Age Related Differences in Language Usage and Reading between English Monolinguals andBilinguals

Dylan Marshall
De La Salle University
Manila, Philippines
marshalld@ismanila.org

Hamid Gomari
De La Salle University
Manila, Philippines
h.gomari@yahoo.com

Abstract

This study investigates age related differences in standardized tests scores of *language usage* and *reading* from elementary to high school for students who are either monolinguals whose L1 is English or bilinguals whose L1 is not English. An interactioneffect between *grade level* and*reading* and *language usage* standardized test scores was hypothesized because as bilinguals become proficient in *Cognitive Academic Language Proficiency (CALP)* in English,they are able tonarrow the 'achievement gap'in comparison to their monolingual classmates and even experience cognitive advantages (Cummins, 1999).Participants were 1081 students from an international school. *Language usage* and *reading*were measured using MAP standardized achievement tests.The2x2 ANOVA showed an interaction between *grade level* and *languages spoken* on *language usage* ($p<0.05$).There was a main effect for *languages spoken* and *grade level* on *language usage* ($p<0.05$). No interaction was found for*grade level* and *languages spoken* on *reading* ($p>0.05$). A main effect was found for *languages spoken* and*grade level* on *reading* ($p<0.05$).Significant differences exist between bilingual and monolingualsand these differences *change* over time. As bilingual students are immersed in English education, their performance on standardized tests catches up with their monolingual counterparts by grade 5 for *language usage* but not for *reading*, but no cognitive advantages are shown.

1Introduction

We live in an increasingly globalized world where bilingualism is very common as global societies become more interconnected. In this context, it is of vital importance to understand how bilingualism relatesstudents' language abilities, cognitive abilities and academic performance.Understanding differences between monolinguals and bilinguals is particularly relevant in the context of reading and language usage in international schools where the medium of instruction is English. These schools are often extremely diverse linguistic communities and many students are known as Third-Culture Kids (TCKs) who have grown up in a different culture to their passport country. Many students come from family backgrounds where there is no spoken English, and their main English input comes from their school life. It is important to find out whether being monolingual or bilingual can account for differences in performance in standardized test scores to understand how the monolingual and bilingual experience in international schools impacts students' performance in reading and language usage.

Early research on bilingualism proposed that bilinguals were at a disadvantage linguistically compared to monolinguals. Peal and Lambert (1962) studied the effect of bilingualism on cognitive functioning which led to a shift in our understanding of the effects of bilingualism. Their study found that the bilinguals outperformed monolinguals on almost all the tests, particularly on the tests involving mental organization; therefore, they concluded that bilinguals profited from *mental flexibility* and being bilingual was an asset. Since then, a considerable number of studies have been conducted on this topic and they havefound enhanced meta-linguistic awareness in bilingual children (Bialystok, 2009).

When considering language development in the school environment, it is important to consider the different levels and types of language proficiency.Cummins (1976) proposed that there are two *threshold* levels of linguistic proficiency: first, it is necessary for bilingual children to reach the lower

27th Pacific Asia Conference on Language, Information, and Computation pages 190－198

threshold to avoid cognitive disadvantages and the second, higher threshold is necessary to make it possible for beneficial aspects of bilingualism to influence cognitive growth.

Cummins (1976)also proposed a distinction between*Basic Interpersonal Communication Skills* (BICS)which account for children's ability to deal with the use of language in "peer-appropriate ways in everyday face-to-face situations" (Cummins, 1984, p.4) and *Cognitive Academic Language Proficiency* (CALP) which are the academically-related aspects of language proficiency. Bilingual children need to develop their proficiency in CALP for academic success in school, and this takes time. Indeed, Cummins (1999) states that "in second language acquisition contexts, immigrant children often acquire peer-appropriate conversational fluency in English within about 2 years but it requires considerably longer (5-10) years to catch up academically in English" (Cummins, 1999,p.2).

Another factor proposed by Cummins (2001) that relates to second language acquisition is Common Underlying Proficiency (CUP). Cummins believes when a child learns one language he/she acquires a set of skills and implicit meta-linguistic knowledge that he/she can draw upon when learning another language. The CUP provides the base for the development of students' native language (L1) and the second language (L2). This suggests that it is very important for students to maintain their L1. In most international schools students learn all their lessons through the medium of English,but there are additional programs in place to encourage students to maintain their non-English L1 languages, so it may be that bilinguals whose L2 is not English may experience some *cognitive advantages* of being bilingual by the time they have spent 5-7 years immersed in English education.

