greater amount of English exposure in school. These issues will be taken up in the next chapter.

## **9 VOCABULARY AND LITERACY DISCUSSION**

### **9.1 OVERVIEW**

This chapter discusses the findings on the vocabulary and literacy tasks in relation to the literature. The results are first discussed in relation to the research predictions, followed by a discussion of the Welsh language measures and the English language measures. Following each sub-section which discusses the findings according to language, the impact of home language and moderate learning difficulties on performance in language and literacy tasks is considered.

The primary aim of this part of the research was to explore the effects of Welsh-medium (WM) education on the first and second language of children with moderate learning difficulties abilities. This was achieved through testing the Welsh and English vocabulary, reading accuracy and reading comprehension abilities of 10-11 year-olds with MLD and typically developing (TD) 7-8 year olds who were either

- first language Welsh bilinguals (L1 Welsh)
- first language English (L1 English ) bilinguals,
- simultaneous bilinguals
- monolingual English.

The language and literacy skills will be discussed in the following order: Welsh vocabulary (measured with the Prawf Geirfa), Welsh reading accuracy and comprehension (measured with the Glannau Menai), followed by English vocabulary (measured with the BPVS) the English reading accuracy and English readingComprehension (measured with the NARA).

### **9.2 PREDICTIONS AND ENGLISH VOCABULARY OVERVIEW OF FINDINGS**

It was predicted that the bilingual 10-11 year-olds with MLD would perform at similar levels to the developmentally age-matched TD 7-8 year olds. Analyses indicated that when compared with TD-7-8 year-olds, children with MLD performed similarly on the Welsh language tests (no significant differences). Interestingly however, children with MLD performed significantly better on all of the English language tasks than the TD 7-8year olds. This will be discussed in the latter section. The findings also indicated that the vocabulary and literacy abilities of children with MLD were comparable, if not better than their

developmentally –age matched peers which suggests that the children with MLD in WM bilingual education are performing at expected, or higher than expected levels.

For both the typically developing children and children with moderate learning difficulties, their home language appeared to affect how well they did on the language and literacy tasks; those who were L1 Welsh performed better on the Welsh vocabulary and literacy measures than those who had less or no Welsh at home. The pattern was similar for English vocabulary, that is, those who were L1 English performed similarly to monolinguals, as did the simultaneous bilinguals, thus indicating that some English in the home may be beneficial to the development of English vocabulary in particular. Conversely, no group differences were found on measures of reading accuracy. Differences in the findings between the English and Welsh measures will be discussed in latter sections.

### **9.3 WELSH LANGUAGE ABILITIES**

In relation to the main aim of exploring the impact of WM education on the language skills of children with MLD, a secondary question related to the effects of being educated through Welsh on the Welsh language skills of children from differing home language backgrounds. It was predicted that (i) children with MLD would perform at similar levels to their TD developmentally age-matched peers on the Welsh language measures and (ii) there would be an effect of exposure with the L1 Welsh performing best and L1 English performing worst.

#### **9.3.1 Welsh Vocabulary**

No significant differences were found between the children with MLD and their developmentally age-matched peers which is seen to support the main prediction that children with MLD's language skills are not disadvantaged as a result of bilingualism when compared with their TD 7-8 year old peers. However, in line with the sub-prediction, the L1 Welsh children with MLD performed significantly higher than the L1 English and simultaneous bilinguals - a pattern also seen with TD bilinguals in Wales. These findings also correspond with other TD vocabulary acquisition studies demonstrating differential performance relative to the amount of exposure one has to a language (Oller, 2005; Genesee, 2001; Hakuta and Diaz, 1985). However, many of the studies that demonstrate the significance of linguistic exposure also suggest that bilinguals achieve monolingual levels following sufficient



exposure to the language (e.g. Kovelman, Baker and Petitto 2008, Oller, Pearson and Cobo-Lewis, 2007; Oller and Eilers 2002). This study identified that this may not be the case for children from Simultaneous or L2 Welsh speaking backgrounds. Similarly to their TD peers, the simultaneous and L1 English 10-11 year olds with MLD are not reaching L1 Welsh levels. This may be to do with exposure as L1 Welsh children receive Welsh from birth and those simultaneous or L1 English bilinguals are likely to receive less Welsh until they begin school between 3 and 4 years of age.

The findings from the current study provide tentative support for the view that vocabulary knowledge, after controlling for developmental age, does improve with exposure to the language. As expected, TD 10-11 year olds scored significantly better than TD 7-8 year olds on the Prawf Geirfa. However, there was also a trend towards the 10-11 year olds with MLD scoring better than the TD 7-8 year olds. This trend was non-significant so further research is needed but this finding may suggest that language exposure does improve language abilities after controlling for developmental age. That is, despite the differences being non-significant between the 10-11 year olds with MLD and the TD 7-8 year old developmental age-match, there was a trend towards higher scores for the children with MLD. Similarly, despite the TD 10-11 year olds performing significantly better, the differences (see

Figure 3) between the TD 10-11 year olds and the 10-11 year olds with MLD is smaller than between the TD 7-8 year olds and 10-11 year olds with MLD, despite the developmental age being significantly different. Again, this trend was non-significant so further research is needed but this finding may suggest that increased language exposure as a result of age does improve vocabulary abilities after controlling for developmental age

### **9.3.2 Welsh Reading Accuracy and Comprehension**

Similarly to Welsh vocabulary, no significant differences were found between the children with MLD and the developmentally age-matched peers which suggests that children with MLD are achieving developmental-age appropriate levels. There was however a clear effect of input with the L1 Welsh bilinguals performing best with the simultaneous and L1 English bilinguals reading less accurately and comprehending fewer aspects of the text. Although differences were expected given the reported importance of linguistic exposure to language development and that both language and literacy are thought to correlate (Duursma et al.

2007), this does raise concern as to what extent these children, who are learning through their L2, can access the curriculum and whether they are in fact at a disadvantage because of this, particularly in light of the difficulties that children with MLD are already experiencing in their learning.

Another finding that was less expected was the significant differences found between the home language groups on Welsh reading accuracy given the transparency of the Welsh system (Hanley et al, 2004; Spencer and Hanley, 2004) as it is generally reported that a transparent system is more readily acquired than an opaque system such as English.

### **9.3.3 Moderate Learning Difficulties (Welsh measures only)**

In accordance with the prediction, the vocabulary and literacy skills of bilingual children with MLD in WM education is comparable to that of their TD developmentally age-matched peers. This may indicate that immersion education is achieving its language transmission goals for children with MLD. On the other hand, this lack of significant differences on the Welsh measures and the identification of significant differences on English measures, may suggest that children with MLD are doing less well in Welsh than in English which may indicate that children with MLD are not reaching their fullest potential in Welsh language proficiency. While this may be an artefact of group sizes (i.e L1 Welsh 10-11 year olds, N=12), these findings may also merit further exploration as there may be other possibilities for this finding such as teachers making the choice to de-emphasise the Welsh and support in English for those not from L1 Welsh homes, or perhaps, it may be due to the lack of Welsh language speaking professionals available in Education to support children with MLD.

### **9.3.4 Home language differences (Welsh measures only)**

Despite the literature on bilingualism that suggests that with increased exposure bilingual children can reach monolingual-like levels, these data have demonstrated that children with MLD who are not from L1 Welsh homes are performing significantly less well than their L1 Welsh peers across Welsh vocabulary and literacy skills. In accordance with Rhys and Thomas (2012) there are four possible reasons for this:

First, Welsh is a minority language in and English majority/dominant environment. As a result of this, those children who do not receive Welsh at home may only be exposed to

Welsh in school thus rendering Welsh linguistic exposure much less than the L1 Welsh group. Though it could be argued that Gwynedd is the county that has the highest proportion of Welsh speakers in Wales (> 60%) which increases the dominance of Welsh in the environment, English is arguably still the most prevalent language for those who do not come from L1 Welsh backgrounds for the following reasons (i) the prevalence of L1 Welsh speakers varies from area to area in Gwynedd (from 35% in Aberdyfi, and 36% in Bangor city centre to 88% in Llanrug) which may mean that only some non L1 Welsh speaking children are exposed other L1 Welsh speakers (ii) just because there is a high prevalence of Welsh speakers in the area does not guarantee that those individuals will be socialising in that language; Thomas & Roberts (2011) has demonstrated that young children, despite using Welsh in school are more likely to use English outside of the classroom and (iii) the linguistic environment is either bilingual or English. This is contrary to many of the bilingual studies that often focus on two majority- status languages (as is French-English in Canada, Spanish-English in The U.S.A.). Second, the results may relate to the lack of use of Welsh with peers in school (Thomas, Lewis and Apolloni, 2012) and the enhanced need for Welsh language initiatives in the community to promote language use (Williams, 2008). This ties in with the third explanation regarding the availability of Welsh language media given the prominence of media. Alternatively, as mentioned in the former paragraph, this may be a result of teachers de-emphasising the Welsh for children who are perceived to be struggling in their L2.

The availability and perceived desirability of Welsh media (such as television and books) is far smaller than English media. For example, compared with the tens of free view channels in English, there is only one Welsh language channel and far fewer Welsh books than English - many of which are often adaptations or translations from the English. Increasing children's engagement with Welsh media outside of school may be a challenge given the prominence and availability of English despite the commonly reported benefits of reading outside of school for vocabulary and reading comprehension (Allen, Cipielewski and Stanovich, 1992) and the language benefits that can be had from television when accompanied with adult interaction (Saxton, 2010).

The fourth explanation regarding the scoring of the reading test and is predominantly related to Welsh reading accuracy scores. Children in the Welsh reading tests are scored 'correct' if the children read the word accurately aloud and any mistakes were scored 'incorrect'. Compared to other language tests, the Welsh ones may be stricter given the morphological

changes the word undergoes in some syntactic contexts due to the mutations rule (see Thomas and Gathercole, 2007). For example, following a preposition such as ‘on’ (ar), the subsequent word’s initial letter changes; bwrdd (table) becomes ‘ar fwrdd’. Children on reading these syntactic structures which cause mutations may not produce the mutated initial sound. Although this does not change the semantics, it is scored incorrectly. Research is needed to explore this issue further.

The assumption that children in WM education are achieving monolingual-like levels in Welsh has not been supported in this study, yet the children with MLD have not been shown to be performing significantly worse than the TD children who were developmentally age matched. While these findings appear to be positive for children with with MLD in WM education, the findings do have implications for practice given that bilingual children who are not from L1 Welsh backgrounds, in general, are not achieving monolingual-like levels in Welsh. This is a concern given that the majority of the curriculum is delivered through the medium of Welsh and the importance of language to access the curriculum. This is similar to the findings of Verhoeven and Vermeer (2006) who also found evidence to suggest that in the language measures used in their study, the bilingual children being educated through their L2 with mild intellectual disability were performing significantly worse than the monolingual peers with mild intellectual disability. This is a concern for all children however the possibility remains that the implications may be greater for those who are already underachieving across most areas of the curriculum, as are children with MLD. More research is needed on this matter. These findings are also similar to those of Kay-raining Bird et al (2005) who found bilingual children with Down’s Syndrome to either be performing better in their English language than than second-language skills or with equal English and second-language skills. This comparison is made tentatively due to the difference in methodology (i.e. Kay-Raining Bird comparing individuals vs groups in this research), the pattern of findings appear similar.

These findings may be interpreted in light of language use and exposure however interpreting these findings are hindered because of the lack of questionnaires returned that contained vital information regarding detailed language use of the parent with the child. More detailed qualitative follow up research would be useful which interviewed parents on their language use with their children.

## **9.4 ENGLISH LANGUAGE ABILITIES**

Another aim of the research related to the effects of being educated through Welsh on the English language skills of children from differing home language backgrounds with MLD. It was predicted that (i) children with MLD on the English language measures would perform at similar levels to their TD developmentally age-matched peers (ii) there would be an effect of exposure with the L1 English performing best and L1 Welsh performing worst. A monolingual sample was also added to the English measures to explore to what extent children with MLD reach monolingual English levels in their language abilities. It was predicted that the L1 English children would perform at monolingual levels given the dominance of English in the environment.

### **9.4.1 English Vocabulary**

Children with MLD were significantly better than their developmentally age matched peers on measures of English vocabulary which does not support the main prediction that children with MLD's English language skills would be at developmentally-age appropriate levels, but were instead seen to make improvements with age and experience. This is in line with other literature that suggests that language experience is essential to bilingual proficiency (Rhys and Thomas, 2012; Sundara, Polka, Genesee, 2006).

Similarly to the Welsh vocabulary there was also an effect of exposure as the L1 Welsh bilinguals performed significantly lower than the monolingual and L1 English groups. These results mirror those of Oller, Pearson and Cobo-Lewis (2007) and Rhys and Thomas (2012) but are somewhat surprising given that Gathercole and Thomas (2009) found evidence to suggest that equivalent home language groups performed similarly on measures of vocabulary and grammatical development. Due to the dominance of English in Wales, it is also believed that English acquisition is more guaranteed than Welsh and that it is almost automatically acquired. Welsh-medium education therefore focuses its efforts on Welsh language immersion and does not begin English language instruction until age 7 (year 3). These results have two possible implications for practice, particularly in relation to children from L1 Welsh homes. First, some literature suggests that equal instruction in both languages from a young age may be more beneficial to language development (Kovelman, Baker and Petitto, 2008) and therefore introducing English before year 3 may be beneficial to the L1 Welsh group. On the other hand, it is also argued that to achieve fluency in both languages,

proficiency in the L1 is desirable prior to introducing the L2 as this enables linguistic transfer (Leseman, 2000; Bialystok, 2006), it could be argued that introducing English later may be more beneficial. The English vocabulary of L1 English and simultaneous bilinguals however reached monolingual-like levels despite the L1 English group experiencing considerably more English at home than the simultaneous bilinguals, thus suggesting that some English in the home may be beneficial to vocabulary development (Scheele, Leseman, and Mayo, 2009).

#### **9.4.2 English Reading Accuracy**

As in the case of English vocabulary, children with MLD were significantly better than their developmentally age matched peers on measures of English reading accuracy. There was no effect of home language, and all bilingual groups performed comparably. While this finding may support the school of thought that suggests that in situations where a language holds majority status over another, its acquisition is believed to be more guaranteed than the acquisition of a minority language (Baetens Beardsmore and Swain, 1985), this cannot account for why differences existed between some home language groups on the other two measures.

These findings are however somewhat similar to Parsons and Lyddy's (2009) research on Irish-English bilingual children and found that by class 4 (age 9-11) the reading accuracy between the bilingual children attending Irish-English education and those monolinguals attending English medium schools only could not be differentiated across the English tasks which support the view that "the language in which reading is formally introduced is not critical to later L1 reading attainment" (p.509), particularly in the majority language.

#### **9.4.3 English Reading Comprehension**

As in the case of English vocabulary and accuracy, children with MLD were significantly better than their developmentally age matched peers on measures of English reading accuracy which disproved the prediction. This supports the notion that language experience may impact language proficiency (Rhys and Thomas, 2012; Sundara, Polka, Genesee, 2006) and may have implications for instructional practices in school. These data also suggested that the L1 Welsh group were performing significantly less well than their L1 English peers which is likely to be related to exposure. As was mentioned in the English vocabulary section, this

may have implications for (i) the introduction of English medium instruction earlier than year 3 (age 7) (ii) later introduction of English medium instruction which will allow sufficient development of the L1 to ensure linguistic transfer into the L2.

#### **9.4.4 Home Language Differences (English measures only)**

Together these English measures indicate findings that are on one hand expected, and on the other unexpected. It is perhaps most expected that those bilinguals who received some English at home were performing at monolingual-like levels in vocabulary and reading comprehension as it is commonly reported that increased exposure to a language results in superior performance. These findings suggest that those being educated in their L2 do not experience any apparent costs to their L1 skills. That is, those children in Welsh-medium education who are from English speaking homes develop Welsh at no cost to their English (but maybe at some cost to their proficiency in subjects taught through their L2). In a recent BBC Wales report analysed the levels achieved by 25,000 children in English-medium and Welsh-medium schools at the end of primary school. The report demonstrated that more children in Welsh-education achieved Level 4 English language, Science and Maths than those in English-medium schools – that is they were less likely to ‘underperform’. It was also demonstrated that there was little difference between the maths and science performance of first language Welsh speakers in Welsh-medium schools (44% maths, 44% science) and those in English schools (43% maths and 44% science). However, fewer pupils being educated through their second language (first language English speakers) in Welsh medium schools reached level 5 in maths and science (39% maths, 38% science). Similarly, more first language Welsh speakers achieved level 5 in Welsh (45%) compared to 30% of those who were being educated through their second language (BBC Wales, 2014).

On the other hand however, the findings that the L1 Welsh group were performing significantly worse than the L1 English and Monolingual groups across vocabulary and reading comprehension measures was unexpected for a number of reasons. First, this research conflicts with Gathercole and Thomas’ (2009) findings that demonstrated that English vocabulary and grammatical knowledge is comparable by age 9 across three kinds of bilingual groups, as used in this research. Second, children are exposed to native-like input in English (Gathercole, 2007), and third, English is the majority language in most areas of

Wales and much of the linguistic environment is either English only or bilingual (Rhys and Thomas, 2012).

Another unexpected finding was that despite home language differences being indicated on the vocabulary and reading comprehension, no home language differences were found on reading accuracy. This is somewhat surprising given that English is an opaque system and opaque systems are more difficult to acquire than transparent systems (as is Welsh) yet home language differences existed on Welsh reading accuracy. These findings on one hand are positive as they suggest that English reading accuracy development is likely regardless of the first language in which literacy instruction is introduced. In relation to English reading accuracy these findings add weight to Parsons and Lyddy's (2009) work that suggests that reading accuracy develops to expected levels regardless of the first language that reading instruction is introduced. That is, despite reading instruction being first introduced in Welsh, and English not being formally introduced until year 3 (age 7-8), the children are making developmentally-expected progress regardless of their home language.

On the other hand they have implications for the instruction of reading comprehension as the L1 Welsh children are not achieving comparable levels to their monolingual peers. The importance of reading accuracy must therefore be questioned, particularly if the children from Welsh speaking homes are unable to make sense of the text that they are reading.

Together these findings suggest that the acquisition of the English vocabulary and comprehension may be less automatic than previously thought and continued targeted instruction or enhanced English provision may be warranted. These will be discussed as implications in a subsequent chapter.

#### **9.4.5 Moderate Learning Difficulties (English measures only)**

It was predicted that children would perform at developmentally age- appropriate levels, however those with MLD performed significantly better than the TD 7-8 year olds. This finding was mostly surprising because the superior performance observed for the English measures wasn't observed for the Welsh measures. There are a number of possible reasons for this, however, due to lack of research in this field reasons for this can only be speculative or anecdotal.



First, it is possible that because the 10-11 year olds with MLD had received 3-4 more years of English instruction than the TD 7-8 year olds they may have benefitted in terms of developing superior language skills. Second, it is possible that because the children with MLD had been identified as having an SEN, they may have been receiving more educational interventions which may involve a greater use of English. For example, it is commonly reported that there is a lack of Welsh speaking professionals in Education and improving this area of Welsh language provision is often noted in Welsh educational policy; or perhaps teachers employ a strategy of supporting the children through their L1 in English. Third, this issue may relate back to English being a majority/dominant language in many areas of Welsh, that is, all language in the public domain is either monolingual or English which is in line with the Welsh Government's Welsh language policy, and the acquisition of a dominant language is believed to be more guaranteed than a less dominant minority language (Baetens, Beardsmore and Swain 1985; Gathercole and Thomas, 2009).

#### **9.4.6 Summary**

In consideration of both Welsh and English vocabulary and reading abilities, one notable finding is that these data suggests that two languages can be acquired in children with a MLD to levels that are developmentally-appropriate (or better) when compared with TD 7-8 year old peers.

In consideration of home language differences however, findings which were also indicated with TD children, the development of Welsh language abilities in these children with MLD, who are not from L1 Welsh homes is lagging behind their L1 Welsh peers, which is potentially due to less exposure. One possible line for further investigation however is the impact of these lower Welsh language abilities on their ability to access the Welsh medium curriculum - a key area that children with MLD are known to struggle with.

The English language abilities of the L1 Welsh group are also significantly lagging behind their other bilingual peers. This finding also appears to be a result of exposure. This does however suggest that despite English being a dominant language in Wales, the acquisition of English is perhaps less guaranteed than suggested in the literature (Baetens, Beardsmore and Swain 1985; Gathercole and Thomas, 2009). However, despite the home language

differences that have been identified in this study, children with moderate learning difficulties are reaching or exceeding developmentally-age appropriate levels.

The implications of these findings will be discussed further in a latter chapter.

## **10 EXECUTIVE FUNCTIONING**

### **10.1 OVERVIEW**

Exploring the linguistic and cognitive advantages and disadvantages of bilingualism has long been a focus of research. While researchers concluded in the early 20<sup>th</sup> century that there were significant disadvantages to intelligence as a result of bilingualism, current research is more likely to discuss the cognitive advantages and its linguistic impact.

While there is large amount of empirical evidence regarding the executive functioning benefits of bilingualism in typically developing children (TD), little is known regarding non-typically developing children, such as those with moderate learning difficulties (MLD) but despite little empirical evidence, anecdotal evidence suggests children with MLD's problems may be compounded by being educated through a language other than that of their home.

Welsh-medium education educates TD and non-TD children from all home language backgrounds, with some being educated through their second language. It may be intuitively argued that using two languages places more of a linguistic and cognitive load on those who are already struggling with the curriculum; and some professionals have been reported to advise the use of only one language with children with special educational needs, and again, this despite little empirical evidence. Therefore, informing parents of the benefits or costs of bilingualism may enable them to make a somewhat more informed decision.

In this second part of the thesis, there will be a series of chapters that explore literature that suggests there are executive functioning advantages as a result of bilingualism, and whether the findings of studies with TD children can be extended to children with MLD. As in the language and literacy chapters, the TD literature will be discussed first as this provides an overview of EF and a rationale for the tasks used in this study as, given the paucity of the literature, this would not be possible through focusing exclusively on EF and MLD.

This chapter outlines executive functioning and its development in typically developing children and those with moderate learning difficulties. It then goes on to discuss executive

functioning in relation to bilingualism and will place particular emphasis on the tasks and/or EF skills targeted in this thesis.

## **10.2 DEFINITION OF EXECUTIVE FUNCTIONING**

Executive Functioning is a theorised higher-order control system and is believed to control actions outside of our ‘automatic processes’ which are usually stimulus driven. It is theorised to control cognitive processes such as mental flexibility, planning, rule acquisition and implementation, and inhibition (Bialystok & Hakuta, 1999). On a more practical level, EF is believed to be responsible for the control of cognitive processes which influence the way individuals perform day-to-day actions such as inhibiting inappropriate actions, or realising that an action which is acceptable in one situation may not be appropriate in another. Norman and Shallice (1980) suggest there are a number of situations in which EF is necessary in order to respond successfully, such as: planning or decision making; error correction or troubleshooting; the overcoming of a strong habitual response or resisting temptation; situations which are dangerous or technically difficult; or situations which are new and/or ambiguous.

Despite the abundance of literature on EF, a definitive definition of EF has yet to be established and it is most frequently explored from 3 differing perspectives. Firstly, EF is viewed as an abstract higher order cognitive ability which defines EF in terms of a single entity of mechanism which has output elements (e.g. inhibition, attention etc). Secondly, it is viewed through using neuropsychological tasks to demonstrate the structure or function of EF. Thirdly, it is viewed as a functional construct in terms of what it accomplishes. For example, when a child needs to get dressed in the morning the child needs to represent the problem, choose a plan of action, execute the plan and evaluate the outcome (Zelazo, 2003). Nevertheless, despite its lack of definition and various approaches, Zelazo, Muller, Frye and Marcovitch (2003) note that the hypothesised EF system allows us to explain and ascribe the development of cognitive processes such as memory, attention, conflict resolution and inhibition to EF.

Even though all three perspectives are central to the bilingualism literature, EF is mostly defined on the basis of “what it can accomplish” and many tasks have been developed to measure different aspects of EF and appropriate tasks are selected based on purpose. For example, the Simon and Flanker tasks measure controlled attention, the Stroop Test measures

conflict resolution, sustained attention to response task (SART) measures response inhibition and the Dimensional Change Card Sort Task measures error perseveration. All of these tasks have been involved in studies exploring the bilingual advantage as all involve an element of conflict or an element of inhibiting a habitual, learned or salient response which are believed to be components of EF that are most exercised as a result of the control of two languages (Bialystok, 2011).

### **10.3 THE DEVELOPMENT OF EXECUTIVE FUNCTIONING**

#### **10.3.1 Typically Developing Populations**

Executive Functioning (EF) has been demonstrated to develop gradually, and is first experimentally evident in children from approximately 18 months old (Bialystok, Barac, Blaye and Polin-Dubois, 2010). It is also believed to be the last cognitive system to develop completely; with executive competence only being achieved once children reach 4 to 5 years old (Zelazo, Frye and Rapus, 1996).

There are a number of studies which demonstrate that children under 5 years have difficulties with a number of tasks related to EF. Flavell, Green and Flavell (1986), using an appearance-reality task, demonstrated that 3- to 4- year-olds perseverate in representing objects in a certain way even when it is not appropriate to do so. In this task children were presented with a sponge painted as a rock and children were asked “What does it look like?” and “what is it?” Children under 5 years were more likely to give the same answer for both questions whereas children of 5 and above were more likely to respond correctly to both questions. This task has been found to be correlated with linguistic ability (Jenkins and Astington, 1996), and should be treated with caution, however Bialystok and Senman (2004) have more recently demonstrated that in 3-5 year old, after controlling for linguistic proficiency that EF ability increases with age and is correlated with inhibitory control, as measured by metalinguistic tasks.

This pattern, where children perseverate with a habitual/salient response instead of responding correctly and an age related increase in mental flexibility have also been seen in other EF tasks such as theory of mind tasks (Wimmer and Perner, 1983), reasoning about physical causality (e.g., Das Gupta and Bryant, 1989; Frye, Zelazo, Brooks, and Samuels,

1996), moral reasoning (e.g., Zelazo, Helwig, and Lau, 1996), reasoning about delayed representations (e.g., Povinelli, Landau, and Perilloux, 1996; Zelazo, Sommerville, and Nichols, 1999), and predicting outcomes based on past experiences (see Deák and Maratsos, 1998). With each developmental transition where children can represent more than one rule of increasing complexity this allows children to gain increased control over their behaviour and environment.

As taken from Zelazo (2003), a real-life example may be that when a child sees an oven, touches it, and gets burnt, the child will then learn that the oven induces pain and will probably avoid the oven. The child may then learn to avoid the oven if the red light is showing whereas the oven may not be hot if the red light is off. As the complexity of rules increases so does the child's EF capacity. It is not known conclusively whether experiences develop EF capacity or EF develops our ability to respond to a hierarchy of rules/situations however the enhancement of the EF system in bilinguals is based on the premise that learning two languages (an experience) enhances EF.

### **10.3.2 Moderate Learning Difficulties**

Little is known about the development of executive functioning (EF) in children with moderate learning difficulties (Ponsioen, 2001 cited in Van der Molen et al, 2007) as no known studies have been conducted which detail its developmental trajectory, unlike the study of EF in TD populations (e.g., De Luca, and Leventer, 2008). There is however an implicit assumption that the developmental trajectory is the same for TD children, only slower. In the handful of studies that have demonstrated lower performances on various EF measures when comparing children with MLD with TD children (Non-verbal IQ above 85), most of the studies have demonstrated that EF ability is correlated with developmental age (Van der Molen et al. 2007; Numminen, Lehto and Ruopilla, 2001; Numminen, Service and Ruopilla, 2002). Van der Molen et al (2007) in their study of EF measured dual-task performance, mazes, letter fluency, category fluency and random number generation and found evidence to suggest that children with MLD performed at similar levels to their developmentally-age matched peers. This was also found with verbal fluency (Connors et al, 1998), category fluency (Henry, 2010) and executive loaded working memory (Mahler and Schuchardt, 2009; Henry and Winfield, 2010; Henry and MacLean, 2002). There are however, some inconsistencies in the literature. First, Russell, Jarrold, & Henry (1996) found

evidence to suggest that children with MLD's performance on executive loaded working memory tasks was significantly below developmentally age matched peers, and not similar, as earlier research had suggested. Second, Van der Molen, Van Luit, Jongmans, & Van der Molen (2009) found evidence to suggest that children with MLD performed worse than their developmentally age matched peers on measures of dynamic and spatial short term memory – as measured by the Corsi test. Although Van der Molen et al's primary aims were to explore short-term memory in those with MLD, the researchers themselves explain that the poorer performance was likely to be a result of the Corsi test's reliance on EF.

Danielsson et al (2012), however, in the most comprehensive study of MLD and EF, measured inhibition, planning, switching, fluency and executive loaded working memory on a series of verbal and non verbal tasks. They found ' profile effects' of EF which may explain the conflicting earlier findings. Children with MLD were found to perform similarly to developmentally age matched peers on switching, verbal executive-loaded working memory and most fluency tasks which indicate the ability "to generate new exemplars (fluency) and to switch attention between tasks" yet they scored below on inhibition, planning, and non-verbal executive-loaded working memory which indicate problems when "inhibiting pre-potent responses, planning, and non-verbal executive-loaded working memory" (p.605). Danielsson et al (2012) note that the skills exhibited in their research may be a result, to different degrees, of developmental age and experience. Conversely, all studies that measured differences based on chronological age, noted that children with MLD performed worse than their chronologically age-matched (CA) peers (Connors et al. 1998; Leven et al. 2008; Danielsson, et al, 2012).

### **10.3.3 Executive Functioning, Intelligence and Academic Achievement**

Little is known as to why EF is more impaired in those with MLD than those who are typically developing, however several studies have found EF to be associated with intelligence (Carpenter, Just, & Shell, 1990; Miyake, Friedman, Rettinger, Shah, & Hegarty, 2001) and this has been suggested as a confounding factor in EF performance. Despite this, recent research suggests a more intricate picture when considering the subcomponents of EF. Friedman, Miyake, Corley, Young, DeFries and Hewitt (2006) found intelligence to be highly associated with updating which required young adults to add and delete information from banks of words but little association was found between intelligence and inhibition and

shifting. Conversely, Arffa (2007) found IQ to be related to inhibition, sorting and fluency but not trail making. This is somewhat surprising given that the trail making test has been found to test many sub-components of EF (Salthouse, 2011) and a study of EF as a unitary concept of EF has been found to be the most strongly associated with intelligence (Brydges, Reid, Fox and Anderson, 2012).

Conversely, Mahler and Schuchardt (2009) distinguished between intelligence and learning ability and found EF scores to be associated with learning ability/academic performance through measuring the EF of two groups with learning difficulties (LD); one with a low IQ and another with an IQ above 75 and one TD control group with no LD. No differences were found between the groups with LD but differences were found between the LD groups and a typically developing control group which suggests that different cognitive functioning is not due to differences in intelligence but possibly more related to 'learning ability' or a feature of having a 'learning difficulty'. These findings have been supported in longitudinal studies that suggest that EF contributes to academic achievement (Bull, Espy and Wiebe, 2008; George and Greenfield, 2005), and like intelligence, particular subcomponents of EF have been associated with certain areas of academic attainment. For example van der Sluis, Jong and Leij (2007) found shifting and updating to be most associated with reading attainment, as did St.Clair-Thompson and Gathercole (2006) find evidence to suggest that inhibition was related to academic attainment in English, Mathematics and Science.

Together, these studies suggest that certain subcomponents of EF may be related to intelligence and/or academic ability however findings are mixed. While there does appear to be more of an agreement amongst academics regarding the association between academic achievement and EF (Best, Miller and Jones, 2009; Best, Miller and Naglieri, 2011), the picture is becoming increasingly nuanced with research into the various sub-components of EF based on different tasks and different samples. While the relationship between EF and intelligence is not the focus of this research, this particular relationship may have implications when interpreting the findings given the range of IQs measured. Also, given the deficits children with MLD experience in their EF abilities, exploring the potential benefits of bilingualism may not only have implications for EF abilities but also their academic performance.



## **10.4 EXECUTIVE FUNCTIONING ADVANTAGES AND BILINGUALISM**

It is generally accepted that children utilise cognitive processes that manage both linguistic and non-linguistic abilities that are controlled by executive functioning (EF) (Bialystok, 2001). As the children get older and gain life experiences, children's cognitive processes develop and become more refined. However, the focus of the bilingualism debate hypothesises that cognitive processes can also be developed or enhanced by managing two language systems, and the cognitive load imposed, as a result of these two languages, affects EF. As a result of such a suggestion, a number of studies have indicated that bilingualism can advantage the linguistic and non-linguistic domains in TD children (e.g., Bialystok, 2009, 2010, and others); an advantage, that if found for children with MLD, may have implications for their ability to perform cognitively-loaded tasks such as enhanced attentional control and the ability to ignore irrelevant information.

