

The Effects of Multilingualism on Reading Speed

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ABSTRACT

Multilingualism is the ability to use several languages with equal fluency by an individual. It has been seen to have various effects on one's academic performance which is connected to reading speed. Through a two-part, mixed-method approach that consisted of a survey related to multilingualism and true experiment (an online reading speed quiz), data was collected from adults ages 30-59 in the United States. Both monolinguals and multilinguals participated in order to determine the effects multilingualism has on reading speed. Upon analyzing the reading speed times of the participants, it was found that multilingualism does not have a significant impact on individuals' reading speed when compared to monolinguals. This study demonstrates that multilingualism may not be the most critical factor affecting academic performance. Among broader implications, a change in education systems to be geared toward advancing reading speed could be highly beneficial.

Introduction

Have you ever wondered why foreign language classes are a prerequisite to graduate high school? Are these classes actually beneficial to high schoolers? Does knowing multiple languages improve a student's academic performance? According to the National K-12 Foreign Language Enrollment Survey Report, 10,632,282 students in grades kindergarten to twelfth grade are enrolled in foreign language courses in the United States (AC, 2017). Additionally, the majority of high schools in the United States require students to pass certain levels of foreign language classes to graduate which is commonly accomplished after at least two academic years. Foreign languages are not only significant during elementary to high school years but they are also crucial in the college application process. Generally, when applying for college, most colleges require students to have taken at least two years of a language. More prestigious schools, such as Ivy League universities, urge applicants to take four or more years of a language. Demonstrating proficiency in a second language is known to strengthen your college application and increase the chances of being accepted into a college. However, does being fluent in multiple languages actually benefit students academically?

Review of Literature

Over the years, the United States has begun to shift its education system towards a new teaching approach called global education. According to Kip A. Cates, an English teacher based in Japan studying global issues in language education, global education is defined as "education that empowers knowledge, attitudes, and skills relevant to living responsibly" (Cates, 2005, p. 1). The goal of global education is to allow students to be able to learn a foreign language while promoting the "knowledge, skills, and commitment required by world citizens to solve global problems" in an effective manner (Cates, 2005, p. 1). This education system places an emphasis on the importance of foreign language classes for the betterment of the world, as foreign language classes have become a requirement in high schools to graduate in the United States. However, other researchers have concluded that a second language can have negative effects on one's life. Richard M. Felder, the Hoechst Celanese Professor of Chemical Engineering at North Carolina State University, stated that language classes have been found to potentially have "unfortunate effects," such as the

development of language anxiety which impacts the quality of learning and attitudes toward the subject (Felder, 1995, p. 1). Language anxiety disrupts the experience of learning and can potentially affect the academic future of students. Thus, there is an uncertainty of whether implementing language classes in schools are beneficial to the students' academic performance.

Current Body of Knowledge

Differences between Monolingual and Multilingual

Previous research by Eve Higby, Loraine K. Obler, and Jungna Kim, researchers in the department of applied linguistics at Cambridge University, analyzed the brain networks of both multilinguals and monolinguals. They found that individuals with the ability to use three or more languages possessed different brain networks from individuals only able to speak two languages at most (Higby, Obler, & Kim, 2013). The right hemisphere of the brain has been found to have greater activation for the L2 (language 2) neural networks than the L1 (language 1) neural networks on several different tasks. Despite this finding, the benefits or advantages of having a certain type of brain network has not received much attention (Higby et al., 2013). The researchers' brain diagrams show that there are explicit differences between monolinguals and multilinguals in brain activation. Similar to this finding, Jared Diamond, a researcher in the geography department at the University of California Los Angeles, also established from his research that there is a clear difference between monolinguals and multilinguals (Diamond, 2010). However, rather than studying brain networks, Diamond focused on the differences monolinguals and multilinguals had in their learning process and abilities. Following a historical analysis of the differences between bilingual and monolingual children, Diamond found that children raised bilingually have far more advantages, such as high vocabulary and cognitive benefits (Diamond, 2010). In addition, Ziyang Yu and John W. Schwieter, researchers in the department of linguistics at the University of California, created an experiment to research the significance of language mode in bilingual work on speech perception, production, and reading. Language mode is defined as "the state of activation of the bilingual's languages and language processing mechanisms at a given point in time" (Schwieter & Yu, 2018, p. 1). Language mode is stated to be important because it defines and shapes the language experience for bilinguals (Schwieter & Yu, 2018). The researchers claim that language has a wide range of impacts on one's everyday life such as academic performance, and they found that bilingual children tend to have higher academic achievements (Schwieter & Yu, 2018). Distinctly, monolinguals and multilinguals have clear differences and it can be seen that multilinguals have greater advantages.