There are differences between monolinguals and bilinguals in terms of how they process information when reading. Jimenez, Garcia and Pearson (1996) studied the strategic reading processes of 8 bilingual Latina/o children who were identified as successful English readers, in order to explore how bilingualism affectsmeta-cognition. They found Latina/o readers were able to actively transfer information across languages, translate from one language to another and openly access cognate vocabulary while reading.Furthermore, while encountering unknown vocabulary items whether reading an English or Spanish text, such readers utilized a *range of strategic processes* to determine the meanings of the unknown words. Less successful Latina/o readers employed *fewer strategies* and were found to be less effective in resolving comprehension problems in either language so that they could identify the unknown words, but were not able to come up with appropriate interpretations of text.The successful Anglo readers, due to their access to the well-developed prior knowledge, rarely encountered unknown vocabulary and were able to use considerable cognitive resources to the act of comprehension.

Martinez and Lesaux (2010) conducted a longitudinal study to examine the process of English reading comprehension for low achieving English Spanish bilingual childrenat the age of 11. The researchers evaluated the influence of growth rates, from early childhood (age 4.5) to pre-adolescence (age 11), in vocabulary and word reading skills on English reading comprehension. They used structural equation modeling (SEM) and annually administered standardized tests of word reading accuracy and productive vocabulary in English and Spanish, and they administered an English reading comprehension test at age 11. They found that English skills accounted for *all* unique variance in English reading comprehension outcomes.This shows that the level of L1 proficiency amongst bilinguals is not necessarily related their L2 proficiency.

The Age-of-Acquisition (AoA) of L2 language for bilinguals is also important in determining later proficiency. Bialystok and Miller (1999) conducted a research study on three groups of participants. They were given a grammaticality judgment test based on five structures of English grammar in both oral and written form. The first group consisted of native speakers of Chinese, the second, native speakers of Spanish, and the third, native English speakers. The two learner groups were divided into those who had begun learning English at a younger (less than 15 years) or older (more than 15 years) age. Performance was measured for

both accuracy of judgment and time taken to respond. The results of their study showed that those who had started learning English *earlier* performed *better* than those who had learnt English later on the English grammar tests.

Furthermore, Kaushanskaya and Marian (2007) studied AoA effects in the development of *bilingual advantage* for word-learning among 30 monolingual speakers of English and 30 high-proficient English Spanish bilinguals. They further divided the bilingual participants into two groups of *early* (15) and *late* (15) bilinguals. The results of their study revealed that the AoA affected word-learning performance, and early bilinguals performed *better* than monolinguals on the word-learning task. Based on the examination of AoA effects in the development of the bilingual cognitive advantage for foreign word learning, they suggested that earlier acquisition age amplifies bilingual*cognitive advantage*. This clearly shows that those who acquire their second language earlier have a distinct advantage over those who acquire it later on.

Indeed, Bialystok (2009) proposes that the longer bilingual students have been immersed in their L2 language education the better their performance is on executive control tasks. They identified executive control as the mechanism that explains how bilingualism connects to bilingual *cognitive advantage.* Luc, deSa and Bialystok (2011) examined young adult bilinguals and found that *early bilinguals* (who were activity bilingual before the age of 10) had higher level of English proficiency than *late bilinguals*.

However, Bialystok et al. (2010) studiedvocabulary differences in the language of schooling (i.e., English) between monolingual and bilingual children using the Peabody Picture Vocabulary Test (PPVT) standard scores of a total of 1,738 children. The overall PPTV score was found to be *higher* for monolinguals than for bilinguals.

Further evidence for this phenomenon comes from Han (2011) who carried out a longitudinal study with a very large sample of 16,380 students on bilingualism and academic performance and found that bilingual children whose L1 was not English performed worse in tests of *reading* and *grammar* in third grade but they were able to *close the gap* on their monolingual counterparts as they progressed through school by the time they reachedfifth grade.This means that by the time they were in middle and high school, the bilingual students' performance was similar to that of monolinguals.