Enhanced Executive Functioning (EF) in bilingual speakers when compared with monolinguals has been found across ages; from infancy (Kovacs and Mehler, 2009) to older age (Bialystok, Craik, Klein, Viswanathan, 2004), (and using various research techniques) in experimental tasks (Bialystok, 2011) and neuro-imaging studies (Luk, Green, Abutalebi and Grady, 2012). The experimental studies in the literature, and the experimental studies discussed in the following sections, all involve an element of conflict or an element of inhibiting a habitual, learned or salient response which are believed to be components of EF that are most exercised as a result of the control of two languages (Bialystok, 2011). To explore this, the literature surrounding metalinguistic and non-linguistic EF tasks will be discussed.

### **10.4.1 Bilingualism as a Mechanism for Cognitive Advantages**

The theoretical underpinning for much of the current research on the 'cognitive development of bilinguals' is based on the representation of language, where psycholinguistic models share the common assumption that there is a single 'storage space' or overlap of languages in the brain (e.g. Fabbro, Skrap, and Aglioti, 2000; Martin, Dering, Thomas, and Thierry, 2009). The literature often demonstrates that a bilingual engaging in one of their two languages shows co-activation, even when the task is explicitly non-relevant to the interfering language (e.g. Ehri and Ryan, 1980) and it has been suggested, that in order to ensure fluent

performance in both languages and prevent cross-language interference there is a need for a mechanism to control linguistic output.

Ben-Zeev (1977) assumed a “special facility” that inhibits interference between the two languages and has since concluded that this “special facility” stems from executive functioning. In an attempt to document the development of executive functioning and explain bilingual cognitive benefits Zelazo and Frye (1997) employed a theory of Cognitive Complexity and Control (CCC). This theory details the development of a mental hierarchy between the ages of 3-5 using the Dimensional Change Card Sort Task (DCCS) where children are expected to sort a pile of cards onto one of two target cards based on a certain feature (e.g. colour). Children at the age of three and four are able to do this but are unable to re-sort the pile of cards based on a different perceptual feature (e.g. shape) until the age of 5. This is thought to be due to the representational limitations held by children which limits their ability to hold more than one rule in mind and override a prevalent rule with a new one. Based on Zelazo and Frye’s concept of ‘representational limitations’, Bialystok (1999) believes that the same mechanism that manages the ability to complete this DCCS through suppressing one rule while another one is in use, is the mechanism that controls attention between the two language systems in order for one to be suppressed or inhibited while the other one is in use. The mechanism that is most frequently believed to be responsible for such behaviours is the Executive Functioning.

Bialystok (2007), extended Zelazo and Frye’s (1997) CCC theory which hypothesises the use of inhibition and conceptual flexibility within this mechanism. She proposes that three particular cognitive processes are developed and exercised in the control of the dual-language system; attention, inhibition, and switching which may be at the root of the suggested bilingual advantage. In an attempt to explore to what extent the cognitive abilities of bilinguals’ diverge, if at all, from monolinguals or between bilinguals, research has included tasks such as metalinguistic tasks, creativity and divergent thinking (both of which are thought to require executive functioning), and non-linguistic executive functioning tasks. These are discussed in subsequent sections.

### 10.4.2 Metalinguistic Development

Metalinguistic ability is often measured as a reflection of a bilingual's cognitive ability. 'Metalinguistic ability' is used to refer to one's ability to objectively view and attend to language as a 'thing', 'process' or a 'system' whilst systematically ignoring the underlying semantics. This is thought to promote linguistic flexibility and greater analytical ability (Dillon, 2009) - thus being advantageous to cognitive ability.

Ianco-Worrall (1972) tested Afrikaans-English bilinguals, on a sound versus meaning task. Participants were presented with words like "cap", "can" and "hat" and asked which of the other words were most like "cap". Cap and hat are words which represent similar objects but "can" is most similar in sound. After 7 years old monolinguals and bilinguals did not differ significantly in their answer whereas bilingual 4-6 year olds answered "hat" based on meaning whereas monolingual 4-6 year olds answered "can" based on sound. Ianco-Worrall (1972) concluded that bilinguals achieve semantic development earlier than monolinguals. In a second part, Ianco-Worrall researched whether bilinguals are better at detaching a label from an object (or item) and realising that labels that we use are not mutually exclusive. Ianco-Worrall asked the participants whether they could call a dog a "cow" and a cow a "dog" if they were making up names for things. Monolinguals were less likely than bilinguals to realise the interchangeability of words for objects and claimed that the change of a label was not possible.

Similar advantages have been found in syntactic awareness type tasks such as grammatical judgement tasks where bilingual children demonstrate an increased ability to ignore irrelevant material and identify a correct sentence (e.g. Bialystok and Majumder, 1998; Cromdal, 1999) and phonological awareness tasks in preschool children (e.g. Bruck and Genesee, 1995).

The bilingual advantage however is not evident in all aspects of metalinguistic ability and studies which include phoneme substitution (Bialystok, Majumder and Martin, 2003) and determining ambiguity (Galambos and Hakuta, 1988), did not provide results in favour of bilinguals. For example Ronsenblum and Pinker (1983) found no difference between Hebrew-English bilinguals and English and Hebrew monolinguals in a task which required them to substitute a nonsense word for an actual word. Superior performances on some metalinguistic tasks have also been suggested to be directly related to levels of literacy or linguistic proficiency which may impact or constrain the interpretation of findings. This has

been found in relation to word awareness tasks (Edwards and Christophersen, 1988; Campbell and Sais, 1995), morpheme deletion (Campbell and Sais, 1995) and grammaticality judgement tasks (Gathercole, 2002, 2007). Bialystok, Majumder and Martin (2003) examined the phoneme segmentation of Spanish-English and Chinese-English Bilinguals and English monolinguals. While the Spanish-English bilinguals performed better than the monolinguals on this task, the Chinese-English bilinguals performed worse thus indicating that there are significant factors, other than bilingualism per se, that influences performance on metalinguistic tasks. The first is language typology as it could be argued that the more similar two languages are, the greater the perseverance of metalinguistic skills in the tasks. Second is language proficiency, Bialystok, Majumder and Martin (2003) claim that it was possible the Chinese-English participants were not as equally proficient in English as their Spanish-English peers. Third is the language in which the instruction in literacy occurs, as group differences disappeared on tasks where the testing took place in the same language as the literacy instruction.

Bialystok (2001) however notes that the inconsistencies in the performance of bilinguals on metalinguistic tasks are related to the specific cognitive demands made. She notes that the majority of tasks which indicate a bilingual advantage are those that include misleading information thus requiring the high control of attention. For example, the ability to recognise a grammatical violation (e.g. “Apples grewed on trees”) demonstrates a representation of correct linguistic structure and relatively high analytical skill, and the ability to ignore/inhibit the semantic arbitrariness which requires the ability to focus attentional control to that structure (Bialystok, 2001, 2007).

### **Opposite Worlds Task**

In a verbal inhibition task of ‘opposite worlds’, children were required to exercise their inhibitory control, resist making habitual responses and replace them with a conflicting one which is thought to be less of a “representational” task but a “control” task (Bialystok, 2001). The task had two conditions; the pre-test condition participants were required to name the farm animals (pig and cow) as quickly as possible, and in the post-test condition participants were required to reverse the name of the farm animals (i.e. call the cow a pig) and name them as quickly as possible. Although no differences were found in the pre-switch condition (using the correct names), there were significant differences between the mean reaction times

(MRT) in the post- switch condition (Bilinguals; MRT=1073.2ms, SD; 203.1. Monolinguals; MRT =1252ms, SD=404.1). These results support the notion that bilingualism may enhance children's abilities to attend to relevant information in the presence of misleading distractions. These cognitive skills such as inhibition and attentional control have also been demonstrated in the non-verbal executive functioning literature and are used as evidence to support the notion that bilingualism may enhance performance in tasks other than metalinguistic skills alone (Bialystok and Shapero, 2005).

Following these metalinguistic findings, it was decided to include a measure of metalinguistic ability in this research. A Welsh version of the 'opposite worlds' task (Bialystok and Shapero, 2005) was created to explore the metalinguistic abilities of Welsh-English bilinguals with MLD, whether their abilities indicate a bilingual advantage when compared with monolinguals of the same age, and whether the children with MLD are performing at developmentally expected levels. Different kinds of Welsh-English bilinguals with MLD were also tested to explore whether a possible bilingual advantage only pertains to certain 'kinds' of bilinguals (e.g., Simultaneous or Sequential).

Presuming the task tests control as opposed to representational ability Bialystok (1993, 2001), (which involves knowledge of a/the language: Hermanto, Moreno and Bialystok, 2012), this task may be beneficial to this study given the varying abilities of the 4 language groups in this study and their likely varying linguistic proficiency.

### **Fluency**

Another task used to measure linguistic and metalinguistic proficiency is the fluency task. This task typically has two elements: category fluency and letter fluency. Category fluency requires participants to name as many items in that category e.g. animals or clothes, and is believed to be a measure of linguistic proficiency and related to vocabulary size (Delis, Kaplan and Kramer, 2001); Bilinguals typically perform worse than monolinguals due to the association with smaller vocabulary size (Bialystok, Craik and Luk, 2008). Letter fluency (to name words beginning with a particular letter) however is believed to be a measure of linguistic proficiency and cognitive control (Delis, Kaplan and Kramer, 2001) and enhanced cognitive control allows for any discrepancies in fluency abilities between bilinguals and monolinguals be compensated for (Bialystok, Craik and Luk, 2008).

Hermanto, Moreno and Bialystok (2012) in their research on bilingual 7 and 10 year olds in French immersion education compared them with L1 monolingual English speakers on the letter and category fluency task. It was found that while the 7 year old bilinguals performed worse than the monolinguals on the letter fluency task (Monolinguals' mean score - 8.1; Bilinguals' mean score -7.2) the bilingual 10 year olds performed similarly to their monolingual peers. The EF gain is believed to be demonstrated by age 10 due to the greater increase in words produced by the bilinguals who produced 4.3 words as opposed to the monolinguals' 2.6 words over the 3 year period; and this despite the monolinguals consistently outperforming the bilinguals on the category fluency task.

Luo, Luk and Bialystok (2010) also found an evident bilingual advantage when comparing sequential bilinguals (varying home languages but educated in English) with monolinguals on the same fluency task after controlling for language proficiency, however Bialystok, Peets and Moreno (2012) note that this metalinguistic task produces the most complex results as age and exposure to the language are confounding variables.

This task has been included in the research to (i) to explore whether the bilingual advantage is found for children with MLD, and (ii) explore whether children with MLD are performing at developmentally age-appropriate levels, but perhaps more importantly (iii) to explore whether the executive functioning advantage, that is believed to mediate the category fluency differences between bilinguals and monolinguals, exists for children with MLD.

It is important to note here that this fluency task is used as a reflection of both linguistic and cognitive measures in the literature and although this task is discussed in the cognitive (executive functioning) section of this thesis, there may well be linguistic implications as a result of the findings.

#### **10.4.3 Non-linguistic Executive Functioning Tasks**

Non-linguistic executive functioning tasks are the most common measures of executive functioning and most easily control for linguistic ability, which is a complex confounding variable when testing bilinguals. The non-linguistic tasks are also most likely to be discussed in relation to the areas of executive functioning they are thought to measure i.e., sustained attention, inhibition and switching.

This sub-section outlines research which details the results of several tests of executive functioning, including Sustained Attention to Response Task (SART) the Simon task, Flanker task, Stroop task. All of these will be discussed in relation to the components of executive functioning they are believed to measure.

### **Sustained Attention to Response Task (SART)**

The sustained attention to response task (SART; Robertson, Manly, Andrade, Baddeley and Yiend, 1997) is a computerised task in which the numbers 1-9 (the stimuli) are presented on a screen and require the participant to press or not press a response key depending on the number being presented. Participants are required to sustain controlled attention to the stimuli (Bialystok, Craik and Luk, 2008) and inhibit their primed automatic response (i.e. to press the response key; Robertson et al, 1997). Inhibition is thought to be most exercised during the 'do not press' stimuli because of the conflict caused by the priming 'to press' and should create longer response times.

Hypotheses regarding bilingualism and executive functioning would suggest that bilinguals perform better than monolinguals on this task however the limited research findings on this task do not necessarily support this. Bialystok, Craik and Luk (2008) found no differences in the response time or error rate between young (MA 20;7 years) and older (MA 63;3) adult sequential bilinguals and monolinguals; and this despite findings of a bilingual advantage on the Simon task. Comparable findings have also been shown in Meuter and Simmond (2007) with young (MA 23;6 years) and older (MA 74;6 year) adults where all were sequential bilinguals.

Both studies can be criticised on methodological grounds given that Meuter and Simmond (2007) (i) had a low number of participants in their young (N=11) and older bilingual (N=13) groups (ii) no measure of their linguistic proficiency was made as their measure of 'bilingualism' was based on 'years of experience' and, (iii) like Bialystok et al (2008), a range of bilinguals were used who spoke numerous languages. While no mention was made of what languages were tested in Meuter and Simmond's study, Bialystok et al (2008) note 24 different kinds of bilinguals: French, Cantonese, Spanish and Polish being the most frequent. This may have implications for the findings as language typology due to the similarity or

difference of particular linguistic features (e.g. phonology, morphology) has been found to have implications for findings (Yang and Lust, 2005).

There is also an ongoing debate regarding the cognitive elements the task is thought to measure. While the evident bilingual advantage in other bilingual tasks (e.g. the Simon task, Stroop, flanker), but not the SART suggests that the SART may measure different aspects of executive functioning, researchers have gone further to suggest that the SART may not test sustained or controlled attention (Robertson et al, 1997) and may measure the relationship/trade-off between speed and accuracy, and impulsivity (Helton, 2009).

Conversely, slow response time and errors on the SART have also been attributed to the “withdrawal of effortful attention” due to the tediousness and repetitiveness of the task i.e. mind wandering which may hide any bilingual advantage (Helton et al, 2009, p.601; Smallwood et al, 2004). This may have implications for the use of this test in this research given that impulsivity has been found to be associated with MLD (Dykens, 2000) which may mask any potential bilingual advantage. This difficulty may also explain the inaccuracy of bilingual children with MLD in Ponsioen’s (2001, cited in Van der Molen et al, 2007) study which was explained as a function of the children’s inability to overcome the lack of structure in the unknown executive functioning task.

This task was used in this research for the following reasons:

- (i) This task was used to measure the bilingual advantage by Bialystok, Craik and Luk (2008) therefore the aim is to explore to what extent their findings are replicated in bilingual children with MLD.
- (ii) A second SART condition was added to the task as an adaptation of Bialystok, Craik and Luk (2008) to make it more difficult. This was done because the bilingual advantages are thought to emerge only when the task is sufficiently difficult (Bialystok, 2006; Costa et al (2009). For example, Costa et al (2009) found a bilingual advantage in the conditions that needed most monitoring on the Flanker test. In the conditions that had 50% congruent and 50% incongruent trials, no advantage was found whereas it was seen in the 75% congruent, 25% incongruent trials. The increased difficulty in the second condition in this research may also remediate any “mind wandering” as noted by (Smallwood and Schooler, 2006; Helton, 2009, p.601).
- (iii) Changing the rules of this task (adding an extra condition to ignore 3 and 8) will also explore the ability of the children to rule-switch, often measured using the



Dimensional Change Card Sort Task (Zelazo, Frye & Rapus 1996), as noted in section 10.4.1.

- (iv) No studies have been found that have used the SART with bilingual children and according to Bialystok Craik and Luk (2011) the bilingual advantage is strongest in children and older adults.

### Stroop Task

The Stroop task (Stroop, 1935) has appeared in bilingual research in many forms: colour Stroop, number stroop (Hernandez et al, 2010), shape and pictorial stroop (Poubin-Dubois, Blaye, Coutya and Bialystok, 2010) - which all have congruent trials and incongruent trials. Using the colour-stroop as an example, the congruent trials requires the participant name the colours which are also presented in the same colour (i.e. the word “red” written in red). The incongruent trial however provides an element of conflict and requires the participant to resolve the conflict when naming the colours as the word is then coloured in a different colour (i.e., the word red is coloured in blue) (see Table 12). This conflict typically interferes with speed and accuracy of naming. To successfully complete the task, participants employ their executive functioning skills (Hernandez, et al 2010) and inhibit their automatic response to reading (Archibald and Kerns, 1999; Zied et al, 2004). The bilingual advantage is typically not found in the congruent trials with both monolinguals and bilinguals performing comparably. The incongruent task, due to the enhanced pressure on cognitive processes where the participants are required to selectively attend to the word (not the colour) and inhibit the urge to name the colour and not the word, an advantage is believed to be evident in bilinguals.

Table 12 Examples of the congruent and incongruent trials of the Colour Stroop Task

Congruent Trial	Incongruent Trial
<b>Red</b>	<b>Red</b>
<b>Blue</b>	<b>Blue</b>
<b>Green</b>	<b>Green</b>
<b>Red</b>	<b>Red</b>
<b>Yellow</b>	<b>Yellow</b>
<b>Black</b>	<b>Black</b>

Research exploring the bilingual advantage using the Stroop however has revealed mixed results. Some researchers have found a bilingual advantage using the shape Stroop in 24 month old children (Poulin-Dubois, Blaye, Coutya and Bialystok, 2010), colour Stroop in young adults (Bialystok, Craik and Luk, 2008), and the numerical Stroop in older adults (Hernandez et al, 2010); a limited number of published studies have found no differences such as Martin-Rhee and Bialystok's (2008) Day-Night Stroop with 4 year olds and Bialystok, Craik and Luk (2008) with older adults using the colour Stroop. One study, though dating back to the late 1970s, found a bilingual disadvantage in the colour Stroop (Biederman and Tsao, 1979).

In research of particular relevance to this study, Gathercole et al (2010) compared Welsh-English bilinguals (from L1 Welsh homes, L1 English homes and Simultaneous bilingual homes) with English monolinguals and found that although there were no differences between the home language groups high vocabulary levels in Welsh and English correlated with the performance on the English stroop and a balanced use of the two languages (simultaneous bilinguals) indicated an advantage in general, on the English Stroop. This, as noted previously is in line with other studies that have found a bilingual advantage.

This research aims to use the Numerical Stroop, as seen in Hernandez et al (2010) as this is believed to remove the linguistic element of the task and focuses more intentionally on non-linguistic executive functioning skills. It was also used in this research due to the reported reliance on, not only on the ability to inhibit reading a colour word in order to read its actual colour, but also on the child's level of reading automaticity (Leon-Carrion, García-Orza, & Pérez-Santamaría, 2004). Speculatively, it was felt that due to the reported reading difficulties of children with MLD (Conners, 2003; Jenkinson, 1989), children with MLD may be less intimidated by numbers up to four, and their results may not be impaired by their 'reading automaticity'.

### **Flanker Task (Eriksen and Eriksen, 1974)**

In this computerised task, stimuli (e.g., arrows or fish) are presented which are either all facing the same direction (congruent trial) or one of the stimuli is facing the opposite direction to the other fish (incongruent trial). Participants are required to respond to the direction of the target fish by pressing one of two buttons which correspond with the direction of the target fish. As the incongruent trial had 2 conflicting representations (the

target fish facing the opposite direction to the other fish) with two possible responses, participants are expected to inhibit the irrelevant information and respond appropriately which is expected to take longer and potentially provoke more errors than the congruent trials.

There are a number of studies that have demonstrated a bilingual advantage through using the Flanker task (e.g., Costa et al, 2009; Carlson and Meltzoff, 2008; Bialystok, 2001) in different bilingual populations such as French-English, Spanish-English, Mandarin-English, Korean-English and various ages (i.e., children Yang and Lust, 2005; young adults Costa, Hernández, & Sebastián-Gallés, 2007; and older adults Emmorey, Luk, Pyers & Bialystok, 2008). All of these have been attributed to the nature of the executive functioning skills developed through being bilingual (Bialystok, 2001).

Yang and Lust (2005) for example, demonstrated a bilingual advantage in Korean-English bilinguals (N=13) compared with English monolingual children (mean age 4;8) years in which they were more accurate and faster on incongruent trials. However, more recent research on the youngest identified sample on this measure to date, French-English bilinguals in Canada indicated no bilingual advantage for children aged 3;8 years (Bialystok, Barac, Blaye and Poulin-Dubois, 2010). Bialystok et al acknowledge this may be due to no identifiable differences in children so young or perhaps the task sensitivity was too low (also noted to be an important factor in Costa et al, 2009). Another potential issue that was not identified by Bialystok et al in the discussion is the differences in linguistic proficiency. Carlson and Meltzoff (2008) for example, only found differences between bilingual Spanish-English and monolinguals when the bilinguals were exposed early to both languages (i.e. early simultaneous bilinguals). Similarly Bialystok and Majumder (1998) report that the metalinguistic advantage they found depended on the degree of bilingualism measured; that is the bilingual advantage demonstrated a linear relationship with language proficiency.

## **10.5 EXECUTIVE ADVANTAGES ONLY IN SOME BILINGUALS?**

Much of the executive functioning literature discussed in this chapter has focused on the executive functioning advantages of bilinguals when compared with monolinguals. Many researchers agree that using two languages improves executive functioning ability due to the need for the same cognitive processes that control linguistic and non-linguistic abilities. That is, because bilinguals are constantly inhibiting one language to use the other, and are

switching between languages, it is thought that those skills that are used to manage the 2 language systems may be transferred to other tasks that require the same cognitive processes. However, bilingualism varies, and the extent to which some bilinguals exercise those cognitive processes may vary as a function of their language use, proficiency or exposure or other societal factors.

Bamford and Mizokawa (1991) for example, explored the impact of early sequential bilingualism in Spanish immersion education on non-verbal problem solving ability<sup>6</sup> and found evidence to suggest that the Spanish vocabulary scores significantly predicted their problem solving abilities. This also supports Hakuta and Diaz's (1985) work that suggested the degree of bilingualism related to non-verbal problem solving ability. Bialystok and Majumder (1998) also noted that cognitive processes may be at their best in highly proficient balanced bilinguals over unbalanced bilinguals.

Similarly, Gathercole et al (2010), despite failing to find evidence of an overall bilingual advantage in a Welsh-English sample, their 'Welsh-English' group who had acquired both languages at approximately the same time showed somewhat of an advantage. This suggested that, contrary to Bialystok and Majumder (1998), the advantages may be less related to proficiency but more the age of exposure or onset of bilingualism. This may be similar to Carlson and Meltzoff's (2008) findings that the cognitive benefits were specific to native bilinguals who had received "early and intensive exposure" to two languages, as the same effects were not evident in the immersion group who received 3 hours of education in their 2<sup>nd</sup> language per day (c.f. Ricciardelli, 1992; Bialystok and Majumder, 1998).

The bilingual advantage may also be related to a number of societal factors such as language status within the community. Much of the research explores bilingualism in majority language contexts however very few papers explore the impact of bilingualism when one language is the minority/heritage language and the other a majority language (e.g. Basque-French, Welsh- English, Indigenous languages). Language status impacts, not only upon linguistic exposure and the availability of resources such as texts, and books in the minority language, but also switching experience. Prior and Gollan (2011) found evidence to suggest

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<sup>6</sup> Problem-solving ability is thought to be skill that is benefitted as a result of EF advantages (Bialystok a Martin, 2004; Cummins, 1979)

that Spanish-English bilinguals who used both languages regularly experienced fewer switching costs than did Mandarin-English bilinguals who reported switching between their two languages less frequently. Other issues related to societal factors such as attitudes, socioeconomic status and culture may impact upon child-rearing behaviour and in turn affect cognitive processing (Sabbagh, Xu, Carlson, Moses and Lee (2006); Carlson and Meltzoff, 2008).

## **10.6 SUMMARY**

Executive functioning is an aspect often explored in relation to bilingualism, both nationally and internationally however there is little agreement. This chapter has aimed to demonstrate the nature of the bilingual advantage, how it is measured and the complexity of interpreting the advantage in light of other confounding variables such as age of bilingual onset, proficiency, the types of language being measured, and language statuses thus why it is difficult to find consensus in the literature.

Nevertheless, what this chapter has most importantly identified is the need for research into bilingualism in Wales in relation to those with moderate learning difficulties. Children with moderate learning difficulties have been consistently found to have deficits in their executive functioning abilities, and a bilingual advantage may have implications for, not only their executive functioning abilities but also their academic success.

## **10.7 THIS RESEARCH**

### **Welsh Education, Moderate Learning Difficulties and Executive Functioning**

To my knowledge there has been no published research on Welsh-English bilinguals with moderate learning difficulties; however it is possible that they may exhibit similar advantages to those that have been found in TD bilingual populations given that they frequently suppress one language to use another and exercise control over both languages.

Research, however, typically focuses on *either* simultaneous or sequential bilinguals and few studies have explored differences between these two differing bilingual groups in a context where both groups have acquired, and use, the same two languages within a heritage language context.

This aspect of the study is important because (i) children with MLD have been consistently found to have poorer executive functioning skills when compared with typically developing children of the same age, and little is known regarding the impact on executive functioning development of bilingualism in children with MLD (ii) the association between executive functioning and learning may have implications for educational success in children with MLD.

The aims of the following chapters are to (i) explore the executive functioning abilities of children with MLD in an attempt to gauge whether they are performing at developmentally expected levels (ii) whether the suggested bilingual advantage extends to children with MLD and (iii) whether the advantage is limited for those from particular bilingual groups.

To do this, children were grouped according to age/developmental ability (i.e. 10-11 year olds with MLD with the developmental age of 7-8 year olds, typically developing 7-8 year olds and typically developing 10-11 year olds) and language background. Three groups of bilinguals (with MLD and without MLD) and one group of monolinguals (with and without MLD) were tested. The language groups are as follows:

- i) Bilingual L1 Welsh: First language Welsh speakers who have acquired English in their environment and are educated through Welsh (Sequential bilinguals)
- ii) Bilingual L1 English: First language English speakers attending Welsh medium education (Sequential bilinguals)
- iii) Simultaneous bilinguals: Those who acquired Welsh and English at approximately a similar time but are educated through the medium of Welsh
- iv) Monolinguals: Those who speak English at home and attend an English medium school in Wales.

See also Table 13.

Table 13 Groups studied in this research

10-11 year olds with moderate learning difficulties	L1 Welsh
	Simultaneous
	L1 English
	Monolingual
Typically developing 7-8 year olds	L1 Welsh
	Simultaneous
	L1 English
	Monolingual
Typically developing 10-11 year olds	L1 Welsh
	Simultaneous
	L1 English
	Monolingual

The subsequent chapters will detail the methodology, results and provide a brief discussion.

## **11 EXECUTIVE FUNCTIONING TASKS**

### **11.1 OVERVIEW**

The aim of this brief chapter is to provide a summary of the research methodology which will detail the metalinguistic tasks and non-linguistic executive functioning tasks, used in this research and remind the reader of the sample. All data in this research was collected together using exactly the same methodology as detailed in chapter 7.

### **11.2 PARTICIPANTS**

Three groups of children were tested: typically developing 10-11 year olds (TD 10-11), typically developing 7-8 year olds (TD 7-8) and 10-11 year olds with moderate learning difficulties (10-11 year olds with MLD). Every group was further divided into four home language backgrounds (monolingual, L1 English bilingual, simultaneous bilingual, L1 Welsh bilingual). All bilingual children attended Welsh-medium education and all monolingual children attended English –medium education in Wales.

### **11.3 METALINGUISTIC TASKS**

#### **Opposite-Worlds Task (Modified from Bialystok and Shapero, 2006)**

This metalinguistic task is a modification of Bialystok and Shapero's (2006) task which aims to explore children's rule-switching abilities. The task was presented with two conditions and used only one syllable words (Buwch/Ci or Cow/Dog). Condition one required the children to follow the path and name the animals that were presented in random order as quickly as possible. The second switch condition then required the children to follow that same path but name the animals with an incorrect name i.e., call the cow a dog and the dog a cow (See appendix 19). The researcher used her finger to point to the animals as the child was naming, and only moved her finger once the animal was named correctly. Total time and errors were measured. All children were tested in Welsh other than the Monolingual children.

The second switch-condition was expected to place a higher cognitive load on the children because of the switch. All children were expected to perform more slowly on the second



condition but the bilingual children with MLD were expected to perform better than the monolingual children with MLD thus demonstrating a bilingual advantage.

Conversely, no differences were expected to be found between the 7-8 year old bilinguals without MLD and the 10-11 year olds with MLD.

### **Verbal Fluency Test (Roselli et al, 2000)**

This task required the children to name as many words as possible that were within a category within 60 seconds. The categories were: (i) semantic i.e., naming as many clothes as possible, (ii) phonetic i.e., naming as many words that begin with F, A or S as possible and (iii) semantic and phonetic i.e., naming as many animals that beginning with either F, A or S as possible. The children received all categories but only one letter for categories (ii) and (iii). The letters were counterbalanced across the children to ensure task validity. All children were tested in English.

It was expected that all children would perform best on the clothes naming task but the monolinguals would perform significantly better overall as their vocabulary is larger (see section 6.2). However, it was expected that the bilinguals with MLD would perform better than monolinguals with MLD in the animal naming task because of the added rules and need for executive functioning control in this task.

## **11.4 NON-LINGUISTIC EXECUTIVE FUNCTIONING TASKS**

### **Numerical Stroop Task (Hernandez et al, 2010 modified version of Stroop, 1935)**

This task is a modification of the original colour stroop, as modified by Hernandez et al, 2010) and is believed to measure attention and the ability to inhibit a pre-potent response.

In this task, children are presented with two conditions. The first is the congruent condition which required the children to say aloud how many numbers they see and not the number itself. For example, if presented with '2, 2' they would say '2'. The same was required on the incongruent trial except the number of digits did not match the number itself (e.g., if presented with 3,3 the correct response would be 2).

Studies in this area have consistently demonstrated the ‘stroop effect’ on incongruent trials because of the inconsistency between the numbers being presented and the number of digits caused a longer reaction time. This task has since been adopted in the bilingualism literature, and it has been demonstrated that bilinguals perform faster on this task than monolinguals (Hernandez et al, 2010).

All children performed both the congruent and incongruent task, one after another. Total response time and total number of errors were recorded.

It was expected that the bilingual children with MLD would perform better than the monolinguals with MLD on the incongruent condition and that the 10-11 year olds with MLD would perform comparably to the TD 7-8 year olds.

**Sustained Attention to Response Test (Kennedy, 2012; modified version of Robertson, Manly, Andrade, Baddeley, & Yiend, 1997)**

This task is a computerised measure of sustained attention. Children were required to push the space bar every time a number (from 1-9) was presented on the screen, with the exception of number three where the children were required to inhibit the urge to press (termed the pre-switch condition). The task was then made more difficult with another condition which required the children to switch the rules by ignoring 3 and 8 (termed the post-switch condition).

The aim of this task was to replicate Bialystok, Craik and Luk’s (2008) task to explore the bilingual advantage (pre-switch condition) in relation to sustained attention. The post-switch condition was however designed to make the task harder and probe the bilingual children with MLD’s ability to rule switch.

It was expected that the bilingual children with MLD would perform better than the monolingual children with MLD (respond quicker and make fewer errors) on both conditions as they have been identified as executive functioning tasks in the literature.

It was also expected that the children with MLD would perform similarly to the TD 7-8 year olds.

### **Flanker Task (Kennedy, 2012; modification of Yang, Yang and Lust, 2005)**

Two computerised versions of the flanker were included in this study to measure the attentional control element of executive functioning. To measure this, Yang and Lust's (2005) Flanker task was replicated (termed the Original Flanker hereafter), and another modified version as used by Kennedy (2012) was replicated. Each will be detailed in turn.

#### **Original Flanker**

In this version the children were presented with 24 trials with each one displaying a row of fish: 3 blue, 1 green. For each trial children had to press a button on the keyboard to indicate in which direction the green target fish was facing ('A' to indicate left and 'L' to indicate right). Of these trials the children were either presented with a congruent or incongruent trial. In the congruent trials all fish were facing the same direction whereas in the incongruent trial the target fish was facing the opposite direction to the blue fish. Fifty percent of the trials were congruent and 50% of the trials were incongruent. Past bilingualism research has indicated that bilinguals perform significantly faster than monolinguals on the incongruent task due to the increase in conflict resolution required on this task. No differences are found on the congruent trials due to the lack of conflict.

If the child responded correctly they would hear "woohoo" and if they responded incorrectly they would hear "Awww". The target fish never appeared at either end of the rows of fish, but did vary in 1 of the 3 other places which were at random. Prior to beginning the task the children practised the trials until they responded correctly 3 times in succession. Before beginning the task, the children had 300ms, and 300ms between the presentations of each trial. The children were instructed to respond as quickly and accurately as possible. Instructions were provided in Welsh for bilingual children and English for monolingual children.