Negative Effects of Multilingualism

According to Dolly Jesusita Young, a researcher specializing in Spanish applied linguistics and second language acquisition, the use of multiple foreign languages have been found to lead to language anxiety. Language anxiety is stated to be a "complex, multidimensional phenomenon" and it impacts students differently depending on their "ethnic background, prior language experience, or learner personality" (Young, 1991, p. 10). This type of anxiety has been found to make language experiences difficult (Young, 1991). Moreover, Yoshiko Saito, Thomas Garza, and Elaine Horwitz, researchers in the foreign language department, supported the idea that foreign languages (FL) negatively affect students as higher levels of FL anxiety results in difficulty of reading and lower grades (Saito, Garza, & Horwitz, 1999). As language anxiety among students has been growing and becoming a more serious issue impacting students' academic performance, a solution to reduce the number of students being affected by language anxiety was strongly recommended (Saito, Garza, & Horwitz, 1999). Lastly, Hanak Ringbom, a professor of English at Åbo Akademi University studying the role of the first language in foreign language learning, stated that L1 mediates the learning of other languages, therefore, causing growing problems in second language learning (Ringbom, 2015). The presence of a first language poses interference in the development of the understanding of another new language thus making it unclear whether multilingualism would truly benefit individuals.

Multilingualism and Academic Performance

An experimental research study conducted by Jasone Cenoz and Durk Gorter, professors of research methods in education, concluded that multilingualism has a great diversity of impacts on education (Cenoz & Gorter, 2010). Cenoz and Gorter studied the background of school children, the language policy of the school, and the sociolinguistic context in which the school is located (Cenoz & Gorter, 2010). While acknowledging the limitations of monolinguals on the possibility of career and financial advantages within the research, Cenoz and Gorter state that multilingualism can improve individual cognitive skills, metalinguistic awareness, and cultural awareness (Cenoz & Gorter, 2010). With this idea, they conclude that schools can contribute to the development of society by educating more students to be multilingual (Cenoz & Gorter, 2010). Similarly, Samantha Fan, Zoe Liberman, Boaz Keysar, and Katherine D. Kinzler, researchers in the department of developmental psychology, also emphasize that multilingualism leads to advances in academic performance (Fan, Liberman, Keysar, & Kinzler, 2016). They revealed that exposure to multiple languages at a younger age allows for an enhancement of the child's communication skills. Thus, advocating for an increase of early exposure of languages within children (Fan, Liberman, Keysar, & Kinzler, 2016). Furthermore, like the previous sources, Benard Oduyo Okal, a researcher in the department of Kiswahili and other African languages at Maseno University, claims that multilingualism in education has had a variety of benefits on individuals. These advantages are the appreciation of "cultural awareness, an increase of academic and educational value, and enhancement of creativity" (Okal, 2014, p. 1). Evidently, multilingualism is found to have many benefits for children and their academic performance. Overall, one could state that multilingualism has a positive impact on the lives of children.

In contrast to the idea that multilinguals have far more advantages, Julia Festman and John W. Schwieter, researchers in the education and language department, examined whether languages affect reading and spelling skills among children (Festman & Schwieter, 2019). According to their findings, monolingual children showed to have slightly higher reading and spelling grades on standardized tests compared to bilinguals (Festman & Schwieter, 2019). However, due to the slight difference, this study concluded that there were no significant disparities in grades of monolingual and multilingual children (Festman & Schwieter, 2019). Thus, this counters the idea that multilingualism provides greater advantages. Additionally, Anna Pot, Merel Keijzer, and Kees de Bot, researchers in the department of applied linguistics, did not find any significant connection between multilingualism and cognitive advantages (Pot, Keijzer, & Bot, 2018). The researchers hypothesized that multilingualism may be one of the contributing factors to enhanced cognitive performance, but found that there were too many uncontrollable factors that could have affected the results (Pot, Keijzer, & Bot, 2018). In another study, conducted by Shelly Ng, a graduate in speech communication at Eastern Illinois University, a Stroop color-word test was conducted to experiment the effects of multilingualism on response time to determine the interference one experiences when using multiple languages (Ng, 1998). Multilinguals were required to identify the color given and their response time was measured. Ng hypothesized that the more languages one spoke, the slower the response speed would be. However, the results suggest that the number of languages one speaks fluently does not affect that person's response speed (Ng, 1998). According to this research, there are no notable differences in academic performance between multilinguals and monolinguals or any significant benefits for multilinguals. In addition, Gregory Poarch, an assistant professor of English linguistics, conducted multiple tests, like the Simon Task, to find the connection between multilingual language control and executive function (Poarch, 2018). Executive function is defined as "the mechanism responsible for cognitive functions such as selective attention, updating information, shifting between sets of information, and monitoring for and resolving conflict" (Poarch, 2018, p. 2). The results conclude that there was "no coherent evidence for a bilingual advantage in executive processing" (Poarch, 2018, p. 9). Overall, the correlation between multilingualism and academic performance is unclear due to the varying conclusions. The inconclusive findings require further research to better understand the relationship between multilingualism and academic achievement.