Taken together, the findings of the aforementioned research studies suggest that significant differences exist at a *young age* between bilingual and monolingual students, but these differences *change* over time. As the bilingual students whose L1 is not English are immersed in English education, their performance catches up with their monolingual counterparts and they may experience cognitive advantages.

The current study seeks to investigate whether there are changes between the grades 3 to 10 (7 to 16 years of age) in the standardized test scores of *language usage*and *reading* for bilingual students with an L1 that is not English and monolinguals whose L1 is English.

This study is significant because it examines differences in performance between monolingual and bilinguals across grade levels in a K-12 international school. There seems to be a gap in the research on this area as no previous studies have examined this topic in this particular context. It is important to know the relationship between languages spoken and students' academic performance, because this knowledge can help schools to provide optimum support for students as they progress from elementary school to middle school and then high school. Once the relationships between these variables are understood, administrators and teachers can identify the key grade levels where extra support should be given to students. In particular, the main focus of this study is to answer the following questions:

- Are there any significant differences in *language usage* and *reading* standardized test scores between monolingual and bilingual students across grades 3 to 10?
- Do bilingual students *close the gap* on their monolingual counterparts on *language usage* and *reading* standardized test scores after being immersed for 4-10 years in English education?

2Methodology

2.1 Participants

The participants were 1081 students from a K-12 international school.The school has students from varied ethnic andcultural backgrounds. There are 65 nationalities represented in the school. The medium of instruction is English throughout the school. The sample consisted ofelementary (*n=254*), middle (*n=622*) and high school (*n=205*) students of mixed gender. All participants had high socio-economic status. Students were L1 English monolinguals *(n=652)* and bilinguals whose L1 is not English *(n=429)*.The languages represented in the sample of bilinguals wereKorean, *(n=115)*, Japanese *(n=65)*, Chinese *(n=29)*, Filipino, *(n=27)*, Hindi, *(n=23)*, Spanish, *(n=22)*, Dutch, *(n=17)*, Indonesian, *(n=16)*, French, *(n=13)*, Norwegian, *(n=10)*, Urdu, *(n=10)*, Swedish, *(n=9)*, Malay, *(n=7)*, Bengali *(n=5)*, German, *(n=5)*, Vietnamese *(n=5)*, Portuguese, *(n=4)*, Arabic, *(n=4)*, and others not specified *(n=43)*. Due to confidentiality reasons and an agreement with the school, no further details with regards to the participants could be provided.

2.2 Instruments

The Northwest Evaluation Association (NWEA) (2012) Measures of Academic Progress (MAP) standardized achievement test was used to measure *language usage* and *reading*. This is a widely used and reliable measure of academic performance in international schools and North America. The theoretical framework used for the scale construction was the Rasch Model (Rasch, 1961). MAP is a computerized adaptive assessment, this means that as a student responds to questions, the test responds to him/her, and the next question is either more or less difficult than the previous one. MAP produces an RIT Score (Rasch Unit) for the student in *language usage*and *reading*. The RIT Scale is an equal interval scale from high to low, and average scores all have the same meaning regardless of grade level (Northwest Evaluation Association, 2012).

For the *language usage* test, students are required to do tasks demanding them to use correctpunctuation, grammar, sentence structures, capitalization and spelling. For the *reading*test, students' ability to analyze and understand text is measured. Students are given a number of reading comprehension tasks on several texts. High reliability was established for students MAP RIT Scores in *language usage*(α. =.78) and *reading*(α. =.74) through analyzing the Chronbach's Alpha (α) of the test scores.

2.3 Procedure

Data was gathered in the fall MAP testing sessions in 2012. Letters were sent to parents to inform them that their child would be completing the MAP tests. The test was administered on computers from 7.30 to 9.30 am in the morning. On arrival in school, students went to the computer room and the computers were already logged on to the MAP test software. The test was supervised by MAP proctors who have attended specialized training in the administration of MAP tests.

Students were instructed to follow the information given on the screen to complete the questions given. Upon completion of the tests, the resultswere submitted electronically to the Northwest Evaluation Association (NWEA) central office in Portland, Oregon, USA. The results were analyzed and shared with the school through the NWEA MAP school portal two months after testing.