#### **Modified Flanker**

In this version, the task was identical to the above except all fish were blue and children could only identify the target fish once it was facing an opposite direction (the incongruent trial). This task was modified to increase the difficulty of the task thus increasing the strain on the executive functioning.

It was expected that the bilingual children with MLD would make fewer errors and respond faster than the monolinguals with MLD. It was also expected that the children with MLD would perform comparably to the TD 7-8 year olds.

### **The Aeroplane Task (Lye, Rhys, Ware, Thomas, Thorpe, 2010 modified version of Craik and Bialystok, 2005)<sup>7</sup>**

This task was based on the concept of Craik & Bialystok's (2005) 'Cooking Breakfast' Task which was a real-world simulation where adult participants were required to cook 5 different items for breakfast that finished cooking at the same time and did not burn, whilst simultaneously laying the dining table – this was the distractor task. This task was believed to be an executive functioning task which required elements such as planning and monitoring and multi-tasking. The cooking task was deemed unsuitable for young children as i) the experience a child may have of cooking may be different between children and would affect the interpretation of the finding and, ii) it was quite complex and required the ability to anticipate and keep the end goal in sight in quite a complex way.

The aeroplane task was designed as an executive functioning task for children based on a game-like situation which would hopefully hold the children's interests and be motivating (which is known to be a problem in executive functioning tasks) but which none of them would have had experience in doing in real life which enabled the control of confounding variables. The aim of this task was to bring the concept of executive functioning into a more 'real-life' situation and eradicate effects of boredom which are renowned in psychological experiments.

The task (or 'game' which the experimenter called it when speaking to the children) was split into 3 sections which the participants completed in order; bags only, aeroplane only, aeroplane & bags together. Instructions were provided in Welsh for bilingual children and English for monolingual children.

#### **Bags Only**

This screen was completed first. Children were told to use the mouse for this task (not buttons like the aeroplane task). Before this task began instructions were given to the children

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<sup>7</sup> This task was included in the methodology but was not included due to time constraints.

in print and verbally. It was explained that they should click on the bag that appears and click it into the 'sorting bin' that matches the bag's colour - blue or yellow. This task in the 'Bags & Aeroplane' task was treated as the distractor (similar to the 'laying the table' in Craik & Bialystok's, 2006 cooking task). As this was a training session the children were told to sort as many bags as they could in two minutes. After two minutes the task was discontinued by the experimenter.

This was treated as training. The dependent variables were the amount of bags sorted correctly and incorrectly. If the children sorted more than 3 incorrectly, the child's data was not included in the study.

### **Aeroplane Only**

This screen was completed second by the participants and was based on a real-life replication of the Simon Task (Simon, 1969). This task was completed twice by every child. Aeroplanes in blue or yellow appeared on the left or the right hand side of the screen randomly. Children were instructed to press the blue jelly bean switch (always on the left) when a blue plane appeared and the yellow jelly bean switch (always on the right) when a yellow plane appeared. Children were told that they should "land the planes as quickly as possible otherwise they'll fly away". There were 24 planes in total and in the first presentation of this task 50% of the planes were congruent and 50% were incongruent.

The dependent variables for this task were the number of correct and incorrect plane landings that were made, MRT for congruent and incongruent landings and total trial time.

### **Bags & Aeroplanes**

This task is a combination of the 'Bags only' and 'Aeroplane Only' task. Children were first given written instructions and verbal instructions which the experimenter read out to them. Both of the tasks described above were put on the screen side by side and children were told now that they had to do exactly the same thing as earlier. They were told that they should begin by sorting the bags but when a plane appeared they should land it as quickly as possible. There were 24 planes which appeared every 0.33ms. It was felt that enough time had to be given to allow for the children to switch their attention between plane landing and bag sorting.

The dependent variables for aeroplanes were number of correct and incorrect plane landings that were made, MRT for congruent and incongruent landings and total trial time and for the bag sorting the dependent variables were the amount of bags sorted correctly and incorrectly. It was expected that the bilingual children with MLD would make fewer errors and respond faster than the monolinguals with MLD. It was also expected that the children with MLD would perform comparably to the TD 7-8 year olds.

## 12 EXECUTIVE FUNCTIONING RESULTS

### 12.1 OVERVIEW

This chapter presents the results of analyses conducted to answer the following questions:

- 1) Do children with moderate learning difficulties (MLD) experience cognitive advantages or disadvantages as a result of bilingualism?
- 2) Are advantages limited to children from certain home language backgrounds i.e. L1 Welsh, L1 English or Simultaneous bilinguals?
- 3) Are children with MLD performing at developmentally appropriate levels?

To test these questions three groups of children were tested: typically developing 10-11 year olds (TD 10-11), typically developing 7-8 year olds (TD 7-8) and 10-11 year olds with moderate learning difficulties (10-11 year olds with MLD). Every group was further divided into four home language backgrounds (monolingual, L1 English bilingual, simultaneous bilingual, L1 Welsh bilingual). For rationale and comparisons see table Table 14.

All of the aforementioned of linguistic (called metalinguistic tasks) and non-linguistic executive functioning tasks were adapted from the bilingualism literature to measure the relevant executive functioning processes. All of the data for these tasks was included in the analyses with the exception of the Aeroplane Task. This was excluded because time constraints did not allow for data to be extracted and input into SPSS. The aim however is to utilise the data in further research.

#### 12.1.1 Analyses

For all of the metalinguistic measures multivariate design ANOVAS or repeated measure ANOVAs were conducted and followed up with Tukey's post hocs unless noted otherwise. For every analysis, 'group' was an independent variable (IV) with 3 levels: TD 7-8, MLD 10-11, TD 10-11. Home language was another IV with four levels (L1 Welsh, Simultaneous, L1 English, Monolingual). The dependent variables differed according to the task being analysed and these will therefore be discussed task by task

Analyses will first be reported on two metalinguistic tasks (opposite worlds and fluency) followed by four executive functioning tasks (Stroop, SART and the Flanker Original and Flanker Modified).



Table 14 Comparisons, rationales for the comparisons and hypotheses used in the analyses of the Cognitive Measures

<b>Comparisons</b>	<b>Rationale</b>	<b>Hypotheses</b>
<p>10-11 year olds L1 Welsh with MLD vs 10-11 year olds Monolinguals with MLD</p> <p>10-11 year olds L1 English with MLD vs 10-11 year olds Monolinguals with MLD</p> <p>10-11 year olds Simultaneous with MLD vs 10-11 year olds Monolinguals with MLD</p>	<p>This comparison enables the exploration of the bilingual advantage as the variable in this group is language background.</p> <p>This also enables the control of home language background to explore whether the bilingual advantage only pertains to some bilinguals.</p>	<p>In line with the TD literature, it is hypothesised that the bilingual children with MLD will have an overall cognitive advantage as a result of bilingualism (see Bialystok, 2009).</p> <p>It is hypothesised that the simultaneous bilinguals will demonstrate the biggest advantage as a result of bilingualism as they frequently switch between 2 languages (Bialystok and Majumder, 1998).</p>
<p>10-11 YO L1 Bilinguals with MLD vs 7-8 YO Bilinguals TD</p>	<p>Both age groups will be matched on their home language background (i.e. all bilingual groups have 3 levels: L1 Welsh, L1 English, Simultaneous).</p>	<p>It is hypothesised that the 10-11YO with MLD will perform similarly to the 7-8YO as they are of a similar developmental age (Dannielsson, 2012).</p> <p>If those with MLD perform better than the TD 7-8 year olds it may suggest that ‘experience’ is a significant factor in the development of executive functioning.</p>

	<p>This comparison enables the comparison of 2 groups that are developmentally similar and will enable the exploration of other variables such as chronological age/experience that may affect the bilingual advantage.</p>	
<p>10-11YO bilinguals with MLD vs 10-11YO bilinguals without MLD</p>	<p>This comparison enables the comparison of a group with and without MLD to ensure the robustness of prior findings and the tasks used.</p>	<p>It is hypothesised that the 10-11 year olds with MLD will perform worse than the 10-11 year olds without (Dannielsson, 2012; Leven et al., 2008; Connors et al, 1998).</p>

## 12.2 RESULTS

### 12.2.1 Opposite-Worlds Task (Modified from Bialystok and Shapero, 2006)

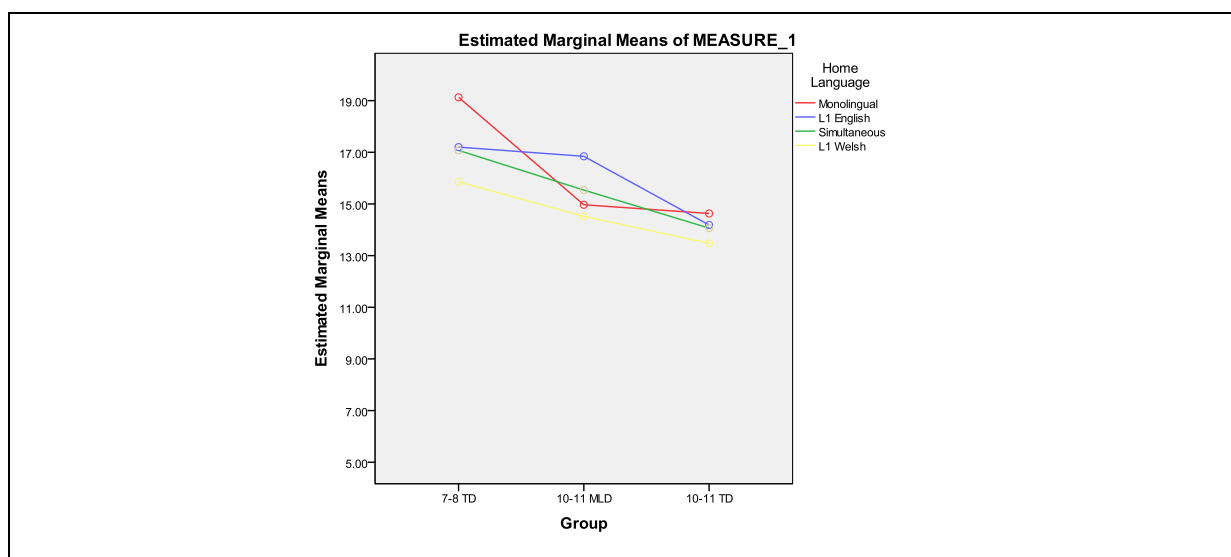
A repeated measures ANOVA was conducted with the pre- and post-switch conditions as the dependent variables and home language (L1 Welsh, L1 English and Simultaneous bilinguals, Monolinguals) and group (TD 7-8 year olds, 10-11 with MLD, and TD 10-11 year olds) as the independent variables. The children were tested in the language of the school.

#### Reaction Times

There was a significant effect of group ( $F(2,360)=15.81, p=0.00$ ) indicating that the TD 10-11 year olds performed the task fastest and the 7-8 year olds least fast. Post-hocs indicated that the TD 7-8 year olds performed significantly more slowly than the 10-11 year olds with MLD ( $p=0.027$ ) and the TD 10-11 year olds ( $p=0.00$ ).

There was also a significant effect of home language ( $F(3,360)=3.77, p=0.011$ ) and post hocs indicated that the L1 Welsh group performed significantly faster the monolingual group ( $p=0.001$ ). An interaction between group and home language was also found. Post hocs indicated that significant differences were found between the TD 10-11 year olds from various home languages: Monolingual vs. L1 English ( $p=0.002$ ), Monolingual vs. Simultaneous ( $p=0.003$ ), monolingual vs. L1 Welsh ( $p=0.00$ ) with the monolingual group performing slowest and L1 Welsh performing fastest; see Figure 9. No differences across home languages were found amongst the other groups.

Figure 9 Opposite worlds response time for groups x home language

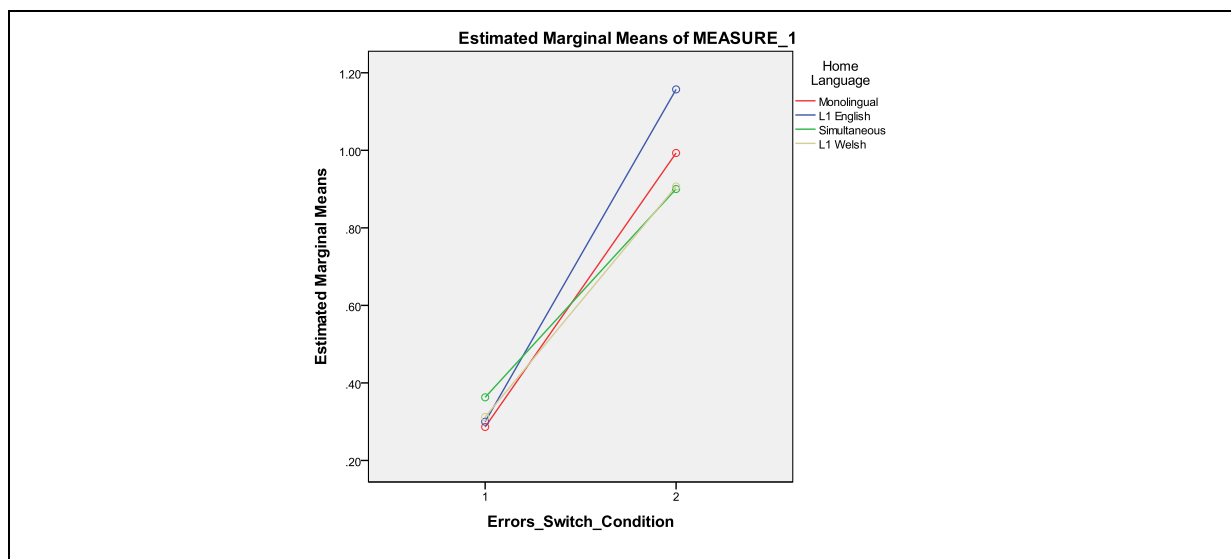


## Errors

There was a significant effect of group ( $F(2,359)=10.12, p=0.00$ ). Post-hocs indicated that there TD 10-11 year olds performed significantly better than the TD 7-8 year olds ( $p=0.00$ ) and the 10-11 year olds with MLD ( $p=0.00$ ). There was no significant difference between the 10-11 year olds with MLD and the TD 7-8 year olds ( $p>0.05$ ).

A significant interaction was also found between the errors in the pre- and post- switch condition and group ( $F(2,359)=19.78, p=0.00$ ). Further analyses indicated that all groups made significantly more errors on the post-switch condition than the pre-switch condition (all  $p$  values  $\leq 0.001$ ). There were no differences between the number of errors made on the pre-switch condition between each of the groups however the 10-11 year olds with MLD made significantly more errors than the TD 7-8 year olds and the TD 10-11 year olds ( $p=0.00$ ) on the post-switch condition.

Figure 10 opposite worlds errors for groups x home language



## Switch

The ANOVA revealed a significant main effect of switch condition, indicating that the reaction times increased significantly between the pre- and post- switch condition ( $F(1,360)=300.25, p=0.00$ ), as did the errors ( $F(1,359)=83.21, p=0.00$ ). No significant interactions were found.

Figure 11 opposite worlds reaction time for pre and post switch according to group

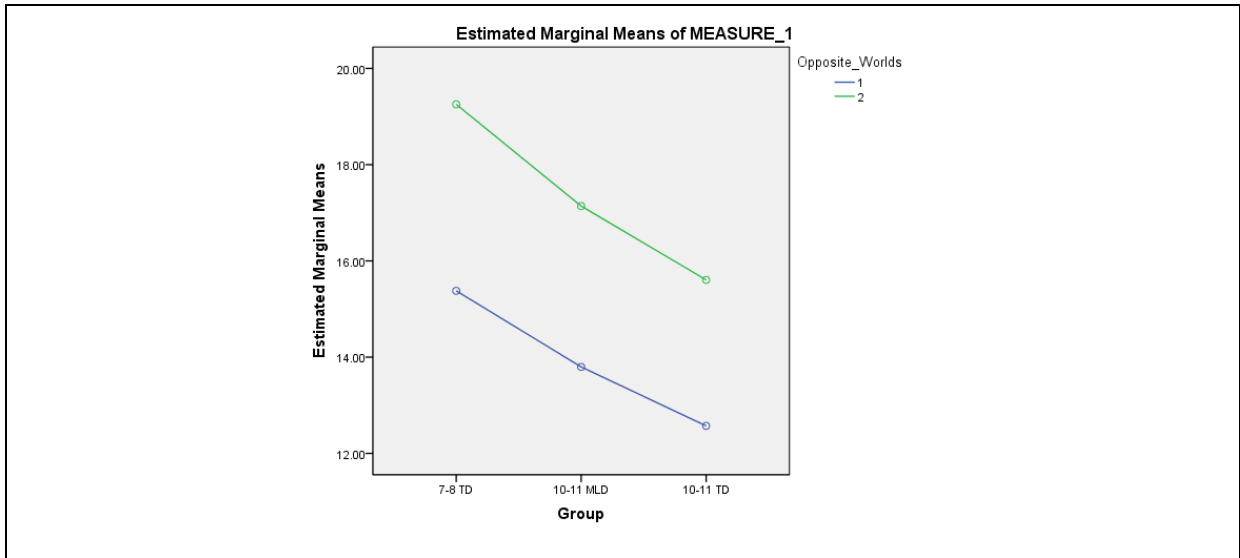
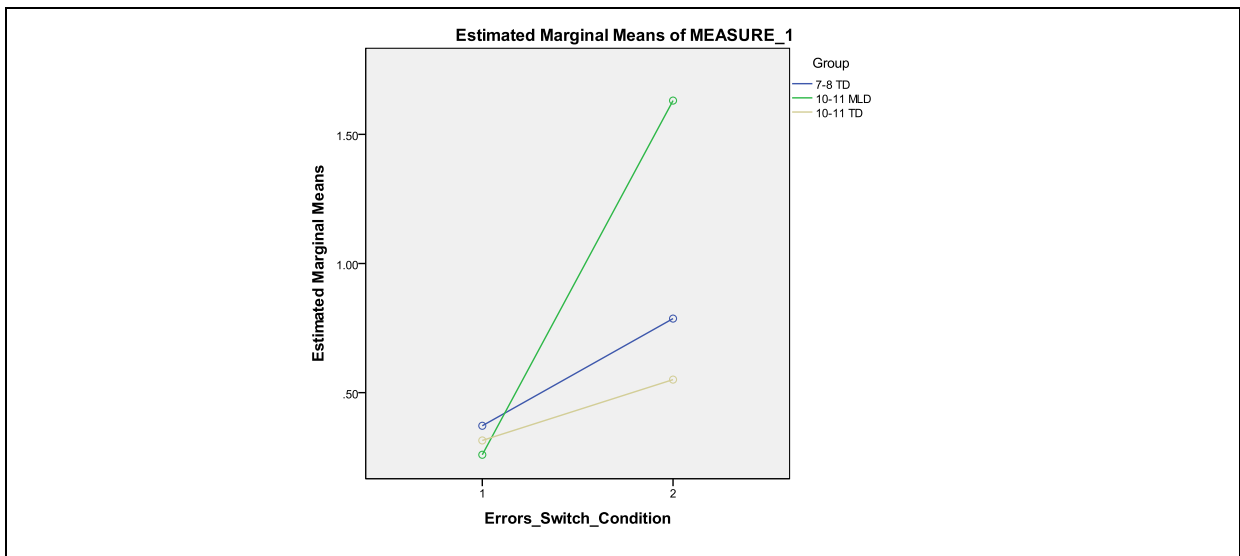


Figure 12 Opposite worlds errors for pre and post switch according to group



### Summary

No effect of home language was found for the group with MLD on the response time or errors indicating that the bilingual advantage does not extend to children with MLD. The 10-11 year olds with MLD did however perform significantly faster than the TD 7-8 year olds which was unexpected given that it was predicted they would perform at similar levels. While it remains a possibility that the 10-11 year olds with MLD performed better on this metalinguistic task, it may also be explained in light of the group with MLD making more

errors on this task which may indicate a time vs. error trade off or that more errors were produced due to the increased cognitive demand placed on the switch-task.

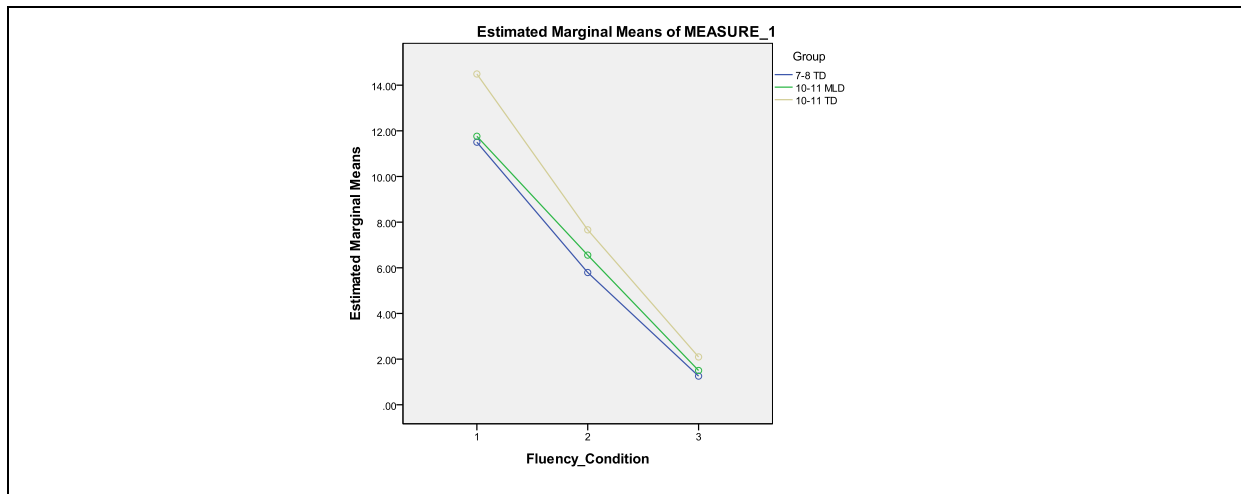
It should also be noted that the superior skills of the 10-11 year olds with MLD over the TD 7-8 year olds was an overall effect and not specific to the bilingual group alone and possibly to do with the maturation of motor skills.

### 12.2.2 Verbal Fluency Test (Roselli et al, 2000)

A mixed design ANOVA was conducted to explore differences across home language and age in relation to the fluency task which had 3 dependent variables (clothes named, words named, and animals named). All children were tested in English.

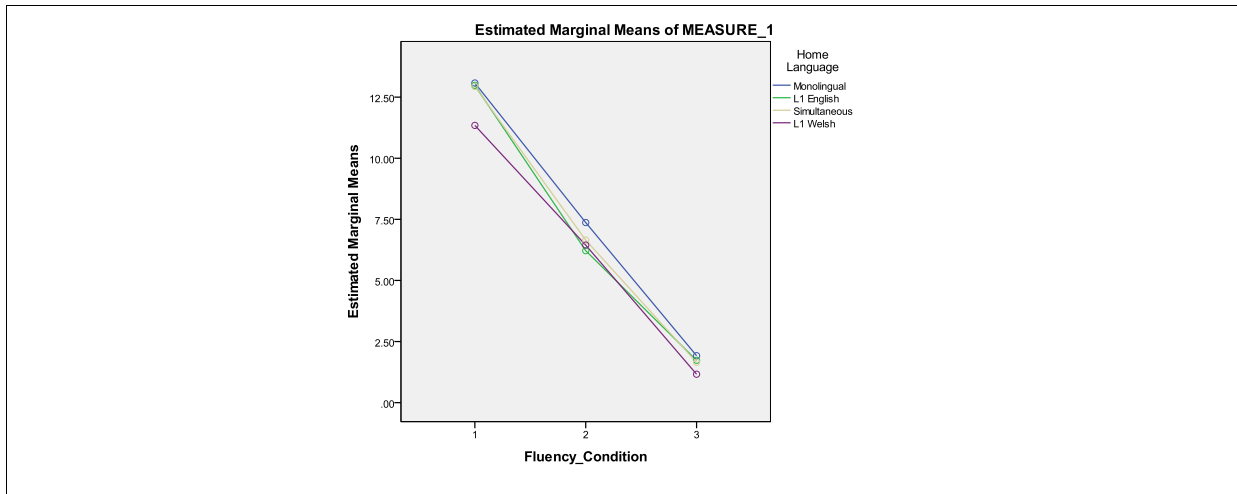
The ANOVA indicated a significant main effect of fluency condition ( $F(2,714)=1148.59$ ,  $p=0.00$ ) indicating that the children named more words in the clothes naming condition and least in the animal naming, as expected (see Figure 13).

Figure 13 Raw scores for the number of items named across the 3 fluency conditions according to group



There was also a main effect for group ( $F(2,357)=29.92$ ,  $p=0.00$ ). Post-hocs indicated that the TD 10-11 year olds performed significantly better than the TD 7-8 year olds ( $p=0.00$ ) and the 10-11 year olds with MLD ( $p=0.00$ ). There was no significant difference between the 10-11 year olds with MLD and the TD 7-8 year olds ( $p>0.05$ ).

Figure 14 Raw scores for the number of items named across the 3 fluency conditions according to home language group



There was also a main effect for home language ( $F(3,357)=3.75, p=0.01$ ) where post hocs indicated that monolinguals performed significantly better than L1 Welsh ( $p=0.00$ ), L1 English significantly better than the L1 Welsh ( $p=0.001$ ) and Simultaneous significantly better than the L1 Welsh ( $p=0.016$ ). There was also a significant interaction between group and home language. Further analyses indicated that for the TD 7-8 year olds, the monolinguals performed significantly better than the L1 English ( $p=0.005$ ) and the L1 Welsh ( $p=0.00$ ) and the Simultaneous performed significantly better than the L1 Welsh ( $p=0.034$ ). For the TD 10-11 year olds both the the monolinguals performed significantly better than the L1 Welsh ( $p=0.039$ ). The L1 English also performed significantly better than the L1 Welsh ( $p=0.00$ ) (see Table 15 for means and standard deviations). There were no significant differences between the different home language groups for the children with MLD.

Table 15 Means and standard deviations for the fluency task according to home language x groups

Home Language	Group	Mean Number of Clothes Named (Std Deviation)	Mean Number of words named (Std Deviation)	Mean Number of Animals named (Std Deviation)
Monolingual	7-8 TD	11.93(3.45)	6.76 (3.64)	1.83 (1.53)
	10-11 MLD	10.83(2.68)	6.36 (3.29)	1.68(1.35)
	10-11 TD	15.98 (3.61)	8.82(3.71)	2.48 (1.50)
L1 English	7-8 TD	10.96(3.55)	4.50(2.94)	1.08 (1.09)
	10-11 MLD	12.28(2.63)	8.67(2.38)	1.78(1.35)
	10-11 TD	15.70(4.23)	8.82 (4.03)	2.34 (1.81)
Simultaneous	7-8 TD	12.52(3.83)	5.84(4.05)	1.44(1.00)
	10-11 MLD	11.82(3.23)	5.86(3.77)	1.55(1.47)
	10-11 TD	14.55(4.34)	8.2(3.72)	1.97(1.43)
L1 Welsh	7-8 TD	9.91(3.45)	4.83(3.14)	0.72(1.05)
	10-11 MLD	8.12(2.82)	5.33(4.64)	1.00(1.04)
	10-11 TD	13.27(4.22)	5.75(3.53)	1.77(1.58)

There were also significant interactions between fluency and group ( $F(4,714)=6.55, p=0.00$ ) and fluency, group and home language ( $F(12,714)=2.22, p=0.01$ ). Further analyses indicated that the TD 10-11 year olds performed significantly better than the TD 7-8 year olds and the 10-11 year olds with MLD across all three fluency tasks (all  $p$  values  $<0.01$ ). There were however significant differences regarding the fluency, home language and group interaction as illustrated in the tables below.



Table 16 Illustrating significant differences between home language groups according to age for the anyword fluency task (\* indicate the group that performed best)

	TD 7-8	MLD 10-11	TD 10-11
Anyword	L1 Welsh vs. Monolingual* (0.004)	n/a	L1 Welsh vs. Monolingual* (0.043)
	n/a	n/a	L1 Welsh vs. L1 English* (0.001)
	L1 Welsh vs. Simultaneous* (0.003)	n/a	L1 Welsh vs. Simultaneous* (0.028)

Table 17 Illustrating significant differences between home language groups according to age for the clothes naming fluency task (\* indicate the group that performed best)

	TD 7-8	MLD 10-11	TD 10-11
Clothes	L1 Welsh vs. Monolingual* (0.024)	L1 Welsh vs. Monolingual* (0.002)	n/a
	n/a	L1 Welsh vs. L1 English* (0.003)	n/a
	L1 Welsh vs. Simultaneous* (0.026)	L1 Welsh vs. Simultaneous* (0.026)	n/a

Table 18 Illustrating significant differences between home language groups according to age for the animal naming fluency task (\* indicate the group that performed best)

	TD 7-8	MLD 10-11	TD 10-11
Animals	n/a	L1 Welsh v Monolingual* (0.009)	n/a
	n/a	n/a	n/a
	n/a	n/a	n/a

### 12.3 SUMMARY

In this task the group with MLD performed comparably to the TD 7-8 year olds, however no bilingual advantage was found. In fact, there was a clear pattern of input with those who had received some English performing best, and the L1 Welsh performing worst in all cases.

The findings did however indicate complex interactions and have been interpreted as follows (see Table 15 and Table 17).

- (i) Most of the significant differences on the clothes naming task were amongst those with a lower developmental age than the TD 10-11 year olds (10-11 with MLD and the TD 7-8 year olds), which may be expected because of the association between cognitive development and vocabulary development (Bialystok, Craik and Luk, 2008). Of those groups however, the L1 Welsh group performed worse than the simultaneous and monolingual groups (and the L1 English group with the 10-11 year olds with MLD) which is a pattern similar to linguistic tasks where exposure mediates performance, particularly in younger children (Gathercole and Thomas, 2009). This is also similar to results of the language and literacy task where some English appeared to be of benefit to bilinguals in reaching monolingual levels. Even more notably, there were no significant differences between home language groups for the TD 10-11 year olds'. This supports the findings that some deficits in linguistic development disappear with age and/or experience (Gathercole and Thomas, 2009).
- (ii) With increasing difficulty in the task (easiest to the hardest), there were fewer home language differences found which may indicate a hidden executive functioning difference. That is, the deficit that the bilinguals with MLD

demonstrated on the phonemic/semantic task (animal naming), disappeared. There are two possible explanations for this. First, bilingual children may be employing their executive functioning skills to negate any differences caused by linguistic background (see also Hermanto, Moreno and Bialystok, 2012 for similar findings) or second, the findings may be a function of that task's difficulty and possible floor effects.

### **12.3.1 Numerical Stroop Task (Hernandez et al, 2010 modified version of Stroop, 1935)**

A repeated measures ANOVA was conducted with the congruent and incongruent conditions as the dependent variables and home language (L1 Welsh, L1 English and Simultaneous bilinguals, Monolinguals) and group (TD 7-8 year olds, 10-11 with MLD, and TD 10-11 year olds) as the independent variables. Children were tested in the language of the school.

#### **Stroop Effect**

The ANOVA revealed a significant main effect of condition ( $F(1,360)=1014.2, p=0.00$ ) in which response time and error rate ( $F(1,360)=320.70, p=0.00$ ) significantly increased for the incongruent condition, thus supporting the stroop effect (1935) and therefore task validity.

#### **Response Time**

There was also a main effect of home language ( $F(3,360)=3.62, p=0.013$ ) and post hoc indicated that the monolinguals performed significantly slower than the L1 English ( $p=0.029$ ) and the L1 Welsh bilinguals ( $0.032$ ) (see Figure 15). There was also a main effect of group ( $F(2,360)=26.3, p=0.00$ ) with the 10-11 year olds with MLD performing significantly faster than the TD 7-8 year olds ( $p=0.00$ ), as indicated by post-hocs (see

Figure 16).