Call to Research

After examining the research surrounding the effects of multilingualism, there was a clear gap in the research. As previously mentioned, the discussion regarding the relationship between multilingualism and academic performance did not have a clear connection due to the variety of different conclusions. Moreover, the specific skill bilinguals attained to potentially improve academic performance is unknown along with whether multilingualism provides benefits or disadvantages towards individuals. To further research this topic, I decided to analyze the specific reading skill multilinguals obtained to result in a potentially higher academic achievement. According to Timothy Bell, a former language teacher, and an ESP/EAP specialist, reading speed was found to have an impact on academic performance (Bell, 2001). Reading speed is defined as “speeds measured in words per minute on selected texts at a level appropriate to the learners” and is used to measure how fast an individual can read (Bell, 2001, p. 4). Bell’s experiment results showed that those who have the ability to read faster end up with higher academic achievements (Bell, 2001). Since reading is a necessary skill in elementary school to college and beyond, I decided to focus on the impacts of multilingualism on reading speed. Furthermore, the research regarding these two subjects is incomplete, leaving a gap in knowledge concerning how multilingualism truly affects reading speed. Reading speed directly correlates with academic achievement, so I decided to research whether multilingualism has an impact on reading speed to conclude how multilingualism affects academic achievement.

Method Alignment

To examine the relationship between multilingualism and reading speed, I concluded that a two-part mixed-method approach was the best approach for my research. This mixed-method consists of both a survey and a true experiment. Other methods like historical analysis or trend analysis do not apply to my research because research on multilingualism and reading speed has not been experimented before, so there is no trend or past data to analyze. From previous researchers with similar topics as my research, Julia Festman and John W. Schwieter conducted their own experimental research to find the relationship between multilingualism and reading and spelling skills among children enrolled in third grade (Festman & Schwieter, 2019). Spelling and reading tests were administered and the grades provided quantitative data for the researchers to analyze. (Festman & Schwieter, 2019). Similarly, I administered a reading quiz for my experiment to be able to analyze numerical data. Both Festman and Schwieter’s test and my quiz were standardized tests and the numerical scores were organized into categories of words per minute. However, differently from Festman and Schwieter’s experiment, I chose to focus specifically on reading speed due to the research gap of my experiment and administered quizzes to adults as opposed to children. My participants were adults in their 30s-50s because, in the traditional education setting, the majority would have graduated and have completed their learning stage by this age. Experimenting kids does not provide accurate information because they may be currently in the process of learning or mastering a language. Thus, it would be more accurate to test if multilingualism influences reading speed at an age where most people have completed learning. However, participants were under the age of 59 because it was found that when people reach their 60s, memory for information starts declining, therefore, allowing for potential inaccuracy. Also, participants were required to know at least one language: English, because the majority of schools in the United States are taught in English. Moreover, I needed a sample size of at least 44 participants because, in the past experiment related to multilingualism, 44 participants were significant to conclude and analyze the results and provide a stable sample size for the experiment.