The MAP RIT scores were downloaded from the NWEA MAP school portal by the elementary school Assistant Principal and collated in a Microsoft Excel document. Students MAP RIT scores for *language usage* and *reading* were matched with their demographic information from the schools registrar's office online PowerTeacher database on the *languages spoken*for each student. All personal details of participants were kept entirely confidential in accordance with the APA (2002) ethical guidelines. Raw data was analyzed using SPSS statistical software.

3 Results

The aim of the study is to examine whether there are age related differences between monolingual and bilingual students (*languages spoken*) on standardized

achievement tests scores of *reading* and *language usage* RIT scores. Two-way between subjects 2x2 ANOVAwere used to analyze differences between grade levels for monolinguals and bilinguals on *language usage* and *reading* standardized test scores.Descriptive statistics for the measures of students' *reading* and *language usage* scores from grades 3 to 10 are presented in Table 1 in Appendix A.

The two-way ANOVA that was conducted examined the effect of *languages spoken* and *grade level* on *language usage*RIT scores. There was a significant interaction between the effects of *grade level* and *languages spoken* on *language usage*RIT scores, F (6, 1067) = 2.126, p = .048 ($p<0.05$). This interaction effect can be seen in Figure 1. Simple main effects analysis showed a main effect for *languages spoken*, monolingualsscored significantly higher thanbilinguals on *language usage* RIT scores. F (1, 1067)= 27.4237, p=.000 ($p<0.05$). A main effect was also found for *grade level* on *language usage*RIT scores F (6, 1067)= 217.234, p=.000 ($p<0.05$).

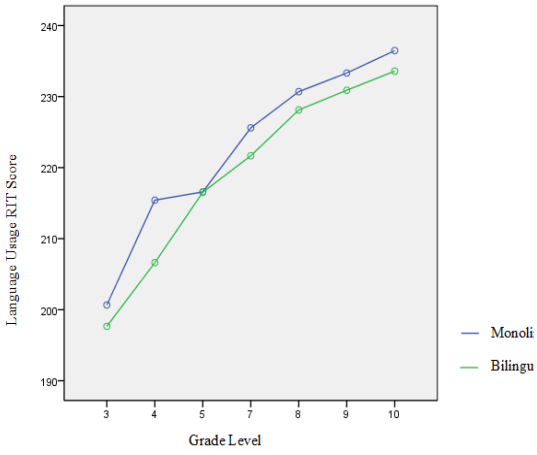

Figure 1.Language Usage RIT scores by grade level for monolinguals and bilinguals.

The two-way ANOVA that was conducted examined the effect of *languages spoken* and *grade level* on *reading* RIT scores. There was no significant interaction between the effects of *grade level* and *languages spoken* on *reading*RIT scores, F (6, 1066) = 1.372, p = .223 ($p>0.05$).Simple main effects analysis showed a main effect for *languages spoken*, monolinguals scored significantly higher than bilinguals on *reading*RIT scores. F (1, 1066)= 47.372, p=.000 ($p<0.05$). A main effect was also found for *grade level* on *reading* RIT scores F (6, 1067) = 221.062, p=.000 ($p<0.05$), these main effects can be seen in Figure 2.

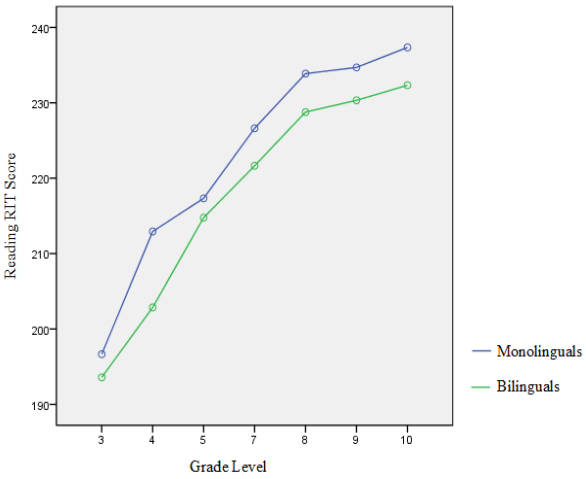

Figure 2.Reading RIT scores by grade level for monolinguals and bilinguals.