Figure 15 Stroop response times for congruent (1) and incongruent (2) conditions according to home language

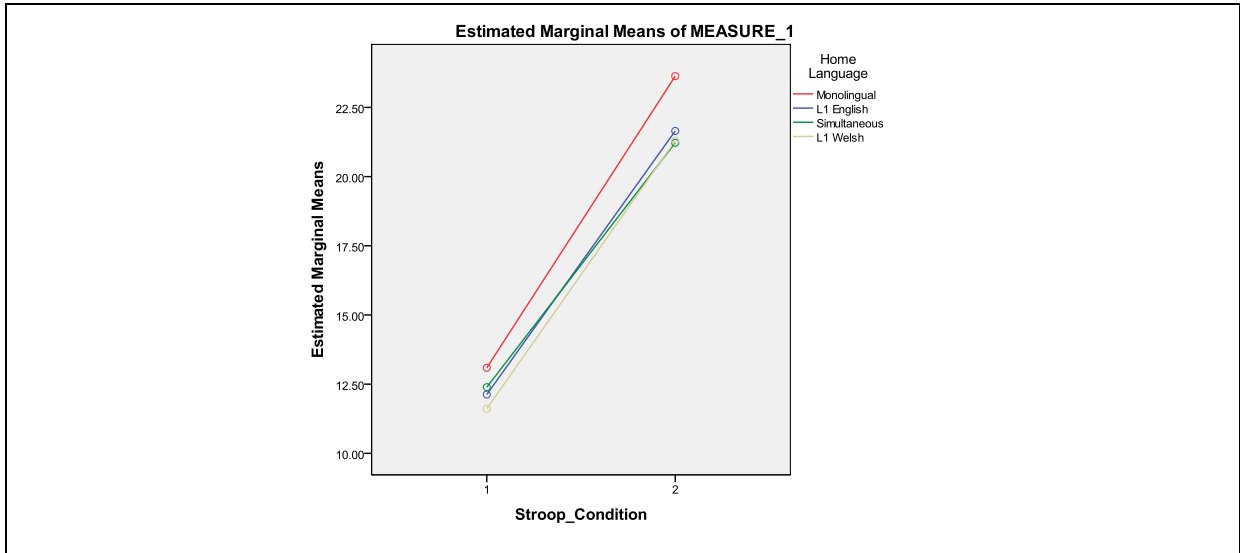
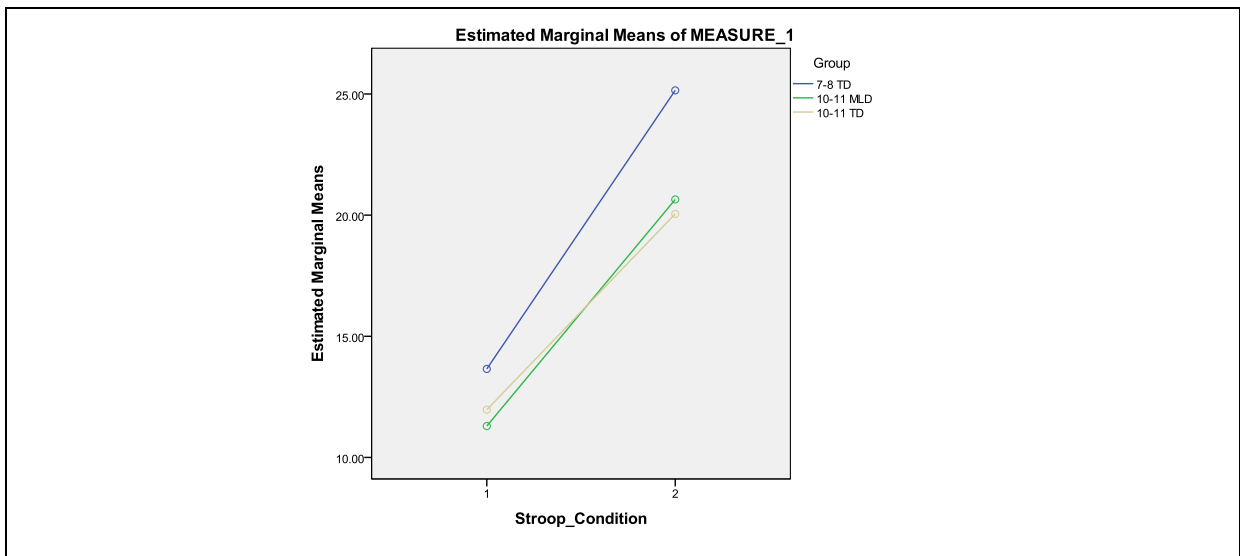


Figure 16 Stroop response times for congruent (1) and incongruent (2) conditions according to group



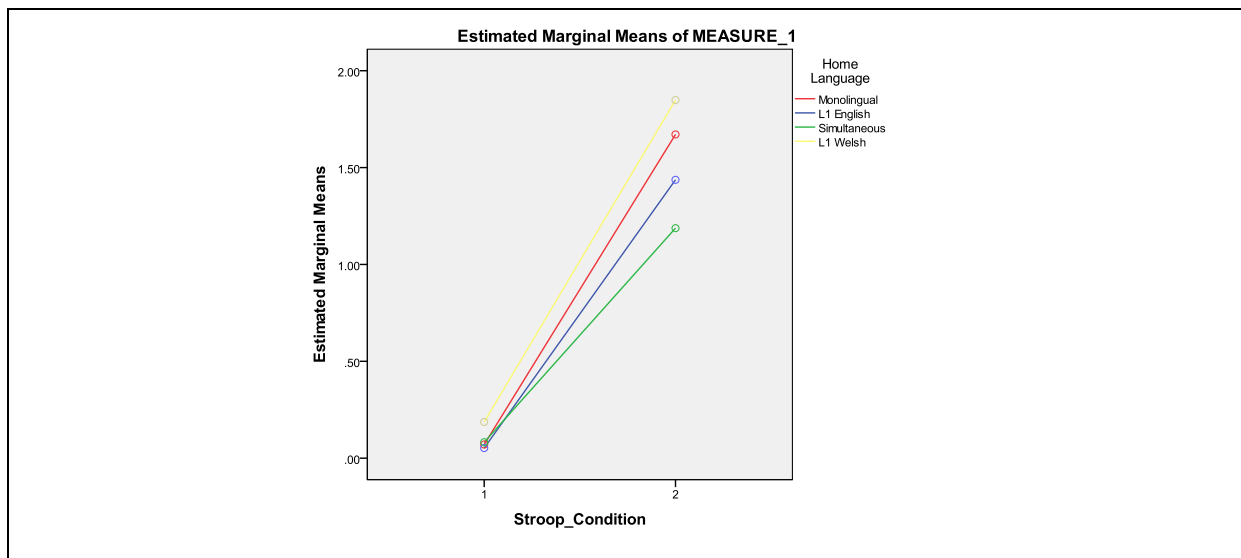
There was also a significant interaction between the stroop condition and group ( $F(2,360)=13.69, p=0.00$ ). Further analyses indicated that each of the groups performed significantly faster on the congruent stroop than the incongruent stroop (all  $p$  values =0.00). On analysis of the congruent and incongruent tasks individually, the TD 10-11 and MLD 10-11 year olds did significantly better than the TD 7-8 year olds on both congruent and

incongruent tasks however there were no significant differences between the TD 10-11 and MLD 10-11 year olds (all significant p values  $\leq 0.001$ ).

## Errors

The ANOVA indicated a significant main effect of home language ( $F(3,360)=2.89$ ,  $p=0.036$ ) and post-hocs indicated that the simultaneous ( $p=0.013$ ) and L1 English ( $p=0.027$ ) bilinguals made significantly fewer errors than the L1 Welsh bilinguals (see Figure 17).

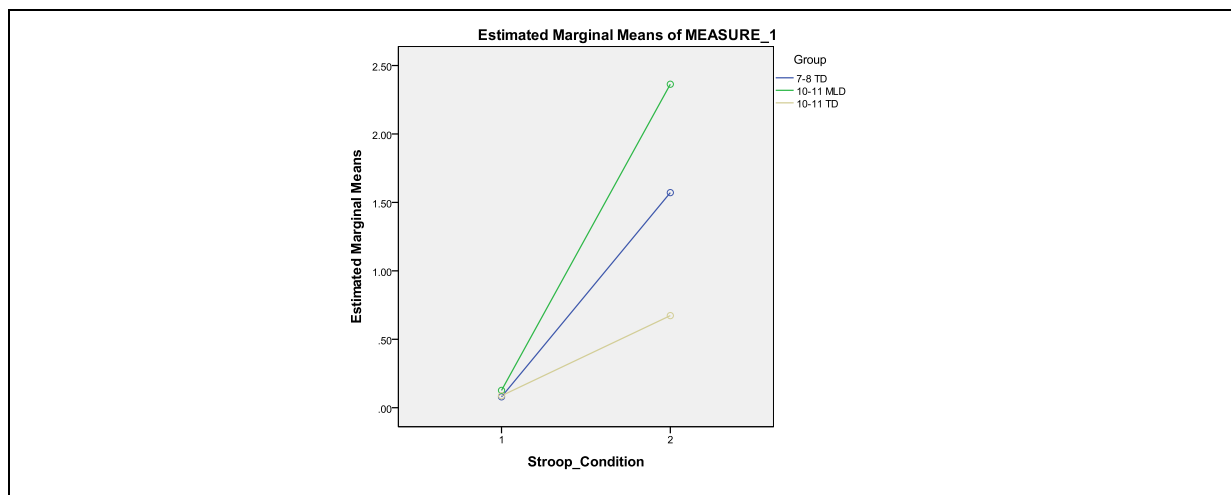
Figure 17 Stroop errors for congruent (1) and incongruent (2) conditions according to home language



There was also a significant main effect of group ( $F(2,360)=29.57$ ,  $p=0.00$ ) where post-hocs indicated significant differences between all groups whereby the 10-11 year olds with MLD made significantly more errors than the TD 7-8 year olds ( $p=0.004$ ) and the TD 10-11 year olds ( $p=0.00$ ). The TD 7-8 year olds also made significantly more errors than the TD 10-11 year olds ( $p=0.00$ ) (see

Figure 18).

Figure 18 Stroop errors for congruent (1) and incongruent (2) conditions according to group



There was also a significant interaction between condition and group ( $F(2,360)=13.69$ ,  $p=0.00$ ). Further analyses indicated that all groups made significantly more errors on the incongruent condition than the congruent condition (all  $p$  values  $=0.00$ ). However, while there were no significant differences between the groups on the congruent condition there were significant differences between the groups on the incongruent condition ( $F(2,369)=32.8$ ,  $p=0.00$ ). There were significant differences between all groups with the 10-11 year olds with MLD performing significantly worse than the TD 7-8 year olds ( $=0.00$ ) and the TD 10-11 year olds ( $p=0.00$ ), The TD 7-8 year olds also performed significantly worse than the TD 10-11 year olds ( $p=0.005$ ).

### Summary

An overall effect of home language was found, indicating that the L1 Welsh and L1 English performed significantly faster, thus suggesting that the bilingual advantage may also extend to those children with MLD.

Unexpectedly however, the children with MLD performed significantly faster than the TD 7-8 year olds on the stroop which may indicate

- (i) That the executive functioning skills of bilingual children with MLD are elevated due to bilingualism. However, further exploration indicated that the mean score differences between the bilingual TD7-8 year olds vs. Bilingual 10-11 year olds with MLD and the mean score differences between the monolingual TD 7-8 year olds vs. Monolingual 10-11 year olds with MLD were not significantly different or in favour of the bilinguals. It is therefore likely that age and experience play a part in the development of executive functioning.
- (ii) The lower response time for the group with MLD may also have been a function of their significantly higher error rate, as seen on the opposite worlds task.
- (iii) Or, perhaps the most plausible explanation may be that motor maturity closes the gap between the TD 10-11 year olds and 10-11 year olds with MLD (further details provided in section 13.3).

### **12.3.2 Sustained Attention to Response Test (Kennedy, 2012; modified version of Robertson, Manly, Andrade, Baddeley, & Yiend, 1997)**

A repeated measures ANOVA was conducted with the pre- and post- switch conditions as the dependent variables and home language (L1 Welsh, L1 English and Simultaneous bilinguals, Monolinguals) and group (TD 7-8 year olds, 10-11 with MLD, and TD 10-11 year olds) as the independent variables. This was a non linguistic task.

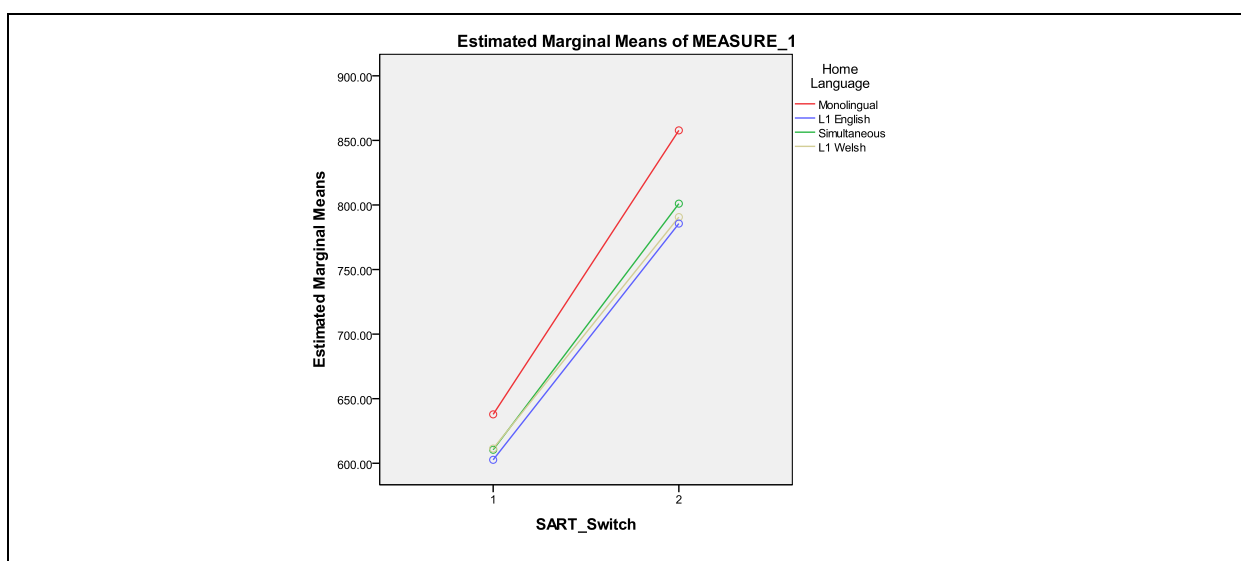
#### **Switch**

A significant main effect of condition was found, with children taking significantly longer to complete the post-switch condition than the pre-switch condition ( $F(1,351)=537.96, p=0.00$ ) and making significantly more errors ( $F(1,351)=197.69, p=0.00$ ).

#### **Response time**

The ANOVA indicated that there was a significant main effect of home language ( $F(3,351)=2.82, p=0.039$ ) and post-hocs indicated that the L1 English performed significantly faster than the monolingual group.

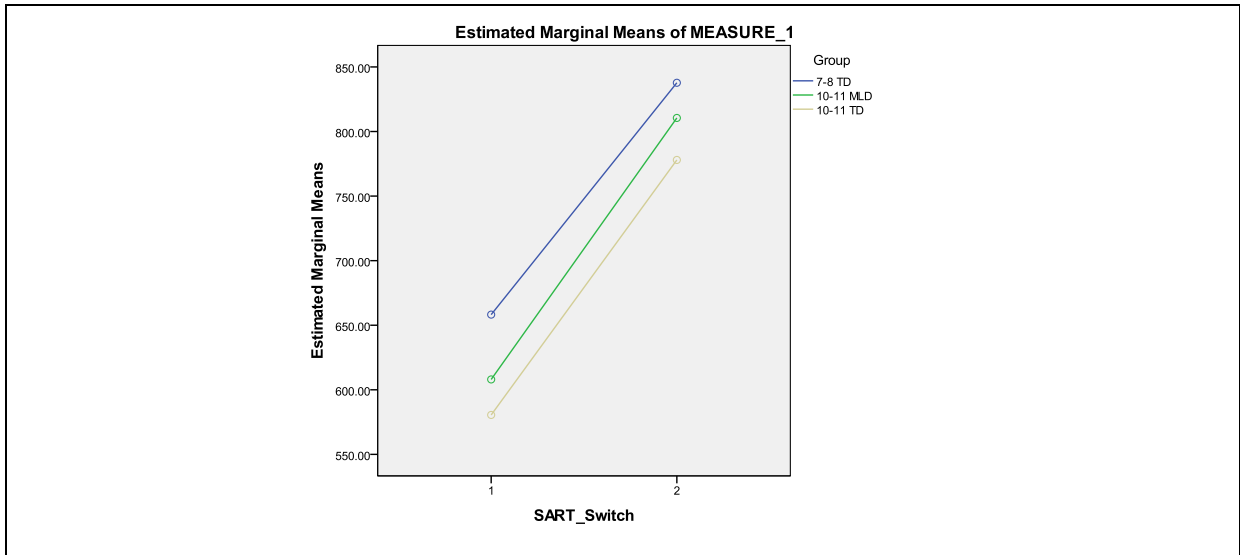
Figure 19 SART response time for pre-switch (1) and post-switch (2) conditions according to home language



There was also a significant main effect of group ( $F(2,351)=8,35$ ,  $p=0.00$ ) where post-hocs indicated that the TD 7-8 year olds performed significantly worse than the TD 10-11 year olds. There was no significant difference between the 10-11 year olds with MLD and the TD 7-8 year olds ( $p>0.05$ ).

Figure 20 SART response time for pre-switch (1) and post-switch (2) conditions according to groups

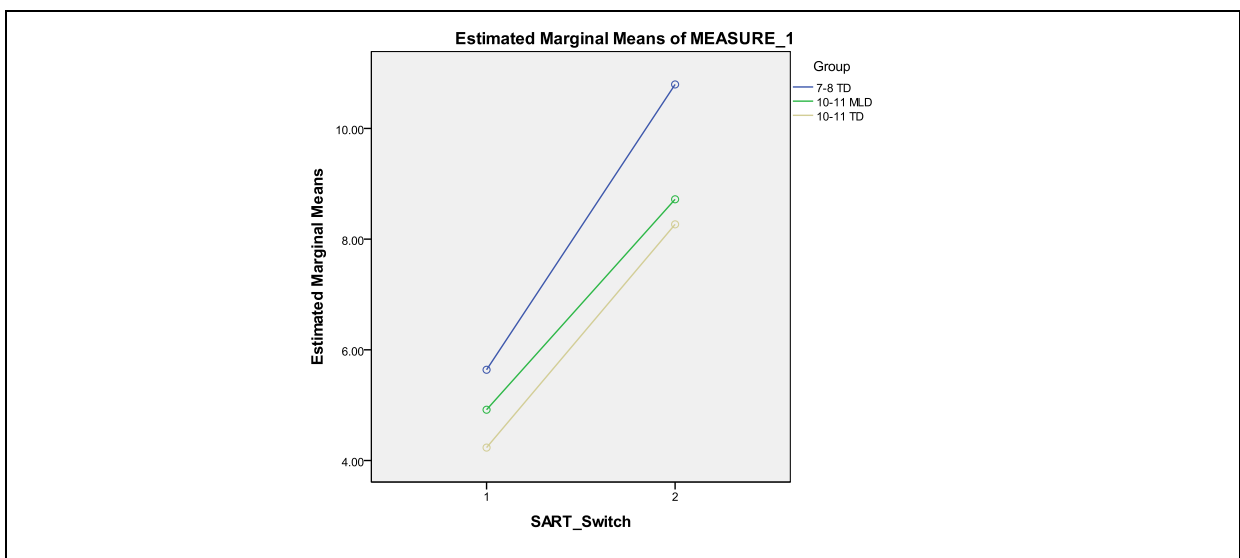




### Errors

The ANOVA indicated a significant main effect of group ( $F(2,351)=11.24$ ,  $p=0.00$ ) and post hoc indicated that the TD 7-8 year olds made significantly more errors than both the TD 10-11 year olds ( $p=0.00$ ) and the 10-11 year olds with MLD ( $p=0.002$ ).

Figure 21 SART errors for pre-switch (1) and post-switch (2) conditions according to groups



There was however a significant interaction between group and home language ( $p=0.028$ ). Further analyses however showed only the following differences between groups once analysed according to home language group, see Table 19:

Table 19 Significant differences of the group x home language interaction on SART errors made

Home language group	Significant differences
<b>Monolingual</b>	TD 7-8 vs TD 10-11* (p=0.00) TD 7-8 vs. 10-11 MLD* (p=0.00)
<b>L1 English</b>	TD 7-8 vs. TD 10-11* (p=0.042)
<b>Simultaneous</b>	TD 7-8 vs. TD 10-11* (p=0.042)
<b>L1 Welsh</b>	None

*\* indicates the group that made least errors*

No significant main effects were found for home language.

### Summary

In summary, there was an overall home language effect indicating that the L1 English group performed significantly faster than the monolingual group which may indicate a bilingual advantage for the group with MLD.

The group with MLD performed similarly to the TD 7-8 year olds on ‘response time’ but the TD 10-11 year olds also performed similarly to those with MLD. This is most likely to indicate that the task was not sensitive enough to test differences between the groups.

### 12.3.3 Flanker Task (Kennedy, 2012; modification of Yang and Lust, 2004)

For both the original and modified Flanker the following analyses were conducted.

One repeated measure ANOVAs was conducted to analyse the reaction times. There were two levels for the dependent variable: reaction time and number of errors. Congruency and Home language (L1 Welsh, L1 English and Simultaneous bilinguals, Monolinguals) and group (TD 7-8 year olds, 10-11 with MLD, and TD 10-11 year olds) were the independent variables. This was a non-linguistic task.

One univariate ANOVA was conducted to analyse errors as no data was available that differentiated between the congruent and incongruent errors. Therefore, errors was the

dependent variable and home language (L1 Welsh, L1 English and Simultaneous bilinguals, Monolinguals) and group (TD 7-8 year olds, 10-11 with MLD, and TD 10-11 year olds) were listed as the independent variables.

## Original Flanker

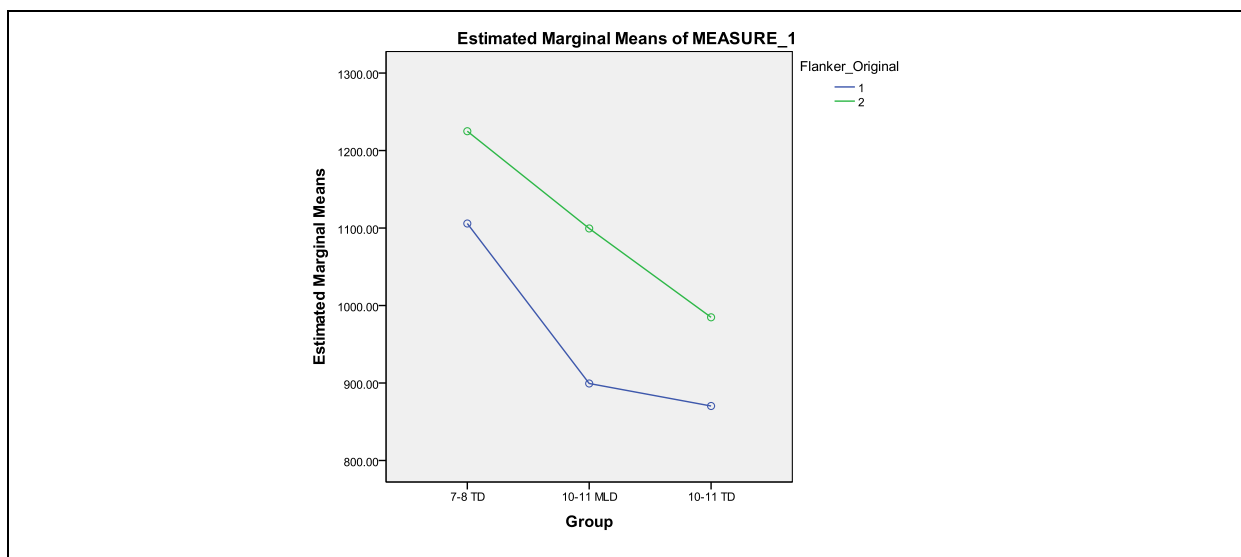
### Congruency

A significant effect of congruency was found with the incongruent trials taking significantly longer than the congruent trials ( $F(1,355)=80.291, p=0.00$ ). This supports the validity of the test.

### Response Times

The only significant difference (except congruency) was of group ( $F(2,355)=14.229$ ) with post-hocs indicating that the TD 7-8 year olds took significantly longer to complete the task than the TD 10-11 year olds ( $p=0.00$ ) and 10-11 year olds with MLD ( $p=0.00$ ).

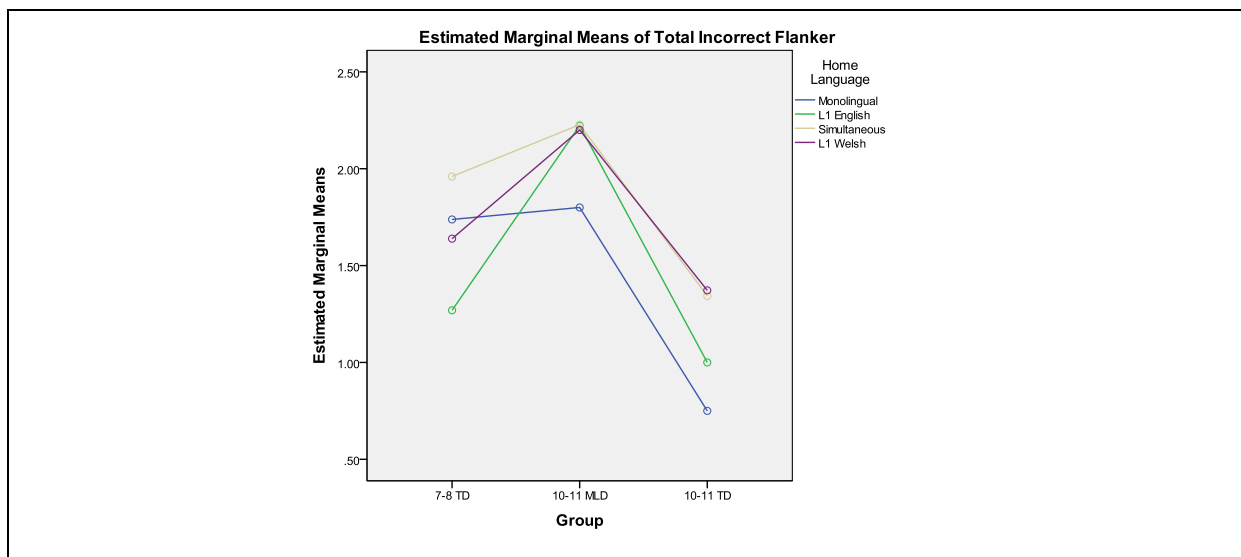
Figure 22 Figure 14 Original flanker response time according to group



## Errors

A significant difference was found for group ( $F(2,355)=6.6.23, p=0.00$ ) with post hocs indicating that the TD 10-11 year olds performed significantly better than the TD 7-8 year olds (0.021) and the 10-11 year olds with MLD ( $p=0.002$ ). There was no significant difference between the 10-11 year olds with MLD and the TD 7-8 year olds ( $p>0.05$ ); no other main effects were found.

Figure 23 Original flanker total incorrect responses according to group x home language



### Modified Flanker

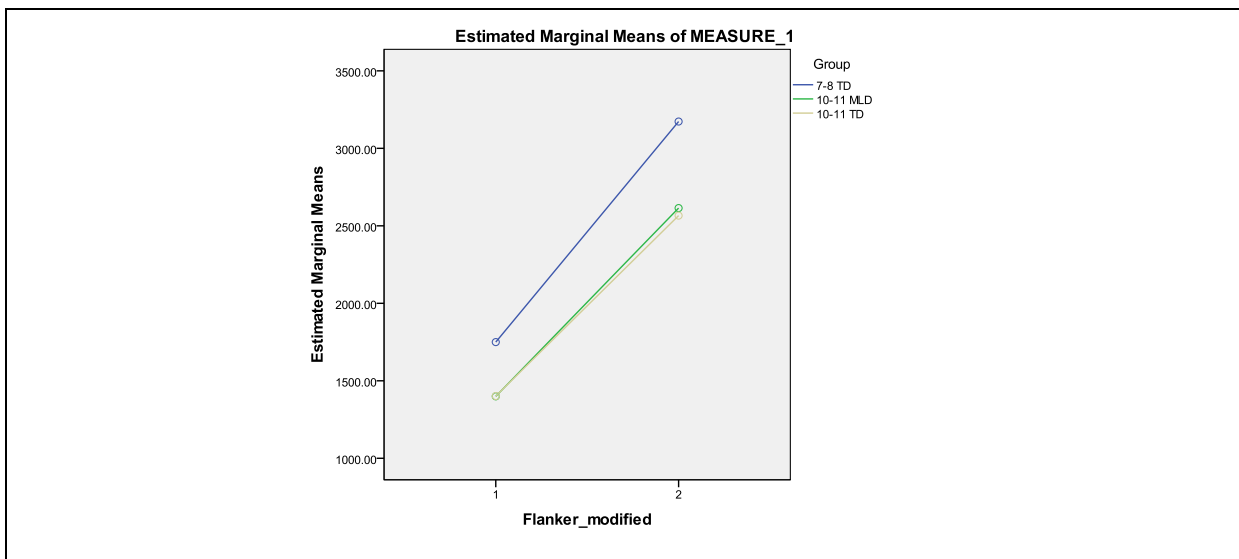
#### Congruency

A significant effect of congruency was found with the incongruent trials taking significantly longer than the congruent trials ( $F(1,353)=533.434, p=0.00$ ). This supports the validity of the test.

#### Response time

A significant effect of group was found ( $F(2,353)=13.401, p=0.00$ ) and post-hocs indicated that the TD 7-8 year olds responded significantly slower than the TD 10-11 year olds ( $p=0.00$ ) and the 10-11 year olds with MLD ( $p=0.001$ ). No main effect of home language was found.

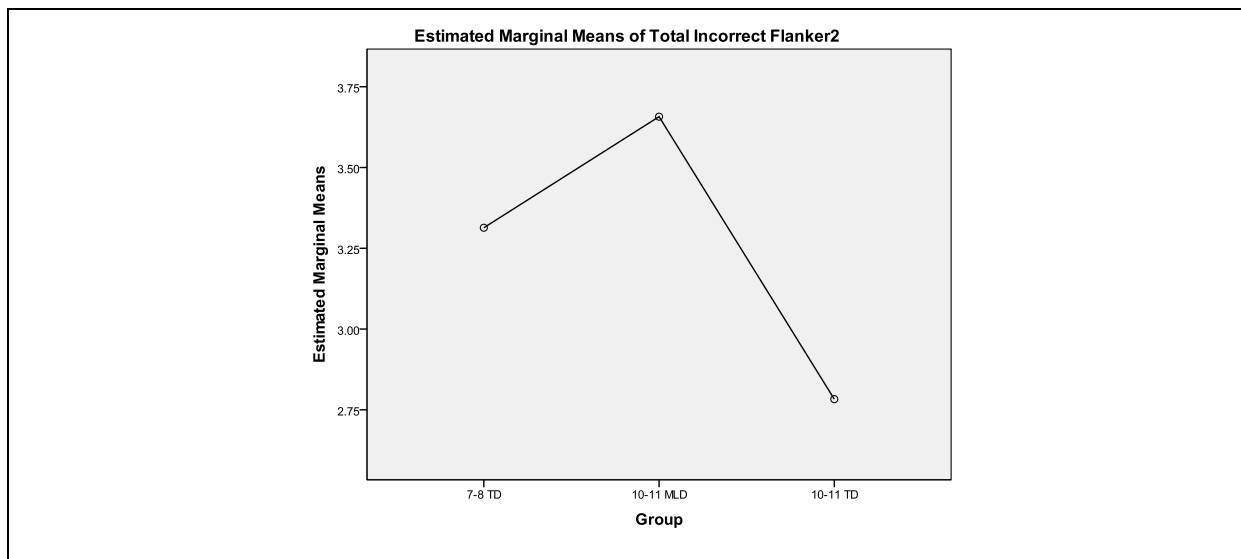
Figure 24 Modified flanker response time according to group



### Errors

There was a significant effect of group ( $F(2,353)=4.108, p=0.017$ ) and post-hocs indicated that the TD 10-11 year olds made significantly fewer errors than the TD 7-8 year olds ( $p=0.041$ ) and the 10-11 year olds with MLD ( $p=0.002$ ). There was no significant difference between the 10-11 year olds with MLD and the TD 7-8 year olds ( $p>0.05$ ). No significant main effect of home language was found.

Figure 25 Modified flanker incorrect responses according to group



### Summary

Across both the originals and modified flanker no bilingual advantage was indicated in the result which was unexpected given the bilingual literature. Unexpectedly however, the TD 10-11 year olds did not perform significantly better than the 10-11 year olds with MLD (as was predicted), neither did they perform significantly better than the TD 7-8 year olds, despite the trend in Figure 22 and indicating such a pattern. This may possibly be indicative of a ceiling effect for all groups.

### 12.3.4 Summary

Table 20 Overall summary of executive functioning findings in relation to the main research aims<sup>8</sup>

<b>Task</b>	<b>Main effect of home language for children with MLD</b>	<b>TD 7-8 v MLD 10-11</b>	<b>MLD 10-11 v TD 10-11</b>
Opposite worlds reaction time	No significant differences (effects for L1 Welsh v Monolingual TD 10-11 year olds)	TD 7-8 v MLD 10-11*	No significant differences
Opposite worlds errors	No significant differences	No significant differences	MLD 10-11 v TD 10-11*
Fluency	No significant differences (effects for TD 10-11 and TD 7-8 only: L1Welsh* v L1 English; Simultaneous v L1 Welsh*)	No significant differences	MLD 10-11 v TD 10-11*
Stroop reaction time	Monolingual v L1 English* Monolingual v L1 Welsh*	TD 7-8 v MLD 10-11*	No significant differences
Stroop errors	Monolingual v L1 English*	TD 7-8* v MLD 10-11	MLD 10-11 v TD 10-11*
SART reaction time	No significant differences	No significant differences	No significant differences
SART errors	No significant differences	TD 7-8 v MLD 10-11* (All home language groups excluding L1 Welsh)	No significant differences

<sup>8</sup> \* indicates the groups that scored best on the tasks

Original Flanker reaction time	No significant differences	TD 7-8 v MLD 10-11*	No significant differences
Original Flanker errors	No significant differences	No significant differences	MLD 10-11 v TD 10-11*
Modified Flanker reaction time	No significant differences	TD 7-8 v MLD 10-11*	No significant differences
Modified Flanker errors	No significant differences	No significant differences	MLD 10-11 v TD 10-11*



In general, as seen in Table 20, no advantage of bilingualism was found for the bilinguals with MLD, nor was there evidence of an advantage for those bilinguals from different home language backgrounds.

Furthermore, while no advantage of bilingualism was found when comparing 10-11 year olds with MLD from differing home language backgrounds, comparisons between the TD 7-8 year olds and 10-11 year olds with MLD indicated that the children with MLD were not performing any worse - thus indicating that there was no executive functioning disadvantage either. In fact, adding to the complexity of the findings, the group with MLD performed similarly to their typically developing, chronologically age matched peers on a number of the tasks despite convincing evidence in the literature to suggest that the children with MLD should perform worse (see Table 20). All of which will be discussed in further detail in the discussion.

## **13 EXECUTIVE FUNCTIONING DISCUSSION**

The second of the twin aims of this research study was to explore whether the suggested bilingual advantage in executive functioning tasks extends to children with MLD who attend Welsh medium education. This was achieved through measuring metalinguistic and non-verbal executive functioning abilities on various experimental tasks. The findings on these measures were varied however, the main findings were:

- (i) No clear advantage of bilingualism was found for children with moderate learning difficulties (MLD) when compared with monolinguals with MLD
- (ii) Differences were found for children with MLD, in general, when compared with typically developing (TD) developmentally age-matched and chronologically age-matched peers

These will now be discussed in relation to the literature.

### **13.1 NO CLEAR ADVANTAGE OF BILINGUALISM WAS FOUND FOR CHILDREN WITH MODERATE LEARNING DIFFICULTIES WHEN COMPARED WITH MONOLINGUALS WITH MODERATE LEARNING DIFFICULTIES**

Empirical evidence suggests that TD bilinguals experience an executive functioning advantage when compared with monolinguals (Yang and Lust, 2005; Bialystok, 2008; Carlson and Meltzoff, 2008), However, this effect was not found in this research. In fact, only the Numerical Stroop task (Hernandez et al 2010) indicated a bilingual advantage for some bilinguals and this was only found for children from some home language backgrounds.

#### **13.1.1 Bilingual Advantage**

For children with MLD the Numerical Stroop task indicated a bilingual advantage for the L1 Welsh and L1 English group (sequential bilinguals) over the monolinguals with MLD. This measure of inhibition of an automatic response was used to extend the current literature (Gathercole et al, 2010) and remove the effects of levels of literacy (Hernandez, et al , 2010) or reading automaticity (Leon-Carion, Garcia-Orza and Perez-Santamaria, 2004) on the test.

The advantage found was arguably stronger in the L1 English group, who made significantly fewer errors than their monolingual peers, in addition to performing the task faster. These findings contrast with Gathercole et al's (2010) research with TD children that indicated a bilingual advantage for simultaneous bilinguals. Despite Gathercole et al's research not being focussed on children with MLD, their research was on children of similar developmental ages (7-8 years) from home language backgrounds which were categorised in a similar way (i.e. Only Welsh at home (L1 Welsh), Welsh and English at home (sequential), only English at home (L1 English)).

### **13.1.2 Monolingual and Some Bilingual Advantages**

In contrast to the aforementioned bilingual advantage, there was a monolingual advantage in the Fluency task which required children to name as many words as they could that fitted into three categories: clothes, any word, animals. The children had one minute to name as many words as they could, within the selected category but for the 'words' and 'animals' condition, the words had to begin with a particular letter e.g. 'name as many words/ animals as you can that begin with the letter F'. It was expected that the bilingual children would perform less well than the monolingual children on the clothes naming task due to its reliance on language and bilingual children's widely recognised smaller vocabularies (Bialystok, Luk, Peets and Yang, 2010; Rhys and Thomas, 2012) however the bilinguals were expected to perform better than the monolingual children on the 'any word' and 'animal' task due to its suggested reliance on executive control ( Bialystok, Craik and Luk, 2008; Bialystok, 2009). The entire verbal fluency task was conducted in English to enable comparison amongst the monolingual and bilingual groups. It was not considered possible to conduct the research with the children in their L1 due to the availability of some words in one language and not another. For example, it could be argued that there are more words for a top piece garment (i.e. jumper, t-shirt, sweater, polo neck etc) than there are in Welsh. This was therefore only a measure of English fluency.

The findings for all three conditions were mixed:

In the 'anyword' condition, all children with MLD performed comparably whereas for both the typically developing groups the L1 Welsh performed significantly worse than TD children who received some English at home (monolinguals, L1 English and Simultaneous

bilinguals). That is, the bilinguals who received some English at home performed at monolingual-like levels which was partially unexpected; previous findings have demonstrated bilinguals perform worse than monolinguals due to their overall smaller vocabularies. Conversely however, the typically developing L1 Welsh groups performed significantly worse than the other language groups, which was expected given the lack of reliance on executive control. It was not expected that the pattern of home language findings would be dissimilar between the TD and MLD groups.

For the clothes condition the TD 7-8 year olds performed significantly worse than the MLD groups and further analyses of home language backgrounds indicated that of those with MLD, the L1 Welsh group performed significantly worse than the home language groups that received some English at home. These findings do not indicate a cognitive bilingual advantage as the monolinguals performed better in all the tasks, and in fact the L1 Welsh are still performing significantly worse. This perhaps may not be surprising given the reliance of this task on language ability and the differences found on English vocabulary measures in the previous section. What was prominent in these findings however was the clear improvement for the TD 10-11 year olds between the 'any word' and 'clothes' task where there were no differences between them and the TD 7-8 year olds according to home language in the clothes or animals tasks. This could suggest two things: (i) a combination of more experience and a higher developmental age is more likely to demonstrate success in this task (ii) the tasks were too easy/too hard thus demonstrating floor and ceiling effects.

For the animal naming condition, which according to the literature places more pressure on the executive control than the clothes task, the only significant difference was between the L1 Welsh and the monolingual children where the monolingual children performed significantly better than the L1 Welsh children. This may be viewed as a bilingual advantage for those who received some English at home but not the L1 Welsh bilinguals or it may be considered a reflection of the simultaneous and L1 English bilinguals' enhanced vocabulary due to greater English exposure than the L1 Welsh. First it is possible that these findings indicate a cognitive advantage for those who receive some English at home, similarly, to Hermanto, Moreno and Bialystok (2012) as it may indicate that those children with MLD who received some English at home remediated the lexical retrieval disadvantages (demonstrated in the other anyword and clothes tasks) through utilising cognitive control in this more cognitively taxing task to perform comparably to the monolinguals on the any word and animal naming

task. However, it could be argued that if the cognitive advantage was present, such an advantage wasn't strong enough to remediate the differences between the L1 Welsh group and monolinguals on the animal naming task. Neither is it clear why lexical retrieval disadvantages may have been remediated in the animal category and not in the clothes naming category which are both believed to exercise cognitive control. While this possible advantage may warrant further investigation in linguistic tasks that require cognitive control, this advantage may be perhaps less likely and the findings should be interpreted in light of possible enhanced vocabulary knowledge due to L1 English and simultaneous bilinguals receiving some English at home and lexical retrieval difficulties had by the L1 Welsh in particular.

The lack of bilingual advantage found for the L1 Welsh group with MLD however could be explained due to (i) the L1 group being the closest of the bilinguals to being 'monolingual'. That is, they use their English more infrequently than the L1 English and simultaneous groups thus practising their language skills and any executive functioning skills associated with the linguistic domain more infrequently (ii) the small sample size for the L1 Welsh group with MLD (N=12).

The animal naming task's validity may however be criticised for being too difficult, with a floor effect being evident in the data with the children most frequently naming no animals. Therefore, interpretation of the significant differences between the L1 Welsh group and monolinguals should be considered with caution, as this is the most likely explanation (see Figure 26 and Figure 27).

Figure 26 Histogram of the number of animals named for the TD 7-8 year olds across home language backgrounds

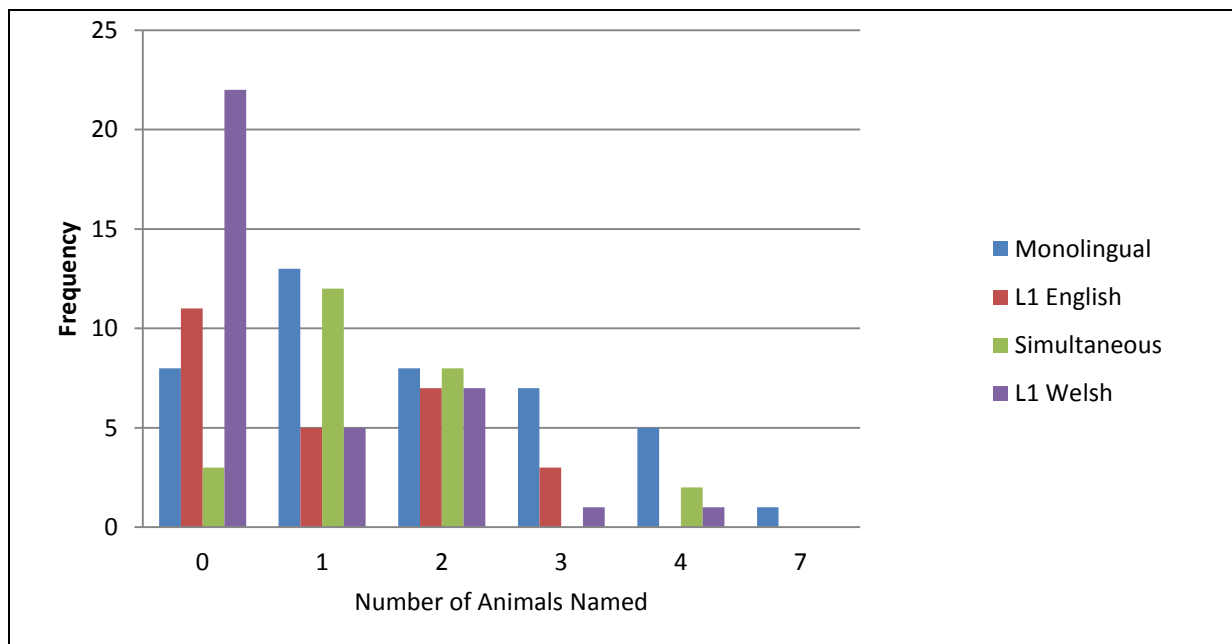
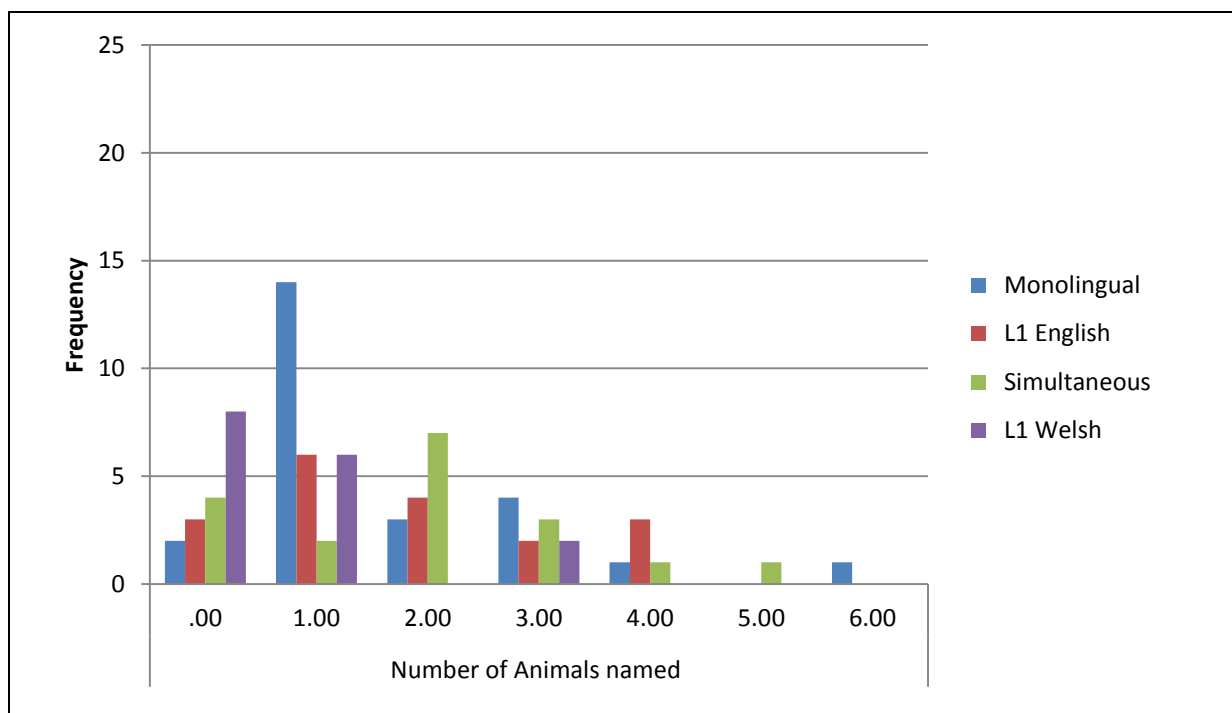


Figure 27 Histogram of the number of animals named for the 10-11 year olds with MLD across home language backgrounds



## **13.2 METHODOLOGICAL ISSUES**

As noted previously, only one (possibly two) bilingual advantage(s) was found which was contrary to a large number of earlier empirical studies based on bilingualism and executive functioning (Emmorey, Luk, Pyers & Bialystok, 2008; Poulin-Dubois, Blaye, Coutya and Bialystok, 2010). However, research published since the start of the current study suggests that this may be due to methodological issues. In particular, a number of recent studies suggest that the bilingual advantage has a tendency to disappear when other factors are rigorously controlled for and a bilingual advantage only appears under very specific conditions. These issues will now be discussed in relation to the following three aspects of the current study: controlling for socio-economic and background factors, condition-specific advantage and task-specific advantage.

### **13.2.1 Controlling for socio-economic and background factors**

First, despite mixed findings, the bilingualism literature has placed emphasis on the prevalence of the bilingual advantage in experimental studies. However, the most recent research is beginning to suggest that there may not be a bilingual advantage after controlling for linguistic proficiency, age of bilingual onset (i.e. before or after 3 years) or kind of bilingualism (simultaneous or sequential bilingualism) and educational status. While there has been recent research published since 2010 that indicates a bilingual advantage (e.g., Hernandez et al, 2010; Gathercole et al, 2010; Hermnanto, Moreno and Bialystok, 2012) and many papers published quite often attempt to control for these factors, increasing evidence is beginning to suggest alternative factors that influence bilingual advantages/lack of disadvantages (e.g. Kousaie and Phillips, 2014 in their study of French-English bilinguals; Kirk, Scott-Brown and Kempe, 2013 in their study of Gaelic-English bilinguals).

Paap and Greenberg (2013) for example, attempt to indicate that the bilingual advantage may be an artefact of certain background variables. Paap and Greenberg (2013) analysed data from three studies that measured monitoring, switching and inhibition in fluent bilinguals. The bilinguals were categorised in relation to their proficiency and varied from equally proficient to more dominant in one language; no bilingual advantages were found, neither did the measures of inhibitory control (Flanker and Simon task) in Paap and Greenberg's study correlate with each other, thus undermining these tasks as indicators of such sub-executive

functioning processes. A number of other recent studies support the findings of Paap and Greenberg with regard to inhibition (Humphrey and Valian, 2012; Kousaie and Phillips, 2012a,b) and monitoring (Prior and MacWhinney, 2010). However, only one study was found that indicated no advantage for a switch condition on tasks which involved switching (Tare and Linck, 2011 cited in Paap and Greenberg, 2013). Tare and Linck (2011) rigorously matched 35 bilinguals to more than 1100 monolinguals using a ‘propensity score matching’ technique that matched the two groups on measures of age, education, income, general intelligence and verbal ability. No switching advantages were found as a result of bilingualism, and the bilinguals in fact performed worse than the monolinguals (a potential bilingual disadvantage) on their measure of inhibition. Tara and Linck therefore concluded that “factors other than bilingualism per se may be driving any purported bilingual cognitive advantages” (p. 132).

Paap and Greenberg (2013) also note that in addition to demographic variables, there are a number of other factors such as parenting styles, methods of schooling, discipline, emphasis on self-control, values that are known to guide and influence the development of executive functioning and very rigorous procedures must be in place when comparing bilingual and monolingual data. Morton and Harper (2007) for example replicated the study of Bialystok, Martin and Viswanathan (2005) who found a bilingual advantage in French-English bilinguals from “similar middle class neighbourhoods”, and they found that after controlling for SES, immigrant status and ethnicity, no bilingual advantage was found and the monolinguals performed 70ms faster.

Controlling for demographic and other background factors was a particular difficulty in this study given the low response rate to the parental questionnaire that was distributed to all parents. There was a significantly higher response rate for the typically developing sample, with only the following number of returns for each of the groups:

Table 21 Parental questionnaire response rates for all children

<b>MLD</b>	<b>TD 7-8 year olds</b>	<b>TD 10-11 year olds</b>
16% (N=16)	59% (N=92)	53% (N=106)



The socio-economic status of the children in this study was consequently measured on the basis of them receiving free school meals which put children into one of two categories (receiving FSM or not receiving FSM). This was considered a suitable measure as educational research in the UK frequently use 'Free School Meal Eligibility' as an indicator of pupils' SES (Hobbs and Vignoles, 2007). This measure is particularly important for children with MLD because of the high association between free school meals and having a learning difficulty and underachieving in school – particularly when comparing typically developing children with this group of children.

This measure may be problematic for the following reasons. First, using FSM as a measure is different to other executive functioning literature which uses a variety of income based measures and parental education measures based on many levels. For example, Gathercole et al (2010) measured socio-economic status based on parents' profession banded across 4 levels, and Paap and Greenberg (2013) used parents' educational levels based on six levels. This makes comparisons, on a SES level, between this study and other studies tentative due to the different measures used. In addition to this, FSM is not a commonly used category in the international literature and is very specific to the UK making inferences between this study and other research difficult due to this variability in socio-economic measures. Second, Halse and Ledger (2007) note that despite FSM being means tested, not all parents with children who would be eligible for free school meals claim eligibility because of the perceived stigma attached to it. This may have affected the validity of the socio-economic control in this study.

### **13.2.2 Condition-Specific Advantage**

Second, although careful consideration was given to the kinds of measures that were to be used in this study, Costa et al., (2009) in their rigorously controlled study found the bilingual advantage only to be present in some cases. That is, for an evident bilingual advantage there needs to be (i) the correct ratio of congruent to incongruent trials to ensure that the task is sufficiently difficult and places enough pressure on the cognitive processes and (ii) the advantage is transient as it is seen in earlier and not later blocks. This may be a particular problem in tasks requiring two conditions e.g., the SART which took approximately 10 minutes per condition (pre- and post- switch). This former point parallels with metacognitive

research that suggests that strategic behaviour is only identified in difficult tasks (see implications for further details).

### **13.2.3 Task-Specific Advantage**

Finally, it could be that the bilingual advantage is a product of the tasks used. That is, task specific performance differences on measures may indicate that the bilingual advantage extends only to that task alone, and not general executive functioning ability (Paap and Greenberg, 2013). This may be true of this study and practical implications of executive functioning performance should be considered in real-life environments which would enable researchers and professionals to relate executive functioning skills and abilities to situations which are measurable and allow them to be compared more easily.

## **13.3 DIFFERENCES WERE FOUND FOR CHILDREN WITH MODERATE LEARNING DIFFICULTIES, IN GENERAL, WHEN COMPARED WITH TD DEVELOPMENTALLY AGE-MATCHED AND CHRONOLOGICALLY AGE-MATCHED PEERS**

To enable the exploration of executive functioning abilities of children with MLD and the exploration of other variables such as chronological age/experience, it was decided to compare the executive functioning abilities of bilinguals with MLD with bilinguals of the same developmental age (DA; TD 7-8 year olds) to enable a valid comparison against 'typical' executive functioning abilities which takes home languages and developmental age into account. A chronological age (CA) comparison was also used (TD 10-11 year olds vs 10-11 year olds with MLD) to enable a clearer picture to be formed.

It was predicted that the bilinguals with MLD would perform comparably to their DA matched peers (as in the studies conducted by Danielsson et al., 2012; Van der Molen, 2007) but worse than their CA matched peers (Danielsson, et al , 2012; Leven et al., 2008; Connors et al., 1998) and if a bilingual advantage was present, bilingual 10-11 year olds with MLD would perform significantly better than TD 7-8 year olds monolinguals (developmental age match) but similarly to the TD 7-8 year old bilinguals.

Contrary to the prediction, no statistical differences were found between the home language groups, that is the bilinguals performed comparably to the monolingual developmental age match. This is somewhat unexpected because it could be assumed that because (i) children with MLD perform at developmentally age appropriate levels and (ii) a bilingual advantage has been found for young bilinguals (and therefore developmentally similar to those with MLD), bilingual children with MLD would also experience this proposed bilingual advantage.

However, in contrast to the studies cited above, the children with MLD performed statistically better than their DA matched peers (TD 7-8 year olds) on all executive functioning measures (except the SART) that measured response time, and the children with MLD performed comparably to their CA matched peers (TD 10-11 year olds) on a number of tasks, which was unexpected. These findings however became increasingly nuanced when considering each task in its turn and the overall pattern of findings. The tasks have been grouped and will be discussed in relation to the pattern of findings.

The following discussion is in relation to both monolingual and bilingual children as no differences between home language backgrounds were found.

### **Opposite worlds task, Original Flanker, Modified Flanker**

On these measures of switching and inhibition, and controlled attention and inhibition the children with MLD performed significantly better than their DA matched peers but comparably to their CA matched peers on response time. This is contrary to previous findings (Leven et al., 2008; Danielsson, et al., 2012). However, with regard to errors, the children with MLD made significantly more errors than their CA matched peers, so it may be reasonable to conclude that for the bilinguals with MLD there was a time versus error ‘trade off’ which may indicate that the group with MLD, in fact, did not perform as comparably to the CA matched children as initially thought.

### **Numerical Stroop Task**

On this measure of inhibition of an automatic response the children with MLD performed significantly faster than their DA matched peers and similarly to their CA match. This was contrary to the suggestion in previous literature suggests that DA matched children are comparable on such measures (i.e. Danielsson et al, 2012). It is possible that motor

maturation differences due to age may account for these unexplained differences (Malina, Bouchards, Bar-Or, 2004) thus enabling the children with MLD to respond faster. The children with MLD also made more errors which may indicate no advantage due to the time versus error trade off. This is somewhat surprising given that the children were told to respond as “fast and accurately as possible”, and the children with MLD performed significantly worse than the DA and CA matches on error rate. While it is possible that children with MLD are making qualitatively different decisions on this task, research into motor and executive functioning may provide some answers as to why this may be. First, motor activity and executive functioning are closely related in terms of neural substrates (Diamond, 2000; Bonifacci, 2004) and second, qualitative motor activity and executive functioning are assumed to share underlying skills with regards to sequencing (Hartman et al 2010); it could possibly be suggested that the doubling of instructions added to the difficulty children had in sequencing their actions.

It may therefore be reasonably concluded that the group with MLD were perhaps worse on this task than CA match due to the increased error rate, but the children with MLD appear to be responding differently to the DA match; that is the children without MLD take both error and time into account but the children with MLD do not.

### **Fluency Task**

This task was the only measure that supported both predictions; that is, the children with MLD performed similarly to the DA matched peers and significantly worse than the CA matched peers. This may be because of the heavy reliance on language and lexical recall to do well on this task. While these findings were somewhat hypothesised, the findings of the ‘any word’ condition may be a surprise given that vocabulary development appears to be, in part, associated with ‘experience’ as indicated in the language and literacy chapters. Without the need for employing executive functioning in the ‘any word’ task it may have been equally plausible that the children with MLD might have performed better than the DA-match (as the children with MLD were older thus having more experience). These findings are not comparable to the opposite worlds task. This may be because the children did not need to recall or have any prior knowledge of the language to complete that task.

### **Sustained Attention to Response Task (SART)**

This measure of sustained attention indicated that the group with MLD performed comparably to their CA matched bilingual peers, which was unexpected given recent research findings (Danielsson, et al., 2012). This was also particularly surprising due to the level of attention needed to complete this task and the strong association between inattentiveness and MLD (Siminoff et al, 2007; Norwich and Kelly, 2005).

There were however limitations that are often associated with this kind of task as the cognitive behaviours that are generated are often questioned in the literature – and it may therefore be deemed an inappropriate task to measure the bilingual advantage. For example, this task has been criticised on the basis that it encourages mind wandering because it is cognitively undemanding (Smith et al., 2006) and can cause impulsive responding (Helton, 2009). This task was also the longest task of the set and children (TD and MLD) often complained of boredom which may have affected their vigilance during the task. Alternatively this could be due to motor maturation based on age.

### **13.4 SUMMARY**

Overall these findings suggest no definitive evidence to suggest that the bilingual advantage extends to Welsh-English bilingual children with MLD on non-verbal executive functioning tasks but may extend to L1 English speakers on the measure of inhibitory control (stroop). The findings also indicated that executive functioning may remediate lexical retrieval differences in bilinguals when compared with monolinguals – but only on those tasks that place sufficient pressure on cognitive capacity. Additionally, recent research is beginning to suggest that the advantage may be associated with factors such as socio-economic status, task design and the tasks used.

The results also indicated some unexpected findings that suggested children with MLD (regardless of home language) may have been making qualitatively different decisions when completing the executive functioning tasks. All of which will be discussed in penultimate chapter.

## **14 COMBINED DISCUSSION**

### **14.1 OVERVIEW**

The aims of this thesis were to explore language and literacy and Executive Functioning abilities of bilingual children with moderate learning difficulties (MLD) who attended Welsh medium education. To do this, three groups of children were compared who varied according to chronological age (CA), and developmental age (DA); TD 7-8 year olds, 10-11 year olds with MLD and TD 10-11 year olds); these were further divided into home language groups (monolinguals, L1 English, simultaneous and L1 Welsh). They were all measured on a range of standardised and experimental tasks.

This research is felt to be particularly important due to the lack of research interest regarding moderate learning difficulties (MLD; or SEN in general) and bilingualism and little- to no-research in this field in relation to Welsh-English bilingualism in Wales. This potentially has serious implications for teaching practices across schools in Wales with many teachers basing their bilingual practices on intuition and experience as opposed to evidence-based practice.

The aim of this chapter is to provide an overview of the results followed directly by the implications for MLD and bilingual practices where both languages exist in a minority-majority relationship in Wales.

### **14.2 VOCABULARY AND LITERACY SKILLS**

These results can be categorised into two main findings. First, it appears that children with MLD are reaching developmentally-age appropriate levels regardless of home language background (i.e. they perform at levels similar to- or better than- the TD 7-8 year olds) which is encouraging as it suggests that children with MLD are developing language and literacy skills in English and Welsh which are equivalent to their TD developmentally-age matched peers, as would be predicted by from developmental approach to MLD (Zigler, 1967, 1969; Fischer, 1980).

In fact the children with MLD performed significantly better than their developmentally age matched peers in the English language tasks but not in the Welsh language tasks. This is

somewhat concerning, because the lack of advantage in the Welsh language measures may indicate that the English language skills of the bilinguals with MLD may develop securely but Welsh language skills do not develop to the same standard. This parallels with the findings of research into language development and skills of bilingual children with intellectual disabilities and with autistic spectrum disorders. For example Kay-Raining Bird et al. (2005) and Feltmate and Kay-Raining Bird (2008) both point out that there was considerable variability in second language proficiency amongst the children with Down's syndrome in their studies. Similarly Hambly and Fombonne (2011) in a study based mainly on parent report measures found no significant differences in first language fluency between monolingual, sequential bilingual and simultaneous bilingual groups, of children with ASD; however, children were reported, in general, not to have acquired fluency in their second language. This is a concern in relation to the current study because, where children are in Welsh medium education, the whole of the curriculum (except English lessons) is taught through Welsh which may have implications for their access to the curriculum.

There is very little research to date on how successfully bilingual children with MLD access the curriculum, and none in particular within the Welsh context. Genesee (2007) however notes that access to the curriculum in bilingual children with MLD or who are considered as "at-risk" is a concern of educators and researchers. It is often reported "that students who are expected to have difficulty in immersion...are discouraged from registering in immersion or are counselled out if they experience difficulty in the program", and this as noted by Genesee, if often without a sound research base. Genesee (2007) in his review however goes on to suggest that there is evidence to suggest that "below-average pupils" educated through their L2 in French immersion perform comparably to "below-average pupils" who were taught through their L1 in academic skills. Furthermore, Bruck (1985) also found evidence to suggest that, even when academic difficulties were noted in children in immersion education, the children still performed at a similar level after they were moved into an L1 program.

Second, the findings indicated that none of the home language groups achieved monolingual-like levels in both languages. The pattern indicated that the L1 Welsh group (who received only Welsh at home) performed significantly better on the Welsh language measures than those who received some English in the home (i.e. L1 English and Simultaneous), however those who received some English in the home performed significantly better in the English language tasks than the L1 Welsh group. These findings are in line with Rhys & Thomas

(2012) but also support the studies that suggest differential performance relative to the exposure one has to a language (Pearson, Fernandez, and Oller 1995; Genesee 2001; Oller 2005; Gathercole, 2002). However, a number of these studies suggest that bilinguals ‘catch-up’ by approximately age 10-11 once they have gained sufficient experience with the language (Oller and Eilers 2002; Hammer Scheffmer, Miccio, and Rodriguez 2004; Kovelman, Baker, and Petitto 2008; Oller, Pearson, and Cobo-Lewis 2007). This was not demonstrated in this study as all the bilingual groups performed below monolingual levels in one of their two languages. Due to the developmental-age difference, in particular for children with MLD, further research should be conducted in this field for older bilinguals with MLD, to explore whether the ‘catch-up’ is based on developmental age as opposed to chronological age. Possible reasons for this have already been discussed in chapter 9.

### 14.3 EXECUTIVE FUNCTIONING SKILLS

Overall these findings provide no definitive evidence to suggest that the bilingual advantage extends to Welsh-English bilingual children with MLD on non-verbal executive functioning tasks but may extend to L1 English speakers on the measure of inhibitory control (stroop). As stated previously, this was somewhat surprising as previous evidence suggests that the bilingual advantage is present only for simultaneous bilinguals and that the L1 English group in this study are sequential bilinguals. However, it could be argued that this bilingual advantage is most prevalent in this group because of the balanced nature of their language abilities. That is, compared with the other bilingual groups, the L1 English group performed most similarly on the Welsh and English vocabulary measures (see table 22). This interpretation is consistent with the findings of a number of other studies that suggest that balanced bilingualism enhances executive functioning (Ricciardelli, 1992; Bialystok, & Majumder, 1998; Salvatierra and Rosselli, 2010).