4 Discussion

In relation to the first research question, the result shows that there are significant differences in *language usage* and *reading* standardized test scores between monolinguals and bilinguals for students across grades 3 to 10. For *language usage*, the main effect for *languages spoken* shows that scores for monolinguals and bilinguals are significantly different across the grade levels. The general trend is that the performance of both monolinguals and bilinguals increases as the students' progress through the grade levels. This may be due to both groups of students developing their skills in language as they progress through schooling and deal with increasingly complex linguistic input. Furthermore, in all grades apart from grade 5, the monolinguals outperform the bilinguals. This shows that for *language usage*, the bilingual students do*close the gap* on their monolingual counterparts by grade 5, but the gap then widens again after that.

The hypothesis of the study is supported by the significant interaction between *grade level* and *languages spoken*for *language usage* scores. This is interesting because it provides empirical support for Cummins (1999) proposition that it takes 5 to 10 years for bilinguals to gain *Cognitive Academic Language Proficiency* (CALP).This also

supports Han's (2009) finding that bilinguals reach the same level as monolinguals on tests of grammar by grade 5. By the time the students finish elementary school and enter middle school in grade 5, the monolingual and bilingual's performance is the same. The immersionof bilinguals in the English language in elementary school education has enabled them to perform just as well as their monolingual counterparts by grade 5. However, contrary to the hypothesis, the result showed that from grade 7 through to grade 10 the gap then widens between the monolinguals and bilinguals. The monolinguals outperform the bilinguals, so the *cognitive advantages* of bilingualism do not demonstrate themselves in the students' performance in *language usage* in their second language.

For *reading* the monolinguals outperform the bilinguals across all grade levels, and performance of both groups also increases with age. There is a narrowing of the gap in performance at grade 5 between the monolinguals and bilinguals, but the interaction effect is not significant, not supporting the hypothesis. The gap in performance between monolinguals and bilinguals narrows more for *language usage* than for *reading.*

This connects to the findings of Bialystok et al. (2010) who found that monolinguals had higher scores on vocabulary tests than bilinguals. Because vocabulary and reading are closely related and this may help explainthe difference in *reading* performance between the monolinguals and bilinguals found in the current study,as this may be connected to the vocabulary differences between the two groups.

The findings connect to Jimenez et al.'s (1996) study because they found that those who were successful in reading comprehension tasksemployed several meta-cognitive strategies, but those who were less successful did not. This suggests that specific techniques should be taught to bilinguals to help improve their reading comprehension skills, because the current study shows their performance to be consistently lower than monolinguals in *reading.*

As discussed by Martinez and Lesaux (2010), English native speakers bring much to the process of learning to read; by about age 6, they have acquired approximately 90% of adult language structures. What such English monolinguals needto do is just learn to recognize printed words which are more likely to be part of their oral vocabulary. On the other hand, forbilingual learners (like Spanish English bilinguals in Martinez and Lesaux's study) school can be considered as the first formal encounter with the English language; therefore, such learners need to learn vocabulary and linguistic structures at the same time,so as to make the meaning of the printed words. Accordingly, it can be said that the difference in the vocabulary size of English monolinguals and bilinguals might affect their performance in *reading* comprehension tests leading to better performance of English monolinguals.

In relation to Peal and Lambert's (1962) and Bialystok's (2009) assertions that bilinguals profit from *mental flexibility,* the result of this study suggests that this mental flexibility does not show itself though increased performance in *language usage* and *reading*, because the monolinguals continue to outperform the bilinguals through until grade 10. Cummins' (1976) threshold hypothesis proposes that students need to reach a lower threshold to avoid cognitive disadvantages and a higher threshold to gain the beneficial effects of bilingualism. In the context of thefast paced educational environment of international middle and high school, it appears that the bilingual students struggle to meet the higher threshold that allowsthem to experience the*cognitive advantages* of bilingualism (Bialystok, 2009).In the school in which this study was carried out, the majority of teachers and students are native speakers of English and this makes it a challenging linguistic environment for the bilingual students. The bilingual students are continually being challenged by more complex linguistic input as they progress through school and they find it difficult to catch up with the monolinguals.

The results show that bilinguals do notexperience a great disadvantage, but apart from *language usage*scores in grade 5, their performance is consistently lower than their monolingual counterparts. This suggests that it may take even longer than from grades 3 to 10 for the bilinguals to develop *Cognitive*

Academic Language Proficiency (CALP).Perhaps it is not until after even more years of immersion in English, such as university studies in an English speaking country the bilinguals develop CALP on par with native speakers, and then start to experience the *cognitive advantages* of bilingualism.

However, in relation to the differences between *early* and *late* bilinguals the findings of previous research are supported by this study.Bialystok and Miller (1999) and Luc, deSa and Bialystok (2011) also found that early bilinguals outperformed late bilinguals on grammaticality judgment tests and tests of English proficiency. These findings relate to the current study because bilingual*sclose the gap* on the monolinguals by grade 5 for *language usage.*This is because that grade contains a cohort of *early bilinguals* who have developed their English skills in their elementary schooling, which supports Bialystok (1999) proposition that it takes 5-10 years to achieve proficiency in CALP.

However, this finding does not support those of Kaushanskaya and Marian (2007) who found that early bilinguals experience bilingual *cognitive advantages* over monolinguals in word learning tasks, because in the current study no*cognitive advantages* for bilingualism were shown in terms of performance in *language usage*and *reading.*Perhaps this is because *language usage* and *reading,* unlike word learning are not the domains in which *cognitive advantages* related to *executive control* are present.

A limitation of this study is that it did not include a non-linguistic measure in order to examine whether bilingualism leads to *cognitive advantage* in other domains. More research is needed into difference in performance between monolinguals and bilinguals on non-linguistic tests such as performance in mathematics, to see whether the *cognitive advantages* of bilingualism transfer themselves to that domain.

A factor to consider in this particular context is that many of the students are Third-Culture Kids (TCKs) who have grown up in a different culture to their passport country and they may have lived in several countries as their families move from one country to another. This means that the quality of the English education they would have received may have varied between the different schools they have attended andthis is not controlled for in the current study. To address this issue, research using a longitudinal rather than a cross-sectional design could be used.

Another factor is that students come from different family background where there is variation in the level of English input and students AoA. A limitation of the study and this is not controlled for in this study, so future research could examine the role of English input and AoA in the home on the development of a student's acquisition of English CALP.

The findings of this study suggest that more support is needed for bilinguals in their schooling. They need to be supported at the transition to middle school, because at grade 5, when middle school starts, they have closed the gap on their monolingual counterparts, but the gap widens out as they progress through middle school to high school. In middle school additional support in English should be targeted at bilinguals to make sure they do not fall behind the monolinguals. This support would allow them to perform at the same level as monolinguals or even outperform them.

Further research is needed to address the influence on English input outside of the school setting on CALP development in bilinguals, and also to see whether cognitive advantages are transferred to domains other than *language usage* and *reading.* More research is also needed into *why* the gap in performance between monolinguals and bilinguals widens after grade 5.

In conclusion, the findings of the current study show that significant differences exist between bilingual and monolingual students in *language usage* and *reading*standardized test scores but these differences *change* over time. As the bilingual students whose L1 is not English are immersed in English education, their performance catches up with their monolingual counterparts by grade 5 for *language usage* but not for *reading*. For *language usage,*monolinguals outperform bilinguals from grades 3 to 4 and grades 6 to 10, but not for grade 5. For *reading* monolinguals outperform bilinguals from

grades 3 to 10 and no *cognitive advantages* to bilingualism were shown in this context.

References

American Psychological Association.(2002). *Ethical Principles of Psychologists and Code of Conduct.* Retrieved from http://www.apa.org/ethics/code/index.aspx

Bialystok, E., & Miller, B. (1999). The problem of age in second-language acquisition: Influences from language, structure, and task. *Bilingualism: Language and Cognition*, 2, 127-145.

Bialystok, E. (2009). Bilingualism: The good, the bad, and the indifferent. *Bilingualism: Language and Cognition 12*, 3–11.

Bialystok, E., Luk, G., Peets, F. K., & Yang S. (2010).Receptive vocabulary differences in monolingual and bilingual children.*Bilingualism: Language and Cognition 13* (4) 225-231.