Table 22 Means and standard deviations of the standardised scores per home language group

Home Language	English Vocabulary BPVS Means (std.dev)	Welsh Vocabulary Prawf Geirfa Means (std.dev)	Mean differences
L1 English	90.16 (13.267)	92.49 (14.42)	2.33
Simultaneous	84.46 (11.125)	98.22 (12.64)	13.76
L1 Welsh	80.27 (11.228)	110.16 (12.69)	29.89



If balanced bilingualism is therefore the key to cognitive advantages, this further supports the use of translanguaging in the classroom to develop both languages simultaneously through encouraging children to switch between their languages. Baker (2011, p.290) notes that

The teacher can allow a student to use both languages, but in a planned, developmental and strategic manner, to maximize a student's linguistic and cognitive capability, and to reflect that language is sociocultural both in content and process

These findings also suggest that on measures which require the inhibition of a pre-potent or salient response (error making) the children with MLD clearly have more difficulty than their CA matched peers but instead perform similarly to their DA matched peers (findings similar to Danielsson et al , 2012). The results showed that the 10-11 year olds with MLD (regardless of language background) performed four of the six tasks( opposite worlds, flanker original, flanker modified, stroop) significantly faster than TD 7-8 year olds. However on three of these tasks they also made significantly more errors than the TD 7-8 year olds, and on the remaining-task (opposite worlds) there were no significant differences between the 10-11 year olds with MLD and the TD 7-8 year olds in terms of errors. Danielsson et al (2012) showed similar results indicating that the children with MLD performed worse on measures of inhibition (error rate) than their DA matched peers. There are a few possible explanations for these findings:

- First it may be that the children with MLD were inclined to act impulsively (as has been suggested in the literature e.g. Voigt et al, 2006), and so 'lost' the second part of the instruction (to react as fast as possible while making as few errors as possible).
- Second it may be that the children with MLD were aware of their own difficulties and were concerned about performing the task too slowly, and so traded accuracy for speed.
- Third, as reported by Danielsson et al (2012), it is possible that the children treated the task qualitatively different. Children received instructions to complete the task “as quickly and as accurately as possible” however, it is possible that the children made a decision to respond to only one of those instructions i.e. speed
- Fourth it is possible that working memory constraints meant that the children may only have remembered one of the rules of the task. In all of the tasks where there appeared to be a speed vs error trade off, speed was where the children with MLD excelled and was always the first instruction given.

It may also be concluded that on measures of switching and inhibition (opposite worlds task), and controlled attention and inhibition (Flanker) the children with MLD outperformed their DA matched bilingual peers. These findings indicate that, similar to the findings of Danielsson et al ., (2012) executive functioning findings become increasingly nuanced with the exploration of executive functioning's sub-components; and while the executive functioning abilities of children with MLD are inferior to their CA peers, (life) experience may contribute significantly to executive functioning development. This may indicate that experience may play a role in the development of executive functioning beyond language and developmental age and may have implications for teaching and learning practices in schools.

Meltzer (2007, p.166) in her book on 'Executive Functioning in Education' notes that children with deficits in their executive functioning will have problems in their "planning, setting realistic goals, prioritizing, initiating tasks, and organising materials and information...monitoring progress and checking and reflecting on their work" (p.166) and that effective instruction will encourage children to become "metacognitive learners" by teaching them how to learn. Despite little to no consensus regarding the best instruction methods to develop these aforementioned skills, Meltzer (p.168) notes several key principles based on a 'successful learner'. That is, executive functioning instruction techniques should:

- Be directly linked to the curriculum
- Explicitly teach metacognitive strategies
- Be structured and systematic
- Using scaffolding and modelling
- Provide time for practice
- Motivate and provide an understanding about how to generalise strategies

Interestingly however Meltzer discusses executive functioning in an educational context in relation to skills that are directly relevant to educational success i.e. planning and setting goals, organising, little is known regarding instructional techniques and the specific executive functioning sub-components that are quite often measured in the bilingual literature. Further research is therefore needed in relation to (i) what skills are necessary to educational success in a bilingual context (ii) what instructional techniques best develop sub-components of

executive functioning and (ii) what are the educational implications of these statistical findings.

#### **14.4 LIMITATIONS OF THIS RESEARCH**

This research has provided an overview of children with MLDs' linguistic and cognitive skills and to achieve this a number of measures were taken to make the study as robust as possible, for example:

- (i) A number number of different schools were approached;
- (ii) Data was collected from a large number of participants and;
- (iii) A variety of background information from teachers, parents and children was collected.

As detailed in this work, there were a number of issues that arose during the course of the research; however the limitations of this research should be considered in light of the fact that there was only one researcher (two for the TD data collection), and a limited amount of time. The context of this study should also be considered in light of the research available in relation to Welsh-medium education and MLD which limited the background information with regards to conducting research in these fields.

##### **14.4.1 Sample and Group Sizes**

To increase the validity of the findings in this research more participants should have been recruited, particularly those with MLD, however, with only one researcher, a limited amount of time, and low response rate (detailed below), this was not possible. A larger sample would have increased the confidence which could be placed in the study findings. The issues found in this research should inform further research with regards to children with MLD.

The group size for children with MLD was significantly smaller than the TD children which meant that these groups were broken into smaller groups according to home language, and became smaller again. All groups with MLD were ( $N < 25$ ) however the smallest group was for the L1 Welsh group with MLD ( $N = 12$ ). While this number is below the recommended numbers for statistical analysis and makes significant and reliable findings less likely, obtaining large sample sizes for these groups is particularly difficult as has been

demonstrated in other research within this field (e.g. Danielsson et al, 2012; Verhoeven and Vermeer, 2011). Replicating this research with higher numbers for this language group would significantly benefit the robustness of the results.

#### **14.4.2 Recruitment Process**

To recruit the bilingual children with, and without MLD, it was initially requested to the ethics board that they approve negative consent, whereby all parents were sent a letter with information of the study, and all children would take part unless parents felt strongly enough to withdraw their child from the research. This was requested to avoid skewed data for two main reasons. First, it was felt that if positive consent was used, the parents who felt most positively about WM education were most likely to respond, thus translating into more parental support and skewing the data in relation to the ‘kinds’ of children that were included in the data. Second, it was felt that parents of children with MLD were unlikely to respond and submit consent which would hinder the true representation of children with MLD in this study. Even though, on the consent form parents were asked to return the slip after ticking “yes their child may participate in the research” or “no they may not”, no parents of children with MLD returned the slip having ticked “no” to their child’s participation in the research. Further research which utilises negative consent would strengthen the representation of children with MLD in the research and avoid disproportionality.

Further research into MLD where child or parental involvement is necessary should consider other means of recruitment such as (i) the researchers distributing the consent forms themselves rather than relying on teachers to do this. This would increase the likelihood of direct contact with the parents and enable instant feedback. (ii) Collect background information (or indeed other data) through interviews or requesting that parents fill any paperwork (i.e. questionnaires) in with the researcher.

#### **14.4.3 Identifying Children with MLD**

A clear issue when contacting schools in Gwynedd was the uncertainty amongst staff whilst identifying children who had, or they believed to have had MLD. In the initial recruitment letter sent out to schools, the term ‘moderate learning difficulties’ was used in the letter, and in follow up phone calls. This was met with a number of responses. While some schools were confident in their response, a large proportion of schools claimed to have no children with MLD, and others asked for the researcher to define MLD. Two actions were put in place to remedy this problem. First, the LEA were contacted for a list of children with MLD in the

Gwynedd schools which would aid the researcher and schools to target the correct children and second, the introductory letter was amended, which included a general definition (see below), was given to the schools and teachers when presenting the research to ensure that schools were certain of the children that were being targeted in the research.

“Children should be significantly underachieving across most areas of the curriculum by approximately three years or more, and if known, have an IQ of around 80 or less, and should not have any known SEN that may have caused the underachievement i.e. Autistic Spectrum Disorder, Down’s Syndrome. Children should also be on a school intervention programme such as school action, school action plus or a statement. ”

(Guidance given to schools by the researcher<sup>9</sup>)

It is also possible that children with MLD had MLD to varying degrees and other associated learning difficulties. While all attempts were made to control for between child variables through collecting information from schools regarding the intervention the child received (school action, school action plus, statementing), providing the schools with a clear and consistent definition and collecting independent non-verbal reasoning ability data, it is still possible that some of the children with MLD experienced other or additional difficulties beyond their cognitive difficulties with the curriculum. For example, Attention Deficit Hyperactivity Disorder is frequently associated with MLD, and if some of the children experienced this additional difficulty, this may have impacted on their results.

#### **14.4.4 Controlling for Bilingualism**

As discussed in section 3.2, bilingualism is a complex phenomenon and a number of factors must be controlled when comparing bilingual samples. It was intended to collect data to inform the categorisation of the children into home language groups (i.e. L1 Welsh, L1 English or Simultaneous bilinguals) through detailed parental questionnaires. However, due to the low response rate for the MLD group this had to be done with less information than originally envisaged. For example, the questionnaire asked for information on language exposure in the environment but due to the low response rate was unable to be considered in

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<sup>9</sup> This the statement was scripted but may have been verbally presented slightly different but contained the same information

the research. While this factor could be discussed in relation to the linguistic environment as a whole, no specific details were available for individuals which have impacted their language background status. Further research with parents of children with MLD should aim to interview, particularly those parents with children with MLD due to the low return rate of questionnaires. A strength of this research, however, was the way in which the Welsh-English bilinguals were categorised into 3 categories in the same way as previous research (i.e. Gathercole and Thomas, 2010) which enables comparisons to be made between the different studies.

## 15 IMPLICATIONS AND CONCLUSION

This chapter aims to interpret the key findings in relation to the literature discussed in Chapters 6 and 10 and to draw out the implications of the study for further research and for policy and practice in the Welsh education system

The key findings were are follows:

1. The bilingual children with MLD did not ‘catch-up’ in their L2 by age 10-11. The implications of this finding will be discussed in relation to the implications for supporting access to the curriculum and parental choice.
2. The L1 English children with MLD, but not the L1 Welsh children nor the simultaneous bilinguals showed an advantage (when compared with the monolingual English children) on the test of inhibitory control (Stroop)
3. Qualitative differences were indicated in the way children with MLD responded to some of the EF tasks. The implications of this for classroom practice will be discussed.

### 15.1 THE CHILDREN WITH MLD DID NOT ‘CATCH-UP’ IN THEIR L2

One of the aims of this research was to explore the language and literacy abilities of children with MLD who attend bilingual education. The findings indicated that the L1 Welsh children with MLD performed significantly better on the Welsh language measure than the L1 English and simultaneous bilingual children with MLD. Similarly the children who received some English at home (L1 English and simultaneous bilingual children with MLD) performed significantly better than their L1 Welsh peers with MLD in English language measure. This finding suggests that the children with MLD do not ‘catch-up’ in the L2. This is contrary to earlier research with TD children which suggests that with sufficient exposure, children will reach monolingual levels in their L2 (Kovelman, Baker and Petitio, 2008; Oller, Pearson and Coco-Lewis, 2007; Oller & Eilers, 2002). This has important implications for children in Welsh medium education learning through their L2 (ie children from English-speaking homes) given that at least 70% of their education is delivered through this medium. If then children do not have ‘full access to the language, how will they have ‘full access’ to the curriculum?

## **15.2 SUPPORTING ACCESS TO THE CURRICULUM**

### ***The Introduction of English***

As children in Welsh medium education are educated primarily through the medium of Welsh in all subject areas (except English) access to the curriculum concerns the L1 English and Simultaneous bilinguals with MLD who do not achieve monolingual or L1 Welsh levels in their Welsh vocabulary, reading accuracy or reading comprehension by age 11-12.

With regard to classroom practice, in Welsh medium education in Wales the introduction of English language instruction is not statutory until year 3 (age 6-7). However, there appears to be little empirical evidence to indicate the efficacy of delaying the introduction of English until this point. Earlier introduction of English language instruction might benefit the L1 Welsh children by preventing or reducing the lag in English language skills which were found in this research. On the other hand, this may be problematic because classrooms in Welsh-medium education are integrated classrooms with children from a range of home languages. Welsh language immersion is perceived to be important to the development of Welsh language abilities of those who do not speak Welsh at home and provide language enrichment for those L1 Welsh speakers. Increasing English language instruction may reduce the amount of time the L1 English children, in particular, are exposed to the Welsh language and water-down the quality and quantity of Welsh language in the classroom. How then can the L2 language needs of children be addressed whilst also ensuring the “needs of L1 minority language children for active language support and enrichment” (Lewis, 2008, p.83). At present, language use in the classroom adopts monoglossic ideals with the Welsh-medium Education Strategy (2010, p. 8) noting that to achieve fluency in both languages, 70% of Welsh medium instruction should be delivered, and this without any supporting research evidence. The Education Strategy (2010) suggest that the following criteria should be met:

Welsh-medium education between the ages of three or four and approximately seven usually means delivering provision primarily through the medium of Welsh. From seven to eleven years of age (Key Stage 2 of the national curriculum), English-language skills are also developed through appropriate use of the language as a subject and medium. A key consideration is the nature of the linguistic balance between Welsh and English, and the intensity of Welsh-medium input required in order for learners to reach fluency in both Welsh and English over time. It is generally accepted that at least around 70% of curricular time should be through the medium of Welsh if learners are to acquire a



sufficiently sound command of the language to enable them to use it across a broad range of contexts with confidence and fluency.

Baker (2010), however, argues that a more equal input of Welsh and English in the classroom increases children's language abilities and understanding in the classroom and the findings of the current study add support to the need for within-classroom strategies to develop both languages (i.e. bilingualism). The differences between the different home language groups found in this study support the need for increased exposure to both languages. Arguably this would benefit pupils from all language backgrounds by helping them to achieve monolingual-like levels in both languages. This may be particularly important for pupils with MLD in terms of facilitating curriculum access, and is further supported by the 'Specific Learning Difficulties Framework' (2015) that suggests that learners with SEN in general (not SpLD only) should access support in the language of their choice. However, further research into this issue is required as the document refers to learners with Specific Learning Difficulty as opposed to MLD, as is the focus of this thesis.

### ***Translanguaging as a means of Scaffolding Learning***

One possible suggestion by Lewis, Jones and Baker (2012) as to how two languages can be used appropriately in the classroom is through the deliberate use of translanguaging.

Translanguaging is a term introduced by Cen Williams (Baker and Lewis, 2012) to describe the method of switching between two languages in the bilingual classroom, such as reading in one language and writing about it in another. It has been suggested as a method of enhancing conceptual and linguistic skills where the use of the stronger language supports the other (Lewis, Jones and Baker, 2012), and is useful in supporting cognitive development because it encourages children to switch and control both languages (Garcia, 2009) – as discussed in this research. This method may be useful in the bilingual classroom primarily to meet the varying linguistic needs of Welsh-English bilinguals, specifically the L1 Welsh speakers' English language development, as identified in this research, but it may also support L1 English and simultaneous bilinguals' access to the curriculum where they can lean on their stronger language for support when learning new educational concepts.

This way of teaching bilingual children is often emphasised in the EAL literature as good practice in supporting outcomes for children learning through their L2 (DCSF, 2007, Littlewood and Yu, 2011; Cook, 2001; Auerbach, 1993). The Primary National Strategy in

England (DCSF, 2010, p.4) notes that “Bilingualism is an asset, and the first language has a continuing and significant role in identity, learning and the acquisition of additional languages”. Extending this practice from the EAL literature to Welsh-English educational practice may consequently be of benefit to L1 English speakers.

Arguably this is particularly important for children with MLD as they are struggling with the curriculum and need strategies in place to aid their access to the curriculum to reduce further possible difficulties. While some translanguaging practices are likely in a Welsh-medium classroom, Garcia (2009, p.308) notes the difficulties of implementing such practices in immersion education because of the “monoglossic ideologies that value only monolingualism where too often bilingual teachers hide their natural translanguaging practices from administrators and others because they have been taught to believe that only monolingual ways of speaking are good and valuable. Yet, they know that to teach effectively in bilingual classrooms, they must translanguage”.

This possible implication for teaching practice should however be considered in light of the concept of translanguaging being relatively new in the area of educational practice, and the lack of experimental evidence in relation to TD children, and especially in relation to the lack of research on translanguaging with children with SEN. Nevertheless, this practice could arguably be grounded in the evidence that suggests that scaffolding in education is beneficial to learning, particularly those with MLD. Fletcher-Campbell (2004) notes that with sufficient and appropriate scaffolding children with MLD can manage a mainstream curriculum.

Scaffolding is a metaphor to describe the classroom interaction between teacher and pupils where the teacher provides temporary assistance to their students to complete a task or develop a new understanding (Burns and de Silva Joyce, 2005). However, as noted by Hammond and Gibbons (cited in Burns and de Silva Joyce, 2005) scaffolding, is not simply a teacher-centred approach and is instead based on joint participation and collaboration. In turn, the active participation enables the children to construct and transform their understanding of new learning. In addition to the active elements of learning, Hammond and Gibbons, discuss the need for teachers and pupils to use their “immediate resources” – language being one of them. Vygotsky has argued that dialogues between teachers and pupils are gradually internalised and support the construct of resources for thinking. This then follows that the kind of discussions that happen in the classroom are critical to the development of how students learn to learn through language. Hammond and Gibbons (2005) argue then that the nature of scaffolding must therefore consider the role of language in teaching and learning

(for a more detailed review see Burns and de Silva Joyce, 2005). Therefore, using language (or translanguaging) as one of the core elements for scaffolding, not only language development, but also the processing and understanding of new and unfamiliar concepts may be of benefit to children with MLD in a bilingual classroom.

The findings of this research indicated an executive functioning advantage for L1 English speakers on the measure of inhibitory control (stroop) and it could be argued that this bilingual advantage is most prevalent in this group because of the balanced nature of their language abilities. That is, compared with the other bilingual groups, the L1 English group performed most similarly on the Welsh and English vocabulary measures (see table 22). This interpretation is consistent with the findings of a number of other studies that suggest that balanced bilingualism enhances executive functioning (Ricciardelli, 1992; Bialystok, & Majumder, 1998; Salvatierra and Rosselli, 2010).

If balanced bilingualism is therefore the key to cognitive advantages, this further supports the use of translanguaging in the classroom to develop both languages simultaneously through encouraging children to switch between their languages. Baker (2011, p.290) notes that

The teacher can allow a student to use both languages, but in a planned, developmental and strategic manner, to maximize a student's linguistic and cognitive capability, and to reflect that language is sociocultural both in content and process.

### ***Parental Choice***

This finding, that children with MLD do not perform at L1 appropriate levels in their L2 by the end of primary school (age 10-11), also has implications for parental choice. Welsh medium education implicitly suggests that children will become proficient in both languages to, at least, functional academic levels by the end of primary school. The assumption is that children will have the same access to the curriculum at secondary level, as they would if they attended English medium education (this implicitly indicated through the use of standard national tests across English-medium and Welsh-medium schools i.e. GCSEs, A-Levels and the comparison of outcomes and levels achieved by children in both English and Welsh medium schools). However this research, has to some extent indicated that children with MLD in Welsh medium education may not reach monolingual-like levels by the end of primary school, which may in turn impact upon the children's' access to the curriculum.

While most counties offer parents the choice of either Welsh- or English- medium education at both primary and secondary levels, this is, arguably, a particular issue in North-West Wales where the counties of Gwynedd and Môn both provide primary education almost exclusively through the medium of Welsh. Indeed Gwynedd Council's Education Policy (2010) notes that all children at primary level will receive Welsh-medium education, which arguably removes the right of parental choice. In order to receive English-medium education, children in Gwynedd must travel to a neighbouring county.

### **15.3 QUALITATIVE DIFFERENCES WERE INDICATED IN THE WAY CHILDREN WITH MLD RESPONDED TO SOME OF THE EF TASKS**

The delay or difference approach has long been a matter of debate in relation to children with MLD. With some researchers suggesting that MLD is a matter of delay (e.g.. Danielson, 2012) and that children perform at levels similar to that of their younger typically developing peers and others suggesting that there is a fundamental difference in development (e.g.. Van der Molen's 2014 research indicated that children with MLD's verbal short term memory plateaued earlier than that of their TD developmentally-matched peers).

This thesis adopted the assumption that MLD is based on a delay, and children with MLD were measured against developmentally-matched younger peers. This research has however identified an interesting finding with regards to the qualitative differences in the way children with MLD completed the executive functioning tasks. That is, the children with MLD, performed comparably in speed to their developmentally-age matched peers but made significantly more errors in a number of the tasks. There are two possible reasons for this finding:

- (i) The cognitive development of children with MLD may be different to the cognitive development of TD children;
- (ii) The finding was less to do with MLD per se, and more to do with other unidentified associated difficulties such as an attention deficit, speech, language and communication difficulty, visual impairment and hyperactivity.

However, regardless of the reasons for the qualitative differences in performance, this finding may have implications for classroom practice.

In tasks where accuracy is important, teachers might consider stressing (i) the need for accuracy and deemphasising the need for speed in particular tasks, (ii) avoid cognitively overloading the children (iii) ensure that they understand what is required of them whilst

completing work where there are a number of elements and (iv) if the work has been completed quickly, ensure that the children understand their work and can explain what they have done. There however is little research in this field and establishing the decisions that children made in the executive functioning tasks and further research into the qualitative decisions that children with MLD make in such tasks would support this research.

## **15.4 IMPLICATIONS FOR FUTURE RESEARCH**

These findings have identified a number of important areas for further investigation. The need to track language and literacy skills more longitudinally into secondary school, particularly in relation to children with MLD where their developmental age may affect the speed at which their language skills ‘catch-up’ with their monolingual peers. This research has also highlighted the importance of developing classroom strategies which support the linguistic needs of all children in the classroom to support both their true bilingual development and access to the curriculum. In addition, some possible cognitive differences were demonstrated by the children with MLD whilst completing cognitively demanding tasks. That is, further research is needed to establish the cause of the higher speed, but lower accuracy of the children with MLD on these executive functioning tasks, this might include interviewing the children in order to try and find out whether or not they had made a conscious decision to sacrifice accuracy for speed. This findings in relation to children with MLDs’ behaviour when completing these executive functioning tasks may have wider potential implications for educationally relevant behaviours (discussed in section 14.3, see also Meltzer, 2007)

The significance of home language has also been highlighted in this study where children excel in their home language (be it Welsh or English) but also appear to need additional educational support to develop their L2, and at present, the support provided in Welsh medium Education may not be meeting the complex linguistic needs of children with MLD, or indeed their TD peers. This area of interest would benefit from research which explores the impact of bilingualism on the academic skills of children with MLD and their access to their curriculum - particularly where children are attending WM education and being educated through their second language. This would extend the findings of this research as children being educated through their L2 were not showing to be performing significantly

better than their developmentally-age matched peers (unlike their English language skills). This is felt to be particularly important given that the children with MLD are already experiencing difficulties across the curriculum and the findings indicated that the children with MLD who were being educated through their L2 were not demonstrating a similar Welsh language advantage over their developmentally aged peers in the way that they were in the English language measures.

The complexity of bilingualism has been highlighted in former chapters with a number of factors impacting bilingual development. While this present study aimed to meet the complexity of bilingualism through controlling for a number of factors, further research is needed that controls for intricate details of language use inside- and outside- the classroom (Thomas and Roberts, 2011) which were not able to be included in this study. This research has however provided an overview and could be used as a framework for further research. The recruitment of and data collection from large numbers of children with MLD in this study provided an additional challenge. Quantitative research requiring large numbers of participants with MLD may not be the most appropriate way forward. Possible areas for development may be the use of detailed case studies for children with MLD.

There are a number of other points to this study that should also be considered. First, this study only explored a limited number of specific areas of language and cognitive development and other areas such as grammatical development, productive vocabulary and metacognitive skills should be explored to create a more complete picture of the impact of Welsh-medium education on children with MLD.

This present research has highlighted some issues which contribute to the complexity of researching bilingualism and MLD:

- the lack of previous research in relation to MLD on which to build
- the lack of research in relation to MLD and bilingualism or SEN and bilingualism as a whole
- the varying definitions of bilingualism and influencing factors
- the variety of language and cognitive measures used in previous studies with typically developing populations which makes it difficult to pinpoint where and when the bilingual advantage may exist.

The findings of this study extends the results of previous research with children with Down's syndrome and ASD to children with MLD, (and indeed typically developing children), suggesting that children's proficiency in their L1 is not negatively affected by bilingualism, but with regard to this group, as also suggested by previous research with children with DS and ASD, it is not clear whether they become fully fluent in their L2, and that further research is urgently needed to investigate this issue further, and ensure that all children receive the relevant support for both language and SEN issues to enable them to access the curriculum and benefit as fully as possible from education

### **15.5 CONCLUSION**

The aim of this research was to explore the linguistic and cognitive impact of Welsh-medium education on children with MLD who come from differing linguistic backgrounds (Welsh only, English only, and Welsh and English). The findings of this study indicated that children with MLD performed better than their developmentally age-matched peers on English reading measures but only comparably in Welsh reading measures. These findings suggest that, based on the developmental approach to MLD, bilingual children with MLD are performing at levels that would be expected.

Analyses with regards to home language background also indicated that the pattern of language development was similar to their TD developmentally-age matched peers where the children with MLD performed best in their L1 and did not catch-up in their L2. Therefore, it is possible that the difficulties that the children with MLD are experiencing with the curriculum are compounded by the linguistic difference they experience in their L2. This finding has implications for access to the curriculum, particularly with regards to the L1 English and Simultaneous bilinguals where the majority of their education (all subjects except English) are being presented through Welsh. It also has implications for the choice that parents make with regards to the language of their child's education and the teaching strategies that are adopted by teachers.

Overall these findings provide no definitive evidence to suggest that the bilingual advantage extends to Welsh-English bilingual children with MLD on non-verbal executive functioning tasks but may extend to L1 English speakers on the measure of inhibitory control (stroop). As

stated previously, this was somewhat surprising as previous evidence suggests that the bilingual advantage is present only for simultaneous bilinguals and the L1 English group in this study are sequential bilinguals. However, it could be argued that this bilingual advantage is most prevalent in this group because of the balanced nature of their language abilities. That is, compared with the other bilingual groups, the L1 English group performed most similarly on the Welsh and English vocabulary measures. This interpretation is consistent with the findings of a number of other studies that suggest that balanced bilingualism enhances executive functioning (Ricciardelli, 1992; Bialystok, & Majumder, 1998; Salvatierra and Rosselli, 2010). This finding may also have implications for teaching strategies employed in the classroom (i.e. the use of translanguaging/providing a more balanced linguistic environment in Welsh-medium education). However, this finding was only one out of a number of other executive functioning tests which suggests that a possible bilingual advantage is only evident in selected tasks which probe particular aspects of the executive functioning with children of a particular bilingual nature. This research however did indicate that children with MLD performed the executive functioning tasks qualitatively different to TD children whereby they appeared to sacrifice the number of errors they made to increase their speed at the task.

This research however, as discussed in the previous section has flagged up the need for more research in a number of areas such as (i) the need to globally agree who children with MLD are and provide a clear definition (ii) explore the impact of bilingual education children with MLD (and other areas of SEN), particularly access to the curriculum (iii) how children with MLD who are being educated through their L2 are sufficiently and effectively supported in the classroom.



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## 17 APPENDICES

The following appendices will include a collection of the following documents:

Ethical consent form

- (i) Headteacher information letter (Welsh version)
- (ii) Headteacher information letter (English version)
- (iii) Headteacher consent form (Welsh version)
- (iv) Headteacher consent form (English version)
- (v) Information and parental consent form (Welsh version)
- (vi) Information and parental consent form (English version)
- (vii) Parents' information sheet (Welsh)
- (viii) Parents' information sheet (English)
- (ix) Child language questionnaire (Welsh)
- (x) Child language questionnaire (English)
- (xi) Background and attitudes questionnaire (Welsh)
- (xii) Background and attitudes questionnaire (English)
- (xiii) Modified parental consent letter (Welsh)
- (xiv) Pupil assent form (English)
- (xv) Pupil assent form (Welsh)
- (xvi) Example of the SART
- (xvii) Example of the Opposite Worlds Task
- (xviii) Example of the Stroop

Most of the documentation was distributed bilingually; both languages will be included where necessary



**Appendix 1 Headteacher information letter (Welsh)**



Coleg Addysg a Dysgu Gydol Oes  
Adeilad Rhos, Safle'r Normal, Prifysgol Bangor  
Bangor  
Gwynedd  
LL57 2PZ

Annwyl Bennaeth,

Yn dilyn ein sgwrs ar y ffôn, ysgrifennwn atoch i ofyn am eich caniatâd ysgrifenedig ar gyfer cynnal ymchwil yn eich ysgol. Bydd dau grŵp oed (7/8 a 10/11 mlwydd oed) yn cael eu cymharu gyda'u cyfoedion mewn ysgolion eraill yn yr ardal. Byddwn yn cymharu sgiliau gwybyddol ac ieithyddol y plant yn Gymraeg a Saesneg ynghyd â sgiliau cofio a chanolbwyntio. Bydd rhan o'r ymchwil hefyd yn edrych ar agweddau'r rhieni a'r plant tuag at addysg ddwyieithog.

Buasem yn hynod o ddiolchgar os medrwch roi eich caniatâd i'r ymchwil gael ei gynnal yn eich ysgol, ac rydym yn eich sicrhau nad oes unrhyw beryglon yn bodoli, ac y bydd y canlyniadau yn cael eu cadw'n gyfrinachol .

Amgaewn ddisgrifiad byr o drefn yr ymchwil a ffurflen ganiatâd i chi ei lenwi pe baech yn dewis cymryd rhan.

Os ydych eisiau mwy o wybodaeth am gefndir yr ymchwil neu os oes gennych unrhyw gwestiynau am yr ymchwil, mae croeso i chi gysylltu â ni drwy e-bost:

[mirain.rhys@bangor.ac.uk](mailto:mirain.rhys@bangor.ac.uk) ,[b.lye@bangor.ac.uk](mailto:b.lye@bangor.ac.uk) neu drwy ffonio 01248 383595.

Edrychwn ymlaen at glywed gennych,

Yn Gywir,

Mirain Rhys a Bethan Lye

**Appendix 2 Headteacher information letter (English)**



College of Education and Lifelong Learning  
Rhos Building, Normal Site, Bangor University  
Bangor  
Gwynedd  
LL57 2PZ

Dear Head teacher,

As a follow up to our phone call, we are writing to ask for your written consent to conduct research at your school. This consent is necessary to satisfy ethical requirements at the University. Two age groups (7/8 and 10/11 years old) will be compared with their peers in other schools in the area. We will be comparing the children's' cognitive and linguistic skills in English, as well as their memory and concentration skills. A part of the research will also be looking at parents' and children's attitudes towards bilingual education. We enclose an information sheet giving further details of this study. We ensure that no harm will come to children from participating and that the results will be kept confidential.

If you, having read the information sheet, would like some more information about the research or if you have any questions regarding the research, you are welcome to contact us through e-mail: [mirain.rhys@bangor.ac.uk](mailto:mirain.rhys@bangor.ac.uk), [b.lye@bangor.ac.uk](mailto:b.lye@bangor.ac.uk) or by phoning 01248 383595. We enclose a brief description of the research if you wish to partake, and a consent form for you to complete.

We look forward to hearing from you,

Kind Regards,

Mirain Rhys and Bethan Lye

**Appendix 3: Headteacher consent form (Welsh)**



Ysgol Addysg a Dysgu Cydol Oes  
Adeilad Rhos, Safle'r Normal, Prifysgol Bangor  
Bangor  
Gwynedd  
LL57 2PZ

Mae hwn i dystio fy mod i \_\_\_\_\_ yn caniatáu i'r ymchwil hwn gael ei gynnal yn fy ysgol fel rhan o ymchwil doethuriaeth Bethan Lye a Mirain Rhys wedi ei awdurdodi o fewn Adran Addysg a Dysgu Gydol Oes, Prifysgol Bangor o dan oruchwyliaeth Dr Enlli Thomas a Dr. Jean Ware.

Mae'r ymchwil hwn, a fy rôl innau, y disgyblion a'r athrawon ynddo, wedi ei esbonio i mi gan un ai Mirain Rhys neu Bethan Lye ac rwy'n deall yr esboniad.

Mae dulliau ac unrhyw risg sy'n gystylliedig â'r ymchwil hwn wedi eu egluro ac rwy'n fodlon gyda'r esboniad. Rwy'n deall y bydd yr holl ddata yn aros yn gyfrinachol ynghyd â manylion yr holl ddisgyblion. Rwy'n deall fod hawl gennyf i dynnu allan ac i ddiweddu'r profion ar y plant ar unrhyw adeg.

## Appendices

Rwy'n deall fod gen i hawl i gopi o grynodeb o ganlyniadau'r ymchwil hwn.

Llofnod y pennaeth

.....

Ysgol .....

Dyddiad:

Rydym ni (arwyddwyd isod) wedi esbonio'r ymchwil i'r unigolyn uchod.

Llofnod ymchwilydd .....

Dyddiad \_\_ / \_\_ / \_\_

Appendices

**Appendix 4 Headteacher consent form (English)**

This is to certify that I ..... give permission for this research to be conducted at my school by Mirain Rhys and Beth Lye as part of research authorised within the School of Education and Lifelong Learning at Bangor University under the supervision of Dr Enlli Thomas and Dr Jean Ware as two separate PhD projects.

This research, and my role as well as the pupils' roles have been explained to me by either Mirain Rhys or Beth Lye and I understand their explanation.