Cummins, J. (1976). The influence of bilingualism on cognitive growth: A synthesis of research findings and explanatory hypotheses. *Working Papers on Bilingualism, 9*, 1-43.

Cummins, J. (1979). Cognitive/academic language proficiency, linguistic interdependence, the optimum age question and some other matters.*Working Papers on Bilingualism, 19,* 121-129.

Cummins, J. (1981). *The role of primary language development in promoting educational success for language minority students.* In California State Department of Education (Ed.), Schooling and language minority students: A theoretical framework. Los Angeles: Evaluation, Dissemination and Assessment Center, California State University.

Cummins, J. (1984) *Bilingual Education and Special Education: Issues in Assessment and Pedagogy* San Diego: College Hill.

Cummins, J. (1999). Biliteracy, empowerment, and transformative pedagogy. In J. V. Tinajero & R. A. DeVillar (Eds.), *The power of two languages: 2000.* (pp. 9-19). New York: McGraw-Hill.

Cummins, J. (2001). *Negotiating identities: Education for empowerment in a diverse society.*Ontario, CA: California Association of Bilingual Education.

Han, W. (2011).Bilingualism and Academic Achievement.*Child Development 83,* 300–321.

Jimenez, T. R., Garcia, E. G., and Pearson, D. P. (1996).The reading strategies of bilingual Latina/o students who are successful English readers: Opportunities and obstacles.*Reading Research Quarterly. 31*(1) 90–112.

Kaushanskaya, M., & Marian, V. (2007). Age-of-acquisition effects in the development of a bilingual advantage for word learning. *Proceedings of the 32nd Annual Boston University Conference on Language Development*.Cascadilla Press; Somerville, MA.

Luk, G., DeSa, E., & Bialystok E. (2011). Is there a relation between onset age of bilingualism and enhancement of cognitive control?. *Bilingualism: Language and Cognition, 14*, 488-495.

Martinez, M. J., & Lesaux, N. (2010).Predictors of reading comprehension for struggling readers: The case of Spanish-speaking language minority learners. *Educational Psychology 102*(3), 701–711.

Northwest Evaluation Association, (2012).*Measures of Academic Progress.* Retrieved 2nd April 2012 fromhttp://www.nwea.org/products-services/computer-based-adaptive-assessments

Peal, E., & Lambert, W. (1962). The Relation of Bilingualism to Intelligence, *Psychological Monographs*, 76, 1–23.

Rasch, G. (1961). On general laws and the meaning of measurement in psychology, pp. 321–334 in *Proceedings of the Fourth Berkeley Symposium on Mathematical Statistics and Probability*, IV. Berkeley, California: University of California Press.

Appendix A

Table 1.

Descriptive Statistics for Reading and Language Usage Scores.

Variable	Group	Grade	N	Mean	SD
Reading	Monolingual	3	196.66	79	12.836
	Bilingual	3	193.58	48	12.123
Language Usage	Monolingual	3	200.67	79	12.444
	Bilingual	3	197.67	48	13.145
Reading	Monolingual	4	212.94	77	10.612
	Bilingual	4	202.86	50	11.992
Language Usage	Monolingual	4	215.42	77	9.190
	Bilingual	4	206.62	50	12.734
Reading	Monolingual	5	217.33	88	9.450
	Bilingual	5	214.76	51	10.869
Language Usage	Monolingual	5	216.58	88	8.963
	Bilingual	5	216.53	51	9.995
Reading	Monolingual	7	226.62	89	9.174
	Bilingual	7	221.65	63	14.937
Language Usage	Monolingual	7	225.60	89	8.415
	Bilingual	7	221.67	63	12.654
Reading	Monolingual	8	233.87	116	9.954
	Bilingual	8	228.77	62	12.661
Language Usage	Monolingual	8	230.69	116	8.434
	Bilingual	8	228.11	62	10.331
Reading	Monolingual	9	234.70	103	11.761
	Bilingual	9	230.33	82	13.232
Language Usage	Monolingual	9	233.31	103	9.178
	Bilingual	9	230.89	83	10.700
Reading	Monolingual	10	237.35	100	10.171
	Bilingual	10	232.33	72	13.343
Language Usage	Monolingual	10	236.47	100	8.807
	Bilingual	10	233.57	72	11.115