The methods and any risks associated with this research have been explained and I am happy with the explanation given. I understand that all the data will remain confidential along with the pupils' information. I understand that I have the right to terminate the school's participation or that of an individual pupil at any time.

I understand that I have the right to a summary of our findings.

Head teacher's signature

.....

Date: \_\_ / \_\_ / \_\_

We (signed below) have explained the research to the above individual.

Researcher's signature .....

Date: \_\_ / \_\_ / \_\_

## Appendix 5 Letter and consent form for parents

Coleg Addysg a Dysgu Gydol Oes  
Adeilad Rhos, Safle'r Normal, Prifysgol Bangor  
Bangor  
Gwynedd  
LL57 2PZ

Annwyl Riant / Warchodwr,

Ysgrifennwn atoch i gyflwyno ein hunain, ac i ofyn os ydych chi'n fodlon cymryd rhan mewn ymchwil sy'n edrych ar fanteision addysg cyfrwng Cymraeg ac addysg ddwyieithog ymysg plant mewn ysgolion prif-lif a phlant gydag anghenion addysgol cymedrol yng Nghymru. Rydym ni'n dwy yn fyfyrwyr PhD yng Ngholeg Addysg a Dysgu Gydol Oes Prifysgol Bangor, ac mae ein hastudiaethau yn cael eu cyllido gan Fwrdd yr Iaith Gymraeg a Phrifysgol Bangor. Mae'r ymchwil presennol yn ffurfio rhan o raglen ymchwil ym Mhrifysgol Bangor am addysg ddwyieithog, ac rydym yn gobeithio y bydd y canlyniadau yn cyfrannu tuag at ddealltwriaeth o ddwyieithrwydd mewn addysg.

Rydym yn ymofyn eich caniatâd i'ch plentyn gymryd rhan yn yr astudiaeth hon. Os ydych yn rhoi caniatâd, byddwn yn gwahodd eich plentyn i gymryd rhan mewn gwahanol gemau sy'n edrych ar sgiliau gwybyddol ac ieithyddol y plentyn yn Gymraeg ac yn Saesneg ynghyd â sgiliau cofio a chanolbwyntio. Bydd rhai o'r profion yn cael eu cynnal gyda grŵp o blant, a rhai eraill ar ffurf un-i-un gydag ymchwilydd o'r Brifysgol.

Ni fydd eich plentyn yn cael ei (g)orfodi i gymryd rhan, ac os yw'n dymuno gadael unrhyw bryd, bydd ef/hi yn rhydd i wneud hynny. Mae'r ysgol wedi cytuno i gymryd rhan yn y prosiect. Rydym wedi trafod yr ymchwil gyda'r Pennaeth sy'n ymwybodol o gynnwys yr astudiaeth ac yn hapus i'r ymchwil gael ei gynnal yn yr ysgol.

Os ydych eisiau mwy o wybodaeth am gefndir yr ymchwil neu os oes gennych unrhyw gwestiynau am yr ymchwil, mae croeso i chi gysylltu â ni drwy e-bost:

[mirain.rhys@bangor.ac.uk](mailto:mirain.rhys@bangor.ac.uk), [b.lye@bangor.ac.uk](mailto:b.lye@bangor.ac.uk) neu drwy ffonio 01248 383595

Amgaewn ddisgrifiad byr o drefn yr ymchwil ynghyd â slip caniatâd.

Bydd cyfrinachedd yn cael ei barchu drwy gydol yr astudiaeth - ni ddatgelir enw unrhyw blentyn sy'n gysylltiedig â'r prosiect ac fe gedwir y data i gyd yn gyfrinachol.

Os ydych chi'n caniatáu i'ch plentyn gymryd rhan yn yr ymchwil hwn, rhowch dic yn y bocs 'Ie', a dychwelyd y llythyr caniatád wedi ei gwblhau. Os nad ydy chi'n caniatáu i'ch plentyn gymryd rhan yn yr ymchwil hwn, rhowch dic yn y bocs 'Na' a'i ddychwelyd i'r ysgol.

**Byddwn yn ddiolchgar os dychwelwch y ffurflen ganiatád i'r ysgol mor fuan a phosib, os gwelwch yn dda.**

Yn gywir,

Mirain Rhys a Bethan Lye

.....

IE       NA

Enw'r Plentyn .....

Ysgol: .....

Llofnod rhiant / Gwarchodwr .....

Dyddiad: \_\_ / \_\_ / \_\_

**Appendix 6 Letter and consent form for parents (English)**



College of Education and Lifelong Learning  
Rhos Building, Normal Site, Bangor University  
Bangor  
Gwynedd  
LL57 2PZ

Dear Parent / Guardian,

We are writing to you to introduce ourselves and ask if you would be willing to take part in some research looking at the effects of Welsh medium and bilingual education for children in mainstream schools and for children with and without moderate learning difficulties in Wales. We are both PhD students in the College of Education and Lifelong Learning at Bangor University and our studies are funded by the Welsh Language Board and Bangor University. The research we are carrying out forms part of a programme of research at Bangor about bilingual education and we hope that the results will contribute towards our understanding of bilingualism in education.

We are asking for your consent for you and your child to take part in this study. If you give your consent, we will invite your child to take part in different games that look at their cognitive and linguistic skills in Welsh and English as well as their memory and concentration skills. Some of the tests will be conducted with a group of children and others in the form of a one-to-one session with a researcher from the University.

Your child will not be forced to take part, and if they wish to leave at any time, they are free to do so. Confidentiality will be respected at all times throughout the experiment, no child's name will be mentioned, and the data will remain anonymous.

We have discussed the project with the Headteacher who is aware of the research and its content and is happy for the research to go ahead in the school.

If you would like some more information about the research or if you have any questions regarding the research, you are welcome to get in contact through e-mail:



Appendices

[mirain.rhys@bangor.ac.uk](mailto:mirain.rhys@bangor.ac.uk), [b.lye@bangor.ac.uk](mailto:b.lye@bangor.ac.uk) or by phoning 01248 383595. We enclose a brief description of the research along with a consent slip.

If you give permission for your child to take part in this research, please tick the 'yes' box and return the form. If you do not wish for your child to take part in the research, please tick the 'No' box and return to the school.

**We would be very grateful if you could return the permission form to school as soon as possible.**

Yours sincerely,

Mirain Rhys and Bethan Lye

.....  
YES  NO

Child's Name: .....

School: .....

Parent / Guardian signature .....

Date: \_\_ / \_\_ / \_\_

## Appendix 7 Parents' information sheet

This was attached behind the letter for parents

### Dwyieithrwydd Mewn Addysg

#### Taflen Wybodaeth

Mae ymchwil wedi dangos dros nifer o flynyddoedd bod manteision yn deillio o ganlyniad i ddwyieithrwydd mewn nifer o agweddau – e.e., mewn addysg, wrth gyfathrebu, mewn swyddi ac yn ddiwydiannol - i enwi rhai. Ond ychydig iawn o ymchwil ar ddwyieithrwydd Cymraeg-Saesneg sydd yng Nghymru.

Bydd yr ymchwil hwn yn canolbwyntio ar bedwar cwestiwn penodol ynglŷn â dwyieithrwydd yng Nghymru, sef:

1. Pa effeithiau addysgol, ieithyddol, a gwybyddol sy'n deillio o ganlyniad i ddwyieithrwydd?
2. Ydy'r effeithiau'n wahanol ymysg plant o gefndiroedd iaith gwahanol?
3. Ydy'r effeithiau'n wahanol ymysg plant sy'n mynychu ysgolion 'unieithog' ynteu ysgolion 'dwyieithog'?
4. Ydy'r effeithiau'n wahanol yn ôl natur y gymuned?
5. Ydy'r effeithiau yma'n ymestyn i blant gydag anhawsterau dysgu?

Bydd yr ymchwil yn canolbwyntio ar blant o gefndiroedd ieithyddol Cymraeg a Di-Gymraeg mewn ysgolion mewn ardaloedd Cymraeg a Di-Gymraeg. Bydd yr ymchwil yn cael ei gynnal gyda phlant 7-11 mlwydd heb anghenion arbennig a phlant 9-12 oed gydag anghenion dysgu cymedrol.

Er mwyn mesur os oes unrhyw effeithiau addysgol, ieithyddol neu gwybyddol o ganlyniad i ddwyieithrwydd, bydd y plant yn cymryd rhan mewn amryw o gemau a phroffion fydd yn edrych ar eu sgiliau yn y Gymraeg a'r Saesneg. Bydd rhan o'r gemau yn canolbwyntio ar sgiliau gwybyddol y plant, yn enwedig yn eu swyddogaeth weithredol, sef gallu'r ymennydd i brosesu adborth, dehongli digwyddiadau ac ymateb yn briodol i ddigwyddiadau. Mae'r casgliad hwn o brosesau ymenydd yn gyfrifol am e.e. cynllunio, hyblygrwydd gwybyddol, a dehongli rheolau. Mae adnabod fod dyn gwyrdd yn ei gwneud hi'n saff i groesi'r ffordd, a dyn coch yn meddwl 'stop' yn esiampl o'r weithred swyddogol ar waith.

Agwedd arall o'r ymchwil ydy agweddau'r plant a'u rhieni tuag at ddwyieithrwydd a defnydd o'r Gymraeg. Mae gennym ni ddiddordeb yn y rhesymau pam mae rhieni sydd ddim yn siarad Cymraeg eu hunain yn dewis gyrru eu plant i ysgol Cymraeg neu beidio.

Bwriad yr ymchwil yma, felly, fydd i lunio darlun clir o fanteision addysg Gymraeg. Mae angen rhagor o ymchwil, ag iddi sail wyddonol gadarn, fel y gallwn hysbysu gwir effeithiau addysg ddwyieithog - ac yn y pendraw ffurfio polisiâu addysg Gymraeg pendant.

Ariannir yr ymchwil hwn gan Fwrdd yr Iaith Cymraeg a Prifysgol Bangor.

### Appendix 8 Parents' information sheet (English)

This was attached behind the letter for parents

## Bilingualism in Education

### Information Sheet

Research over the years has demonstrated that bilingualism can benefit the individual in various ways e.g. educationally, through communication, employability and economically – to name but a few. There has however been very little research surrounding Welsh-English bilingualism in Wales.

Consequently, the aim of this research is to answer 4 specific questions with regards to bilingualism in Wales:

- 1) What are the educational, linguistic and cognitive effects as a result of bilingualism?
- 2) Do these effects differ between children from various linguistic backgrounds?
- 3) Do the effects differ between children who attend monolingual and bilingual schools?
- 4) Are these effects different according to the nature of the community?
- 5) Do these effects apply to children regardless of whether or not they experience difficulties in learning

The research will focus on children between the ages of 7--11 from Welsh and English speaking backgrounds in Welsh and English speaking areas. The children will have either no history of special educational needs or will have been identified as having moderate learning difficulties.

To establish whether educational, linguistic and cognitive effects exist as a result of bilingualism, children will be asked to complete various tasks and games which will look at their skills in Welsh and English. The cognitive tasks will most specifically be focused on 'Executive Functioning ability' which is a collection of processes that are responsible for tasks/situations in everyday life such as our ability to process feedback, interpret events and react appropriately to events. An example where Executive Functioning is required is at a pedestrian crossing where we must realise that the green person is a symbol to go and a red person a symbol stop.

Another aspect to the research is a measure of parents and children's attitudes towards bilingualism and the Welsh language. We are interested in the reasons why parents who don't speak Welsh themselves choose whether or not to send their children to a Welsh medium school.

Therefore, the aim of this research is to obtain a clearer picture of Welsh education based on a sound research basis to inform us of the possible effects of bilingual education in Wales. This will hopefully aid in the development of significant educational policies in the future.

This research is funded by the Welsh Language Board and Bangor University.

## Appendices

### Appendix 9 Child language use questionnaire (Welsh)

Pa ieithoedd wyt ti'n siarad? (Rho die yn y bocsys sy'n berthnasol i ti)

Cymraeg       Saesneg       Arall

Pa iaith/ ieithoedd wyt ti'n siarad gyda'r canlynol? (Rho die mewn un bocsys ar gyfer pob dewis).

	Cymraeg yn unig	Cymraeg ran amlaf	Cymraeg a Saesneg	Saesneg ran amlaf	Saesneg yn unig
<b>Mam</b>					
<b>Dad</b>					
<b>Athro</b>					
<b>Brodyr/ Chwiorydd</b>					
<b>Ffrindiau ysgol, yn y dosbarth</b>					
<b>Ffrindiau ysgol, ar y cae chwarae</b>					
<b>Ffrindiau ysgol, tu allan i'r ysgol</b>					
<b>Ffrindiau eraill, tu allan i'r ysgol</b>					
<b>Cymdogion</b>					

## Appendices

### Appendix 10 Child language use questionnaire (English)

What languages do you speak? (Tick the boxes that are relevant to you)

Welsh       English       Other

What language/ languages do you speak with the following? (Tick one box for each choice).

	Only Welsh	Mostly Welsh	Welsh and English	Mostly English	Only English
Mum					
Dad					
Teacher					
Brothers/ Sisters					
School friends, in the classroom					
School friends, on the playing field					
School friends, outside of school					
Other friends, outside of school					
Neighbours					

**Appendix 11: Background and attitudes questionnaire (Welsh)**

Annwyl Riant/Warchodwr,

Diolch am adael i'ch plentyn gymryd rhan yn ymchwil Prifysgol Bangor yn ymwneud ac Addysg a

Dwyieithrwydd. Os gwelwch yn dda, a wnewch chi lenwi'r holiadur isod i mewn ynglŷn â chefnidir eich plentyn a chithau (bydd yn cymryd rhwng 10 a 15 munud i'w gwblhau), gan ddilyn y cyfarwyddiadau, a'i ddychwelyd i'r ysgol mor fuan a phosib.

Nid oes atebion cywir nac anghywir. Bydd pob ateb yn cael ei gadw'n gyfrinachol, ac rwy'n sicrhau y bydd y wybodaeth yn anhysbys. Os, am unrhyw reswm, yr ydych yn teimlo'n anghyffyrddus yn ateb unrhyw gwestiwn, gadewch y blwch yn wag, os gwelwch yn dda, a symud ymlaen i'r cwestiwn nesaf. Rhowch dic mewn un bocs (e.e. 'ydy' neu 'nac ydy') ac ychwanegwch unrhyw sylw ble mae'n dweud 'arall' os ydyn nhw'n berthnasol. Diolch yn fawr iawn i chi am eich parodrwydd i helpu.

<b><u>Cefndir</u></b>	
<b>Dynodwch y canlynol, os gwelwch yn dda:</b>	
<b>1. Enw'r plentyn</b> _____	<b>Dyddiad geni'r</b>
<b>plentyn</b> _____	
<b>Ysgol</b> _____	
<b>2. Oes gan eich plentyn anabledd?</b> Nac oes <input type="checkbox"/> Drwgdybiaf <input type="checkbox"/> Wedi ei gadarnhau <input type="checkbox"/>	
Mynegwch, os gwelwch yn	
dda: _____	
<b>3. Ydy eich plentyn wedi byw yng Nghymru drwy gydol ei fywyd?</b> Ydy <input type="checkbox"/> Nac ydy <input type="checkbox"/>	
Os Na, ble arall mae eich plentyn wedi	
byw? _____	
A pha iaith a siaradwyd yno? Saesneg <input type="checkbox"/> Cymraeg <input type="checkbox"/> Arall _____	
<b>4. Aeth eich plentyn i ysgol Feithrin?</b> Do <input type="checkbox"/> Naddo <input type="checkbox"/> .	
<b>4a. Os 'do', pa iaith a siaradwyd yno?</b> Cymraeg <input type="checkbox"/> Saesneg <input type="checkbox"/>	
<b>Arall</b> _____	

**5. Ydy eich plentyn erioed wedi mynychu ysgol arall, ar wahân i'r ysgol y mae'n mynychu ar hyn o bryd?**

Ydy  Nac ydy

5a. Os Ydy, ym mha ardal oedd yr ysgol hon? Ardal:

\_\_\_\_\_

5b. Os 'Ydy', pa iaith siaradwyd yn yr ysgol? Cymraeg  Saesneg

Arall \_\_\_\_\_

5c. Os 'Ydy', a pha iaith a siaradwyd yn yr ardal? Cymraeg  Saesneg

Arall \_\_\_\_\_

**6. Beth yw eich iaith(oedd) cartref ar hyn o bryd?**

Cymraeg yn unig  Cymraeg rhan amlaf, ychydig o Saesneg  Cymraeg a Saesneg yn hafal

Saesneg rhan amlaf, ychydig o Gymraeg  Saesneg yn unig

Arall \_\_\_\_\_

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**7. Pa iaith(oedd) mae'r canlynol yn siarad gyda'ch plentyn:**

Mam y plentyn (neu warcheidwad 1)

Cymraeg yn unig  Cymraeg rhan amlaf, ychydig o Saesneg  Cymraeg a Saesneg yn hafal

Saesneg rhan amlaf, ychydig o Gymraeg  Saesneg yn unig

Arall \_\_\_\_\_

\_\_\_\_\_

**7a. Tad y plentyn (neu warcheidwad 2)**

Cymraeg yn unig  Cymraeg rhan amlaf, ychydig o Saesneg  Cymraeg a Saesneg yn hafal

Saesneg rhan amlaf, ychydig o Gymraeg  Saesneg yn unig

Arall \_\_\_\_\_

\_\_\_\_\_

**7b. Brodyr a chwiorydd y plentyn:**

Cymraeg yn unig  Cymraeg ran amlaf, ychydig o Saesneg  Cymraeg a Saesneg yn hafal

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Saesneg ran amlaf, ychydig o Gymraeg <input type="checkbox"/> Saesneg yn unig <input type="checkbox"/> Arall _____ _____
<b>8. Pa iaith(oedd) mae eich plentyn yn siarad gyda'r canlynol:</b> <b>Mam y plentyn (neu warcheidwad 1)</b> Cymraeg yn unig <input type="checkbox"/> Cymraeg rhan amlaf, ychydig o Saesneg <input type="checkbox"/> Cymraeg a Saesneg yn hafal <input type="checkbox"/> Saesneg rhan amlaf, ychydig o Gymraeg <input type="checkbox"/> Saesneg yn unig <input type="checkbox"/> Arall _____ _____
<b>8a. Tad y plentyn (neu warcheidwad 2)</b> Cymraeg yn unig <input type="checkbox"/> Cymraeg rhan amlaf, ychydig o Saesneg <input type="checkbox"/> Cymraeg a Saesneg yn hafal <input type="checkbox"/> Saesneg rhan amlaf, ychydig o Gymraeg <input type="checkbox"/> Saesneg yn unig <input type="checkbox"/> Arall _____ _____
<b>8b. Brodyr a chwiorydd y plentyn:</b> Cymraeg yn unig <input type="checkbox"/> Cymraeg rhan amlaf, ychydig o Saesneg <input type="checkbox"/> Cymraeg a Saesneg yn hafal <input type="checkbox"/> Saesneg rhan amlaf, ychydig o Gymraeg <input type="checkbox"/> Saesneg yn unig <input type="checkbox"/> Arall _____ _____
<b>9. Ar gyfartaledd, faint o oriau mae eich plentyn yn treulio yn siarad yr ieithoedd canlynol pob diwrnod:</b> Cymraeg _____ Saesneg _____ Arall _____
<b>10. Mae addysg yn bwysig ar gyfer plant.</b> Cywir iawn <input type="checkbox"/> Eithaf cywir <input type="checkbox"/> Ddim yn gywir nac anghywir <input type="checkbox"/> Eithaf anghywir <input type="checkbox"/> Anghywir iawn <input type="checkbox"/>



<p><b>11. Faint o amser ydych chi'n gwario yr wythnos gyda'ch plentyn tra mae'n gwneud gwaith cartref?</b></p> <p>__ awr</p>
<p><b>12. Beth yw'r lefel addysg uchaf a gwblhawyd gan bob rhiant? (ticiwch)</b></p> <p><b>a. <u>Mam/ Gwarcheidwad</u></b></p> <p>Heb gymryd unrhyw arholiad <input type="checkbox"/> TGAU <input type="checkbox"/> Lefel A <input type="checkbox"/> Gradd <input type="checkbox"/> Ôl-radd <input type="checkbox"/></p> <p>Arall _____</p> <p>_____</p> <p><b>b. <u>Tad/ Gwarcheidwad</u></b></p> <p>Heb gymryd unrhyw arholiad <input type="checkbox"/> TGAU <input type="checkbox"/> Lefel A <input type="checkbox"/> Gradd <input type="checkbox"/> Ôl-radd <input type="checkbox"/></p> <p>Arall _____</p> <p>_____</p>
<p><b>13. Beth yw braced cyllid blynyddol eich cartref (cyn treth)?</b></p> <p>O dan £20,000 <input type="checkbox"/> £20,001 i £30,000 <input type="checkbox"/> £30,001 i £40,000 <input type="checkbox"/> £40,001 i £50,000 <input type="checkbox"/></p> <p>Dros £50,001 <input type="checkbox"/></p>
<p><b>14. Nodwch swyddi'r rhieni:</b></p> <p>Mam/Gwarcheidwad 1 : _____</p> <p>Tad/Gwarcheidwad 2: _____</p>
<p><b>15. Ydy'r plentyn wedi derbyn cinio ysgol am ddim? Ydy <input type="checkbox"/> Nac ydy <input type="checkbox"/></b></p>
<p><b>16. Ydy'r plentyn wedi derbyn therapi iaith a llefarydd? Ydy <input type="checkbox"/> Nac ydy <input type="checkbox"/></b></p>
<p><b>17. Ydy'r plentyn wedi derbyn triniaeth am broblemau clyw? Ydy <input type="checkbox"/> Nac ydy <input type="checkbox"/></b></p>
<p><b>18. Ydy'r plentyn erioed wedi cael ei asesu am unrhyw anghenion arbennig? Ydy <input type="checkbox"/></b></p> <p>Nac ydy <input type="checkbox"/></p> <p><b>18a. Os 'ydy', beth? _____</b></p>
<p><b>19. Ydy'r plentyn yn derbyn unrhyw cymorth ychwanegol? Ydy <input type="checkbox"/> Nac Ydy <input type="checkbox"/></b></p> <p><b>19a. Os ydy, nodwch unrhyw cymorth ychwanegol mae'r plentyn yn derbyn</b></p> <p>_____</p>

**20. “Mae dwy iaith yn anoddach i blant gydag anghenion arbennig na phlant eraill”**

**Dewiswch ddatganiad:**

Cytuno'n llwyr  Cytuno  Ansicr  Anghytuno  Anghytuno'n llwyr

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**Defnydd o'r Iaith Gymraeg**

Nodwch, os gwelwch yn dda, pa mor aml yr ydych chi a'ch plentyn yn siarad, darllen, neu/a gwrando yn Gymraeg isod. Atebwch wrth gylchu'r canlynol:

**1=Bob amser; 2=Yn aml; 3=Weithiau; 4=Anaml; 5=Byth**

	Mam	Tad	Eich Plentyn
<b>Defnyddio'r Gymraeg</b>			
<b>1. Teulu agos.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>2. Teulu estynedig.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>3. Cydweithwyr/</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>4. Ffrindiau.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>5. Cymdogion.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>6. Athrawon.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>7. Pobl yn y</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>8. Mudiadau.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>9. Gwleidyddion.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>Arall (mynegwch</b>			
	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>Defnydd o'r Gymraeg</b>			
<b>1. Siopa.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>2. Darllen papurau</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>3. Gwrando ar y</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>4. Theatr, Ffilm,</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>5. Gwaith.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>6. Clybiau.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>7. Amser hamdden.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>8. Addoldy.</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>9. Cyfrifiadur, e-</b>	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
<b>Arall</b>			
	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

**Defnyddiwch y blwch isod i ychwanegu unrhyw beth yr ydych yn credu sy'n berthnasol i unrhyw bwynt uchod.**

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**Agweddau tuag at ddwyieithrwydd**

**Dyma ddatganiadau am y Gymraeg a'r Saesneg. Nodwch, os gwelwch yn dda, os ydych chi'n cytuno neu yn anghytuno gyda'r datganiadau.**

**Nid oes ateb cywir nac anghywir. Byddwch mor onest ac y medrwech. Atebwch drwy gylchu'r canlynol:**

**1 = Cytuno'n Llwyf 2 = Cytuno 3 = Dim yn cytuno nac yn anghytuno 4 = Anghytuno  
5 = Anghytuno'n Llwyf**

<b>1. Mae'n bwysig medru siarad Cymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>2. Dim ond y gallu i siarad Saesneg sydd angen arna' i.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>3. Mae'r gallu i siarad Cymraeg a Saesneg yn gwneud pobl yn fwy galluog.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>4. Mae plant yn ffwdro wrth ddysgu Cymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>5. Mae siarad Cymraeg a Saesneg yn helpu tuag at gael swydd.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>6. Mae'r gallu i ysgrifennu yn Gymraeg a Saesneg yn bwysig.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>7. Dylai ysgolion ddysgu eu plant i siarad dwy iaith.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			

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<b>8. Dylai arddangosfeydd waliau ysgolion fod yn Gymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>9. Nid yw siarad dwy iaith yn anodd.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>10. Mae gwybod Cymraeg a Saesneg yn achosi problemau i bobl.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>11. Dwi'n teimlo dros bobl sy'n methu siarad Cymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>12. Dylai plant ddysgu darllen yn Gymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>13. Mae pobl yn gwybod mwy os ydynt yn medru'r Gymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>14. Mae gan bobl sy'n siarad Cymraeg a Saesneg fwy o ffrindiau.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>15. Mae siarad Cymraeg a Saesneg yn fwy perthnasol i bobl hŷn nag i bobl ifanc.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>16. Mae siarad Cymraeg a Saesneg yn gallu arwain at ddyrchafiad swydd.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>17. Mae plant ifanc yn gallu dysgu Cymraeg a Saesneg ar yr un pryd yn hawdd.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>18. Dylai Cymraeg a Saesneg fod yn bwysig yn yr ardal lle dwi'n byw.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>19. Gall pobl ennill mwy o gyflog os ydynt yn siarad Cymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>20. Hoffwn i Saesneg yn unig gael ei siarad yn fy ardal i.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>21. Hoffwn gael fy ngweld fel siaradwr/wraig Cymraeg a Saesneg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>22. Hoffwn i'm mhlant fedru siarad Cymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>23. Mae Cymraeg a Saesneg yn gallu cydfyw efo'i gilydd yn yr ardal hon.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			

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<b>24. Dim ond un iaith sydd angen i bobl wybod.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>25. Mae angen i oleiaf un rhiant siarad Cymraeg er mwyn i'r plentyn allu llwyddo.</b>	<b>5</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>26. Rwy'n poeni na fedrai helpu fy mhlentyn gyda'i (g)waith cartref gan nad ydwi'n gallu siarad Cymraeg.</b>	<b>5</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<p><b>Defnyddiwch y blwch isod i ychwanegu unrhyw beth yr ydych yn credu sy'n berthnasol i unrhyw bwynt uchod.</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>				

**Agweddau tuag at yr iaith Gymraeg**

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<p>Dyma rai datganiadau am yr iaith Gymraeg. Nodwch, os gwelwch yn dda, os ydych chi'n cytuno neu yn anghytuno gyda'r datganiadau.</p> <p>Nid oes ateb cywir nac anghywir. Byddwch mor onest ac y medrwch. Atebwch drwy gylchu'r canlynol:</p> <p><b>1 = Cytuno'n Llwyf 2 = Cytuno 3 = Dim yn cytuno nac yn anghytuno 4 = Anghytuno 5 = Anghytuno'n Llwyf</b></p>			
<b>1. Tydi unrhyw un sy'n erbyn adfywio'r Gymraeg ddim yn Gymro.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>2. Ni fyddai Cymru yn Gymru heb siaradwyr Cymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>3. Mi fuasai Cymru yn colli ei hunaniaeth fel diwylliant unigol heb yr Iaith Gymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>4. Mae'n rhaid gwybod y Gymraeg i ddeall diwylliant Cymru.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>5. Bydd Cymraeg yn parhau i farw os na wnawn ni rhywbeth yn ei gylch yn fuan.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>6. Mae'r Gymraeg yn marw.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>7. Mae'r Gymraeg wedi marw.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>8. Mae'r Gymraeg yn gallu cael ei adfywio fel ffordd gyffredin o gyfathrebu.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>9. Tydi'r rhan fwyaf o bobl ddim yn poeni am y Gymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>10. Mae ymdrechion i adfywio'r Gymraeg yn sicr o fethu, er gwaethaf ymdrechion y llywodraeth.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>11. Mae'r rhan fwyaf o bobl yn gweld popeth sy'n ymwneud â'r Gymraeg yn rhy hen ffasiwn.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>12. Bydd y Gymraeg wedi diflannu mewn cenhedlaeth neu ddwy os nad oes unrhyw ymyrraeth.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>13. Nid yw'r Gymraeg yn gallu cael ei haddasu i'r byd busnes.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	

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<b>14. Ni ddylem wario gymaint ar adfywio'r Gymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>15. Mae beth mae'r llywodraeth yn ei wneud am y Gymraeg yn ddibwys i mi.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>16. Dylai arweinwyr cyhoeddus osod esiampl dda wrth ddefnyddio'r Gymraeg o ddydd i ddydd.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>17. Dylai siaradwyr Cymraeg gael yr hawl i ddisgwyl i was sifil/ gweithiwr Cyngor allu siarad Cymraeg gyda nhw.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>18. Mae'n well fod pobl yn siarad Cymraeg gwael na pheidio siarad yr iaith o gwbl.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>19. Dylai'r Llywodraeth gefnogi unrhyw fudiadau'r iaith Gymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>20. Dylai mudiadau gwirfoddol gefnogi'r Gymraeg yn hytrach na'r Llywodraeth.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>21. Fyswn i ddim yn hapus i beidio clywed y Gymraeg ar y radio a'r teledu.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>22. Mae'r rhan fwyaf o blant ysgol yn meddwl mai iaith ysgol yn unig yw'r Gymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>23. Mae dysgu'r Gymraeg yn yr ysgol yn ddigon i gadw'r iaith yn fyw.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>24. Mae dysgu'r Gymraeg i blant o gartrefi Saesneg yn wastraff amser mewn rhai ardaloedd.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>Defnyddiwch y blwch isod i ychwanegu unrhyw beth yr ydych yn credu sy'n berthnasol i unrhyw bwynt uchod.</b>			
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Appendices

<b>Agweddau tuag at Addysg Gymraeg ac Addysg Prif-Lif</b>			
<b>Dyma ddatganiadau am addysg Gymraeg ac addysg prif-lif. Nodwch, os gwelwch yn dda, os ydych chi'n cytuno neu yn anghytuno gyda'r datganiadau.</b>			
<b>Nid oes ateb cywir nac anghywir. Byddwch mor onest ac y medrwch. Atebwch drwy gylchu'r canlynol:</b>			
<b>1 = Cytuno'n Llwyf 2 = Cytuno 3 = Dim yn cytuno nac anghytuno 4 = Anghytuno 5 = Anghytuno'n Llwyf</b>			
<b>1. Mae addysg Gymraeg yn cadw'r iaith yn fyw.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>2. Bydd siarad Cymraeg yn yr ysgol a Saesneg adref yn fanteisiol.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>3. Mae addysg Gymraeg yn agored i bawb- dosbarth gweithiol, canol ac uwch.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>4. Mae addysg prif-lif yn cadw'r Gymraeg yn fyw.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>5. Mae addysg prif-lif yn agored i bawb- dosbarth gweithiol, canol ac uwch.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>6. Bydd siarad Cymraeg yn yr ysgol a Saesneg adref yn achosi problemau i addysg y plentyn.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>7. Mae'r rheiny sy'n mynychu ysgol gwbl Gymraeg yn dysgu cwricwlwm hollol wahanol i blant mewn ysgolion eraill.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>8. Nid yw addysg Gymraeg yn effeithio'n negyddol ar sgiliau ieithyddol Saesneg y plant.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>9. Mae addysg Gymraeg neu addysg ddwyieithog yn cyfoethogi plant</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>10. Nid oes modd i blant o gartrefi Saesneg lwyddo yn academiaidd yn yr un ffordd a phlant o gartrefi Cymraeg sy'n mynychu ysgolion Cymraeg.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>11. Mae plant gydag anghenion addysgol arbennig yn gweld dwy iaith yn anoddach i gymharu â phlant eraill.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	

**Defnyddiwch y rhan yma i ddynodi pa fath o addysg mae eich plentyn yn ei derbyn, a pham y gwnaethoch gofrestru eich plentyn yn y math yma o addysg.**

**Mae rhai atebion wedi eu rhestru isod gyda blwch ar gyfer sylwadau. Hefyd, mae blwch wedi ei ddarparu isod i chi allu rhestru unrhyw resymau eraill sy'n berthnasol i chi.**

**Mae eich plentyn yn mynychu addysg Gymreig/ ddwyieithog  addysg mewn ysgol drochi**

**oherwydd mae'r math hwn o addysg:**

**Sylwadau**

**Yn cael mwy o enw da yn yr ardal hon na unrhyw ysgol arall**

\_\_\_\_\_

**Gydag adnoddau gwell na unrhyw ysgol arall yn yr ardal**

\_\_\_\_\_

**Oedd yr unig ysgol ar gael**

\_\_\_\_\_

**Yn y lleoliad mwyaf cyfleus**

\_\_\_\_\_

**Yn cynnig cyfleoedd gwell o ran swyddi i'r disgyblion**

\_\_\_\_\_

**Yn darparu sgiliau ieithyddol gwell yn y Gymraeg**

\_\_\_\_\_

**Mae rhan fwyaf o'i ffrindiau yn mynd i'r ysgol**

\_\_\_\_\_

**Defnyddiwch y blwch isod i ychwanegu unrhyw beth yr ydych yn credu sy'n berthnasol i unrhyw bwynt uchod.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Appendices


Appendices

**Appendix 12: Background and attitudes questionnaire (English)**

Dear Parent,

Here are some questions relating to you and your child's background. There are no right or wrong answers. Please be assured that confidentiality will be guaranteed. If, for any reason, you feel uncomfortable answering any of these questions, please leave the answer blank and move on to the next question. Please tick one box (e.g. either 'yes' or 'no') and add any comments where it states 'other' if they apply.

<b>Please indicate the following:</b>	
Child's name _____	Child's Date of Birth __/__/__
Is your child male <input type="checkbox"/> or female <input type="checkbox"/>	
Does your child have any disability? None <input type="checkbox"/> Suspected <input type="checkbox"/> Confirmed <input type="checkbox"/>	
Please state if any: _____	
Has your child always lived in Wales? Yes <input type="checkbox"/> No <input type="checkbox"/>	
If you answered <b>No</b> , what area/country did your child previously live in _____	
And, what language was spoken there? English <input type="checkbox"/> Welsh <input type="checkbox"/>	
Other _____	
Did your child go to nursery? Yes <input type="checkbox"/> No <input type="checkbox"/> .	
If so, what language was spoken in it? Welsh <input type="checkbox"/> English <input type="checkbox"/>	
Other _____	
Did your child previously attend a school other than the one in which he or she is presently enrolled? Yes <input type="checkbox"/> No <input type="checkbox"/>	
If you answered <b>Yes</b> , what area/country was this school in _____	
What language was spoken in that school? Welsh <input type="checkbox"/> English <input type="checkbox"/>	
Other _____	

<p><b>And, what language was spoken in that area?</b> Welsh <input type="checkbox"/> English <input type="checkbox"/></p> <p>Other _____</p>
<p><b>What is your home language (or languages) at present?</b></p> <p>Only Welsh <input type="checkbox"/> Mostly Welsh/some English <input type="checkbox"/> Welsh and English equally <input type="checkbox"/> Mostly English/some Welsh <input type="checkbox"/> Only English <input type="checkbox"/></p> <p>Other _____</p>
<p><b>What language(s) do the following speak to your child:</b></p> <p><b>Child's mother (or Guardian 1)</b></p> <p>Only Welsh <input type="checkbox"/> Mostly Welsh/some English <input type="checkbox"/> Welsh and English equally <input type="checkbox"/> Mostly English/some Welsh <input type="checkbox"/> Only English <input type="checkbox"/></p> <p>Other _____</p> <p><b>Child's father (or Guardian 2)</b></p> <p>Only Welsh <input type="checkbox"/> Mostly Welsh/some English <input type="checkbox"/> Welsh and English equally <input type="checkbox"/> Mostly English/some Welsh <input type="checkbox"/> Only English <input type="checkbox"/></p> <p>Other _____</p> <p><b>Child's siblings</b></p> <p>Only Welsh <input type="checkbox"/> Mostly Welsh/some English <input type="checkbox"/> Welsh and English equally <input type="checkbox"/> Mostly English/some Welsh <input type="checkbox"/> Only English <input type="checkbox"/></p> <p>Other _____</p>
<p><b>What language(s) does your child speak to the following:</b></p> <p><b>Child's mother (or Guardian 1)</b></p> <p>Only Welsh <input type="checkbox"/> Mostly Welsh/some English <input type="checkbox"/> Welsh and English equally <input type="checkbox"/> Mostly English/some Welsh <input type="checkbox"/> Only English <input type="checkbox"/></p> <p>Other _____</p> <p><b>Child's father (or Guardian 2)</b></p>

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Only Welsh  Mostly Welsh/some English  Welsh and English equally  Mostly English/some Welsh  Only English

Other \_\_\_\_\_

**Child's siblings**

Only Welsh  Mostly Welsh/some English  Welsh and English equally  Mostly English/some Welsh  Only English

Other \_\_\_\_\_

**On average, how many hours per day does your child speak either of the following :**

Welsh \_\_\_\_\_ English \_\_\_\_\_

Other \_\_\_\_\_

**Education is important for children.**

Absolutely true  Somewhat true  Neither true or false  Somewhat false

Absolutely false

**How many hours a week do you spend with your child doing their homework?**

\_\_ \_\_ hours

**What is the educational background of the people indicated below?**

**Mother/Guardian**

No exams taken  GCSE  A Levels  Degree  Postgraduate

Other \_\_\_\_\_

**Father**

No exams taken  GCSE  A Levels  Degree  Postgraduate

Other \_\_\_\_\_

**What is the gross (before tax) combined household income?**

Below £20,000  £20,001 to £30,000  £30,001 to £40,000  £40,001 to £50,000

bove £50,001

**Please state the parent's/guardian's occupations:**

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**Mother:** \_\_\_\_\_

**Father:** \_\_\_\_\_

**Does your child receive free school lunches?**  
 Yes  No

**Has your child ever received speech and language therapy?**  
 Yes  No

**Has your child ever been treated for a hearing problem?**  
 Yes  No

**Has your child ever been assessed for any special educational needs?**  
 Yes  No

**If yes, are they receiving additional support?** Yes  No

**What does your child need help with?** \_\_\_\_\_

**Please choose a statement:**  
**“Children with special needs find two languages more difficult than other children”**  
 Strongly Agree  Agree  Unsure  Disagree  Strongly Disagree

**Welsh language use**

**Please indicate how often you and your child spend speaking, reading, and/or listening to Welsh in the areas below. Answer by circling one of the following:**

**1=Always; 2=Often; 3=Sometimes; 4=Rarely; 5=Never**

	<b>Mother</b>	<b>Father</b>	<b>Your Child</b>
<b>Welsh use with the following</b>			
<b>1. Immediate family</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>2. Extended family</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>3. Work colleagues/School</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>4. Friends</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>5. Neighbours</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>6. Teachers</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>7. People in the</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5



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<b>8. Organisations</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>9. Bureaucrats and Other (please state</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
	1 2 3 4	1 2 3 4 5	1 2 3 4 5
	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>Welsh use in the following</b>			
<b>1. Shopping</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>2. Reading newspapers.</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>3. Listening to radio,</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>4. Theatre, T.V., movies,</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>5. Work</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>6. Clubs</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>7. Leisure, hobbies</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>8. Church</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>9. Computers, emailing,</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>Other (please state</b>			
	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>11.</b>	1 2 3 4	1 2 3 4 5	1 2 3 4 5
<b>Please use this space to add anything that you think is relevant to any of the points above.</b>			
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**Attitudes towards bilingualism**

Here are some statements about Welsh and English languages. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Be as honest as possible. Answer by circling one of the following:

1 = Strongly Agree; 2 = Agree; 3 = Neither Agree Nor disagree; 4 = Disagree; 5 = Strongly Disagree

1. It is important to be able to speak Welsh and English.	1	2	3	4	5
2. To speak English is all that is needed.	1	2	3	4	5
3. Knowing Welsh and English makes people smarter.	1	2	3	4	5
4. Children get confused when learning Welsh and English.	1	2	3	4	5
5. Speaking both Welsh and English helps to get a job.	1	2	3	4	5
6. Being able to write in Welsh and English is important.	1	2	3	4	5
7. Schools should teach children to speak in two languages.	1	2	3	4	5
8. School wall displays should be in Welsh and English.	1	2	3	4	5
9. Speaking two languages is not difficult.	1	2	3	4	5
10. Knowing both Welsh and English gives people problems.	1	2	3	4	5
11. I feel sorry for people who cannot speak both Welsh and English.	1	2	3	4	5
12. Children should learn to read in both Welsh and English.	1	2	3	4	5
13. People know more if they speak Welsh and English.	1	2	3	4	5

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<b>14. People who speak Welsh and English can have more friends than those who speak one language.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>15. Speaking both Welsh and English is more for older than younger people.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>16. Speaking both Welsh and English can help people get a work promotion.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>17. Young children can easily learn to speak Welsh and English at the same time.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>18. Both Welsh and English should be important in the region where I live.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>19. People can earn more money if they speak both Welsh and English.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>20. I would like English to be the only language in this area.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>21. I would like to be considered as a speaker of Welsh and English.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>22. I want my children to speak Welsh.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>23. Both the Welsh and English languages can live together in this region.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			
<b>24. People only need to know one language.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>25. At least one parent needs to be able to speak Welsh for their child to succeed.</b>	<b>5</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>26. I worry that I cannot help my child with their homework because I cannot speak Welsh.</b>	<b>5</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>			



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<b>1. No real Welsh person can be against the revival of Welsh.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>2. Wales would not really be Wales without Welsh speaking people.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>3. Wales would lose its identity as a separate culture without the Welsh language.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>4. One must know Welsh to really understand Welsh culture.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>5. Welsh will continue to die out if we do not do something about it soon.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>6. The Welsh language is dying.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>7. The Welsh language is dead.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>8. Welsh can be revived as a common means of communication.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>9. Most people do not care about Welsh.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>10. Attempts to revive Welsh are bound to fail no matter what the Government does.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>11. Most people see all things associated with Welsh as too old fashioned.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>12. Welsh will disappear in a generation or two if nothing is done about it.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>13. The Welsh language cannot be made suitable for business.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>14. Far less money should be spent reviving Welsh.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>15. What the Government does about the Welsh language is not important to me.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	
<b>16. Public leaders should set a good example by using Welsh in day to day life.</b>	<b>1</b>	<b>2</b>	<b>3</b>
	<b>4</b>	<b>5</b>	



Appendices


**Attitudes towards Welsh Medium and Mainstream Education**

Here are some statements about the Welsh medium and mainstream education.

Please say whether you agree or disagree with these statements. There are no right or wrong answers. Be as honest as possible. Answer with circling one of the following:

1 = Strongly Agree; 2 = Agree; 3 = Neither Agree Nor Disagree; 4 = Disagree; 5 = Strongly Disagree

1. Welsh medium education is keeping the Welsh language alive.	1	2	3
	4	5	
2. Speaking Welsh at school and English at home will ultimately benefit a child's education.	1	2	3
	4	5	
3. Welsh medium education is open to all—working, middle, and upper class.	1	2	3
	4	5	
4. Mainstream education is keeping the Welsh language alive.	1	2	3
	4	5	
5. Mainstream education is open to all—working, middle, and upper class.	1	2	3
	4	5	
6. Speaking Welsh at school and English at home will ultimately damage a child's education.	1	2	3
	4	5	
7. Those attending Welsh medium education learn a different curriculum from those in mainstream education.	1	2	3
	4	5	
8. Welsh medium education does not negatively affect English language skills.	1	2	3
	4	5	
9. Welsh medium or bilingual education enriches children.	1	2	3
	4	5	

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<p><b>10. Children from English speaking homes cannot succeed academically in the same way as children from Welsh speaking homes attending a Welsh speaking school.</b></p>	<p><b>1</b> <b>4</b> <b>1</b></p>	<p><b>2</b> <b>5</b> <b>2</b></p>	<p><b>3</b>  <b>3</b></p>																
<p><b>11. Children with special educational needs find two languages more difficult than other children.</b></p>	<p><b>4</b></p>	<p><b>5</b></p>																	
<p><b>Please use this section to indicate which type of education your child is enrolled in, and why you chose to enrol him/her in this type of education. There are some potential reasons given below, and a space provided for comments. Also, there is a space provided below for you to add any other reasons that are appropriate to you.</b></p> <p><b>Your child attends a Welsh medium/bilingual education school <input type="checkbox"/> or immersion education school <input type="checkbox"/></b>  <b>because this type of education:</b></p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="width: 80%;"></th> <th style="text-align: right; width: 20%;"><b>Comments</b></th> </tr> </thead> <tbody> <tr> <td> <p><b>Has a better reputation than other schools in the area</b> <input type="checkbox"/></p> <p>_____</p> </td> <td></td> </tr> <tr> <td> <p><b>Has better resources than other schools in the area</b> <input type="checkbox"/></p> <p>_____</p> </td> <td></td> </tr> <tr> <td> <p><b>Was the only school available</b> <input type="checkbox"/></p> <p>_____</p> </td> <td></td> </tr> <tr> <td> <p><b>Has the most convenient location</b> <input type="checkbox"/></p> <p>_____</p> </td> <td></td> </tr> <tr> <td> <p><b>Provides better career opportunities for students</b> <input type="checkbox"/></p> <p>_____</p> </td> <td></td> </tr> <tr> <td> <p><b>Provides better Welsh language skills</b> <input type="checkbox"/></p> <p>_____</p> </td> <td></td> </tr> <tr> <td> <p><b>Most of their friends attend the school</b> <input type="checkbox"/></p> <p>_____</p> </td> <td></td> </tr> </tbody> </table>					<b>Comments</b>	<p><b>Has a better reputation than other schools in the area</b> <input type="checkbox"/></p> <p>_____</p>		<p><b>Has better resources than other schools in the area</b> <input type="checkbox"/></p> <p>_____</p>		<p><b>Was the only school available</b> <input type="checkbox"/></p> <p>_____</p>		<p><b>Has the most convenient location</b> <input type="checkbox"/></p> <p>_____</p>		<p><b>Provides better career opportunities for students</b> <input type="checkbox"/></p> <p>_____</p>		<p><b>Provides better Welsh language skills</b> <input type="checkbox"/></p> <p>_____</p>		<p><b>Most of their friends attend the school</b> <input type="checkbox"/></p> <p>_____</p>	
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<p><b>Most of their friends attend the school</b> <input type="checkbox"/></p> <p>_____</p>																			
<p><b>Please use this space to add anything that you think is relevant to any of the points above.</b></p>																			



## Appendices


**Appendix 13 Modified Parental Consent Letter (Welsh)**

Coleg Addysg a Dysgu Gydol Oes  
Adeilad Rhos, Safle'r Normal, Prifysgol Bangor  
Bangor  
Gwynedd  
LL57 2PZ

Annwyl Rhiant/Gwarcheidwr .....,

Ysgrifennwn atoch i ymfyn eich caniatâd i'ch plentyn gymryd rhan yn yr astudiaeth hon sy'n edrych ar fanteision addysg cyfrwng Cymraeg ac addysg ddwyieithog ymysg plant mewn ysgolion prif-lif a phlant gydag anghenion addysgol cymedrol yng Nghymru.. Os ydych yn rhoi caniatâd, byddwn yn gwahodd eich plentyn i gymryd rhan mewn gwahanol gemau sy'n edrych ar sgiliau gwybyddol ac ieithyddol y plentyn yn Gymraeg ac yn Saesneg ynghyd â sgiliau cofio a chanolbwyntio. Bydd rhai o'r profion yn cael eu cynnal gyda grŵp o blant, a rhai eraill ar ffurf un-i-un gydag ymchwilydd o'r Brifysgol.

Ni fydd eich plentyn yn cael ei (g)orfodi i gymryd rhan, ac os yw'n dymuno gadael unrhyw bryd, bydd ef/hi yn rhydd i wneud hynny. Rydym wedi trafod yr ymchwil gyda'r Pennaeth sy'n ymwybodol o gynnwys yr astudiaeth ac yn hapus i'r ymchwil gael ei gynnal yn yr ysgol. Ni ddatgelir enw unrhyw blentyn sy'n gysylltiedig â'r prosiect ac fe gedwir y data i gyd yn gyfrinachol.

Os ydych chi'n caniatáu i'ch plentyn gymryd rhan yn yr ymchwil hwn, rhowch dic yn y bocs 'Ie', a dychwelyd y llythyr caniatâd wedi ei gwblhau. Os nad ydy chi'n caniatáu i'ch plentyn gymryd rhan yn yr ymchwil hwn, rhowch dic yn y bocs 'Na' a'i dychwelyd i'r ysgol.

**Byddwn yn ddiolchgar os dychwelwch y ffurflen ganiatâd i'r ysgol mor fuan a phosib, os gwelwch yn dda.**

Yn gywir,

Mirain Rhys a Bethan Lye

Appendices

e-byst: [Mirain.rhys@bangor.ac.uk](mailto:Mirain.rhys@bangor.ac.uk) & [b.lye@bangor.ac.uk](mailto:b.lye@bangor.ac.uk)

Rhif Ffon: 01248 383595

.....

IE  NA

Enw'r Plentyn .....

Ysgol:.....

Llofnod rhiant / Gwarchodwr .....

Dyddiad: \_\_ / \_\_ / \_\_

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-

**Appendix 15 Modified Parental Consent Letter (English)**



College of Education and Lifelong Learning  
Rhos Building, Normal Site, Bangor University  
Bangor  
Gwynedd, LL57 2PZ

Dear Parent/Guardian of \_\_\_\_\_,

We are writing to ask if your child can take part in a research study about the effects of Welsh medium and bilingual education. We want to include both children who find learning more difficult others, and children who find learning easy in our study.

If you say 'yes' to the study, we will ask your child to take part in some games and tests which look at their thinking and language skills in both Welsh and English, and also their memory and concentration skills. Your child will do some of the tests as one of a group of children, and others in a one: one session with a researcher from the University

If you say 'yes' we won't try and make your child take part if they do not want to.

Confidentiality will be respected at all times throughout the experiment, no child's name will be mentioned, and the information we collect will be remain anonymous. We have discussed the project with the Headteacher who is aware of the research and its content and is happy for the research to go ahead in the school.

If you give permission for your child to take part in this research, please tick the 'yes' box and return the form. If you do not wish for your child to take part in the research, please tick the 'No' box and return to the school. If you want to know more, please get in touch with us

**It would be really helpful if you could send the permission form back to school as soon as possible.**

Yours sincerely,

Mirain Rhys and Bethan Lye

Appendices

E-mail: [Mirain.Rhys@bangor.ac.uk](mailto:Mirain.Rhys@bangor.ac.uk) & [B.lye@bangor.ac.uk](mailto:B.lye@bangor.ac.uk)

Telephone: 01248 383595

.....  
YES

NO

Child's Name: .....

School: .....

Parent / Guardian signature .....

Date: \_\_ / \_\_ / \_\_

## Appendices

### Appendix 16 Pupil Assent Form (English)

Name: \_\_\_\_\_

School: \_\_\_\_\_

We are going to be playing some games and doing some tasks. Some will be done as a group, and some on your own. Some will be hard and some will be easy. You do not have to do the tasks or play the games, and if you've had enough you can stop. If you decide you want to stop just tell me or show me the card with the sad face.

If you are **happy** to do the tasks please circle the smiley face

If you are **not happy** about doing the tasks please circle the sad face



If you have any questions please ask me

( the information on this sheet will also be read to the children with any questions answered)

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### Appendix 15 Pupil assent form (Welsh)

Enw: \_\_\_\_\_

Ysgol: \_\_\_\_\_

Rydym ni'n mynd i chwarae gemau a gwneud rhai tasgau. Bydd rhai yn cael ei gwneud fel grŵp, a rhai yn unigol. Bydd rhai yn anodd a rhai eraill yn hawdd. Does dim rhaid i ti wneud y tasgau na chwarae'r gemau, ac unwaith rwyd ti wedi cael digon fe gei di orffen. Os wyt ti'n penderfynu gorffen, dywedwch wrthyf fi neu dangos y cerdyn gyda'r wyneb trist.

Os wyt ti'n **hapus** i chwarae'r gemau a gwneud y tasgau rho gylch o gwmpas y wyneb hapus.

Os **nad wyt ti'n hapus** i chwarae'r gemau a gwneud y tasgau rho gylch o gwmpas y wyneb trist.



Os oes gen ti unrhyw gwestiwn plis gofynnwch.

**Appendix 16 Example of the 'Sustained Attention to Response Task' (SART)**

This is a snapshot of a succession of 6 different images the child would have seen.

The blue boxes were the break between each number and required to do nothing. Children were asked to press the spacebar on every number but inhibit the press when number 3 was presented. In the modified SART, children had to inhibit the press of the number 3 and 8.

The children did not see the 'tick' or the 'cross'. They are present to demonstrate correct presses and incorrect presses. The following script was used

**English**

Pre switch: On this screen you are going to see a number popping up, and numbers will keep popping up one after another. Your job is to press this button (researcher puts child finger on the space bar) every time you see a number 3. What number are you looking for? (Child says 3). Can you show me number 3 on this number line? (Child points to 3).

Post switch: : This time you're going to see a number popping up, and numbers will keep popping up one after another. Your job this time is to press this button (researcher puts child finger on the space bar) every time you see a numbers 3 or 8. What numbers are you looking for? (Child says 3 and 8). Can you show me number 8 on this number line? (Child points to 8).

**Welsh**

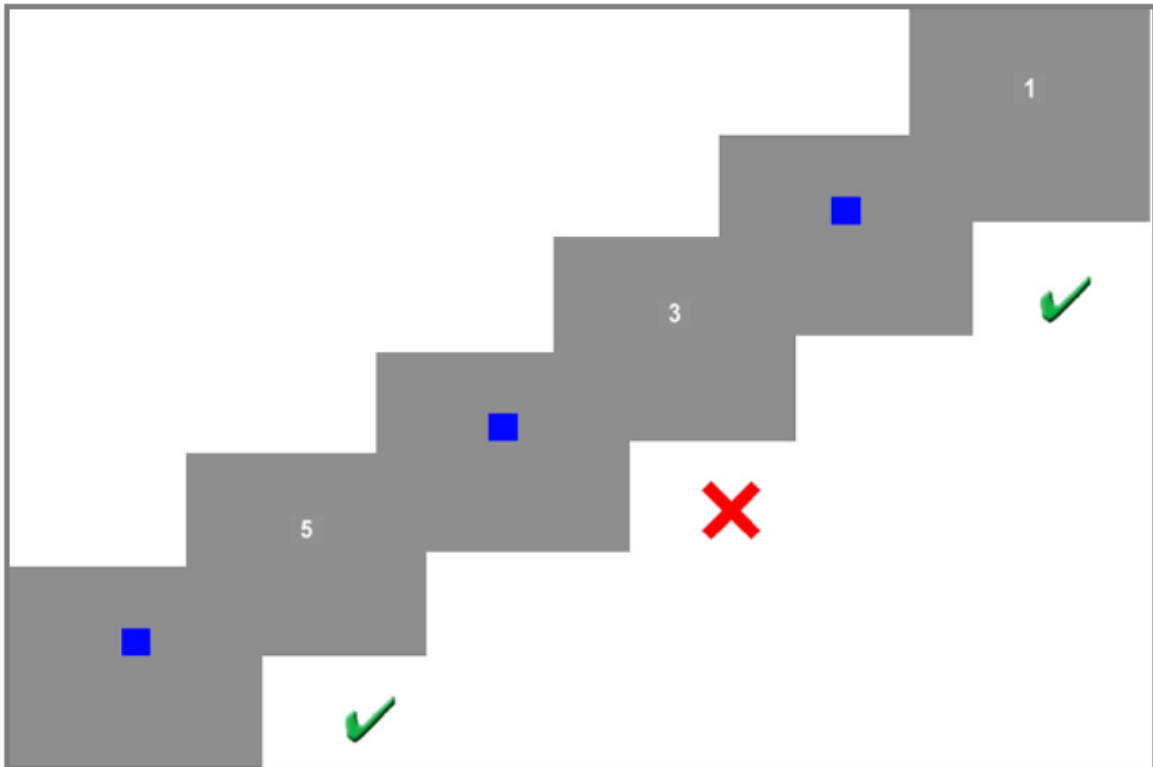
Pre switch: Ar y sgrin yma rwyt ti am weld rhif yn ymddangos. Bydd rhifau yn ymddangos un ar ôl y llall. Dy job di yw gwthio'r botwm yma (researcher puts child's finger on the space bar) bob tro rwyt ti'n gweld rhif 3. Am ba rif wyt ti'n chwilio? (Child says 3). Fedri di ddangos rhif 3 ar y llinell rif yma? (Child points to 3).

Post switch: : Bydd rhifau yn ymddangos un ar ôl y llall, eto. Y troy ma dy job di yw gwthio'r botwm yma (researcher puts child's finger on the space bar) bob tro rwyt ti'n gweld rhif 3. Am ba rif wyt ti'n chwilio? (Child says 3 and 8). Fedri di ddangos rhif 8 ar y llinell rif yma? (Child points to 8).



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This time you're going to see a number popping up, and numbers will keep popping up one after another. Your job this time is to press this button (researcher puts child finger on the space bar) every time you see a number 3 or 8. What numbers are you looking for? (Child says 3 and 8). Can you show me number 8 on this number line? (Child points to 8).



### **Appendix 17 Example of the Opposite Worlds Task**

In this task children began naming the animal on the far left, closest to the barn and ‘around the path’. In the pre-switch condition children used the correct names i.e. pig, sheep. In the post-switch condition children used the opposite name i.e. called the pig a sheet and the sheep a pig. The following script was used

#### **English version:**

“Here is a farm. They have pigs and sheep. What’s this called?” (Researcher points to pig and child says “pig”. Researcher then points to sheep and child says “sheep”). If child is uncertain or incorrect the researcher models the correct words. “Now I have a game. You have to say the names of the animals as fast and correct as you can. You can point to the pictures if it helps you keep your place. Now can you tell me what you have to do? (Child re-tells what he/she has to do).

On the switch: “Now, a big wind has come and everything is upside down and the wrong way around. The pigs aren’t called pigs any more, they’re called sheep. And the sheep are called pigs. What’s this called now? (Researcher points to pig and child says “sheep”; Researcher points to sheep and child says “pig”). You have to say the names of the animals as fast and correct as you can. You can point to the pictures if it helps you keep your place. Now can you tell me what you have to do? (Child re-tells what he/she has to do).

#### **Welsh version:**

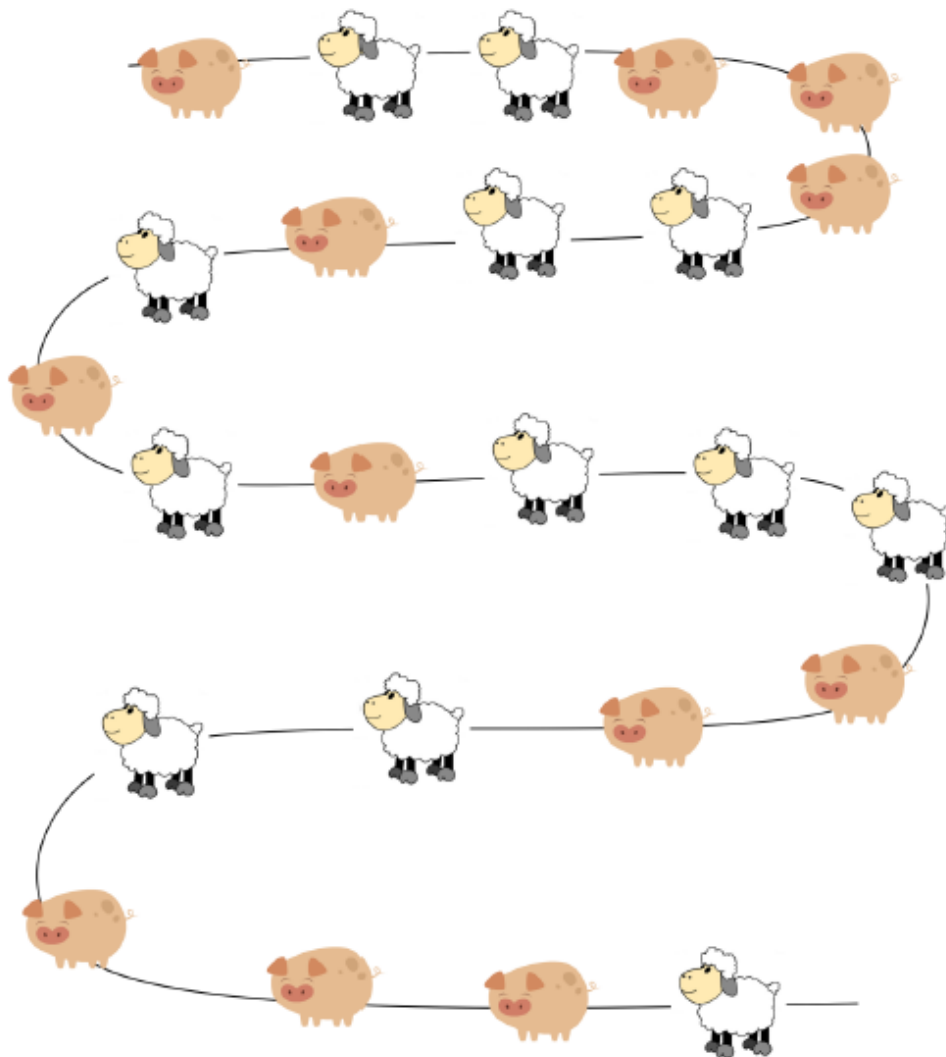
“Dyma fferm. Ar y fferm mae moch a dafad. Beth yw hwn? (Researcher points to pig and child says “mochyn”. Researcher then points to sheep and child says “dafad”). If child is uncertain or incorrect the researcher models the correct words. “Mae gen i gêm. Mae’n rhaid I ti ddweud enwau’r anifeiliaid mor gyflym ag y galli di. Gallet ti ddefnyddio dy fys i gadw lle os wyt ti eisiau. Fedri di ddweud wrtha i beth sydd angen I ti wneud?” (Child re-tells what he/she has to do).

On the switch: “Nawr, mae gwyntoedd mawr wedi dod ac mae popeth ben i waered. Mae’r mochyn yn cael ei alw’n dafad ac mae’r dafad yn cael ei alw’n mochyn. Beth yw enw hwn? (Researcher points to pig and child says “dafad”; Researcher points to sheep and child says “mochyn”). Eto mae’n rhaid I ti enwi’r anifeiliaid mor gyflym g y galli di. Gallet ti

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ddefnyddio dy fys i gadw lle os wyt ti eisiau. You can point to the pictures if it helps you keep your place. Now can you tell me what you have to do? (Child re-tells what he/she has to do).

All bilingual children completed this task in Welsh, all monolingual children completed this task in English.



### **Appendix 18 Example of the Stroop Task**

This is an example of the stroop task. Children first complete the congruent and then complete the incongruent task. The congruent task required the children to say the number they saw i.e. if they saw “1” they would say “1”. The incongruent task required the children to say the amount of numbers they say i.e. if they saw “1 1” they would say “2”. The following script was used:

#### **English**

Congruent: I’m going to show you some numbers and I want you to say what number you see as quickly and accurately as possible. For example, if I show you this. What do you say? (Child provides correct answer). Yes well done. Remember, as fast and right as you can. If child provides the wrong answer, the researcher re-iterates and provides another example.

Incongruent: This time I’m going to change the rule. I don’t want you to say what number you see but I do want you to say how many numbers you see. For example, if I show you this, what do you say? (Child provides correct answer). Yes well done. Remember, as fast and right as you can. If child provides the wrong answer, the researcher re-iterates and provides another example.

#### **Welsh**

Congruent: Rydw i am ddangos rhifau i ti ac mae’n rhaid I ti ddweud y rhif rwyt ti’n ei weld. Mae’n rhaid i ti wneud hyn mor gyflym ac mor gywir ag y galli di. Er enghraifft, beth fyddi di’n dweud wrth weld hyn? (Child provides correct answer). Ie, da iawn. Cofiwch, mor gyflym a chywir ag y fedri di.

Incongruent: Y tro yma rydw I am newid y rheol. Rydw i am ddangos rhifau i ti ac mae’n rhaid i ti ddweud sawl rif rwyt ti’n ei weld. Mae’n rhaid i ti wneud hyn mor gyflym ac mor gywir ag y galli di. Er enghraifft, beth fyddi di’n dweud wrth weld hyn? (Child provides correct answer). Ie, da iawn. Cofiwch, mor gyflym a chywir ag y fedri di.

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Congruent	Incongruent
1	1 1
3 3 3	3 3 3 3
2 2	2 2 2
1	1 1
2 2	4 4 4
4 4 4 4	1 1
3 3 3	4 4 4
1	3 3 3 3