In the experimental research study, conducted by Festman and Schwieter, a questionnaire was administered to both students and parents to ask about the background of the languages used (Festman & Schwieter, 2019). I also administered a survey to ask my participants a few questions regarding factors that may affect their reading speed and the general background of the language(s) they use. However, I only needed to give the survey to adults as students are not part of my experiment. I asked a total of 11 questions as these questions would make sure that all the possible factors that might affect reading speed are addressed. My survey questions asked how many languages my participants

were fluent in and what these languages were in order to determine if they were considered monolingual or multilingual. Being fluent in a language was defined as being able to use the language as easily as using English. Then, I asked questions about factors that may have impacted one's reading speed other than multilingualism. These factors included whether participants read consistently in their free time or occupation, whether English was their first language, and whether participants majored in a specific language. Through this survey, I was able to find if there is a relationship between multilingualism and reading speed in contribution to my research. Since my survey may ask for some personal information, I did not ask for any names or any contact information because it may have influenced the answers given. Furthermore, this step was crucial to ensure anonymity. To get the most accurate data, I had all of my participants read the same reading prompt and time them to determine the reading speed. The genre of the reading prompt was fiction so that the possibility of my participants having prior knowledge about the reading was eliminated. Shelly Ng conducted a Stroop color-word test to research more about the effects of multilingualism on response time. During Ng's experiment, the participants had to name the color of the ink as quickly as possible, ignoring the word itself. By timing participants, numerical data was provided and this was significant in establishing an accurate conclusion about effects of multilingualism on response time. Like this experiment, I tested the speed of an individual hence timing my participants was required. Timing my participants allowed me to collect numerical data which is prominent in creating a meticulous analysis. However, since I am researching reading speed and not response time, I will be timing how quickly one can read as opposed to how fast one can react (Ng, 1998). For precision, I gave a short quiz after my participants finished reading the prompt to determine if they fully understood the passage they read. This prevented false data from people that did not fully read or comprehend the passage. To eliminate possible factors that may cause my participants to read faster due to their knowledge of what I am testing, there will be directions before starting the reading that will inform the participants that the reading is timed but there is no need to rush. By conducting a true experiment, I collected the most accurate results through quantitative data. Quantitative data is accurate because a clear analysis can be made with numbers rather than hypothesizing or assuming.

Methods

To collect my data, I administered a survey and reading quiz to adults ages 30-59. The online survey was distributed by link. All participants were adults ages 30-59 that I was familiar with and the survey was sent to them. First, I allowed my participants to choose a location that they are most comfortable with so that I could eliminate the possibility that they may read slower due to different environments. After answering all the questions in the first part of the survey which asked about the general background of the language(s) that participants used, the survey brought the participants to the second part. The second part of my survey consisted of a link and two follow up questions that asked about the reading speed of participants and their quiz grade. The link brought the participants to an online reading speed test. This reading speed test was utilized because this website provided the same reading prompt every time the link was clicked on which is crucial in collecting accurate data. Other sources did not provide the same reading prompt and did not consist of a "Start Reading" and "End" button. These buttons are important to confirm that the reading speed collected is solely the time participants took to finish reading the prompt from beginning to end. Additionally, before starting the reading, the directions state "This is a timed test, but read at your natural pace and do not skim. The timer will start when you click the button." This helps participants to feel a little bit more comfortable in taking this test and reducing stress. After reading, a 3 question reading comprehension quiz was administered through the same website. Any score below $\frac{2}{3}$ was considered failing so I excluded any responses with a failing grade. Then, the reading speed of the participant was provided on the website. After this, participants had to go back to the online survey to answer the last two questions that asked about the score they received and their reading speed. Participants were then able to submit their responses. Conducting both my survey and true experiment online was more convenient because all the data was collected in one document and my participants were able to complete the survey and reading quiz more easily with one link. I also made sure that all my questions were required which means that the participant must answer every question before pressing "submit." This allows me to obtain precise answers and

reduces any assumptions. With my data, I analyzed if there was a relationship between knowing more languages and if that results in faster reading speed or not by categorizing and ranking all the reading speeds. The reading speed category was organized by 5 groups which were 100s, 200s, 300s, 400s, and 500+ categories. The reading speeds of monolinguals were categorized separately from multilinguals and I analyzed whether multilinguals or monolinguals generally had faster or slower reading speeds. Along with this, I also took the average of both monolingual and multilinguals' reading speed to compare if knowing multiple languages impacts reading speed.

Results and Findings

From my survey, I collected 90 responses. Out of those responses, I eliminated 14 responses because they were not in the correct age range and I eliminated another 4 responses because these participants failed the reading comprehension quiz. In total, 72 responses were analyzed.

As shown in Figure 1, 48.6%, 35 responses claimed to only be fluent in one language (English). 37.5% of the participants (27 responses) stated to be fluent in one more language in addition to English (Figure 1). 11.1% (8 responses) claimed to be fluent in more than two languages in addition to English (Figure 1). Lastly, 2.8% (2 responses) stated to have fluency in three or more languages in addition to English (Figure 1).

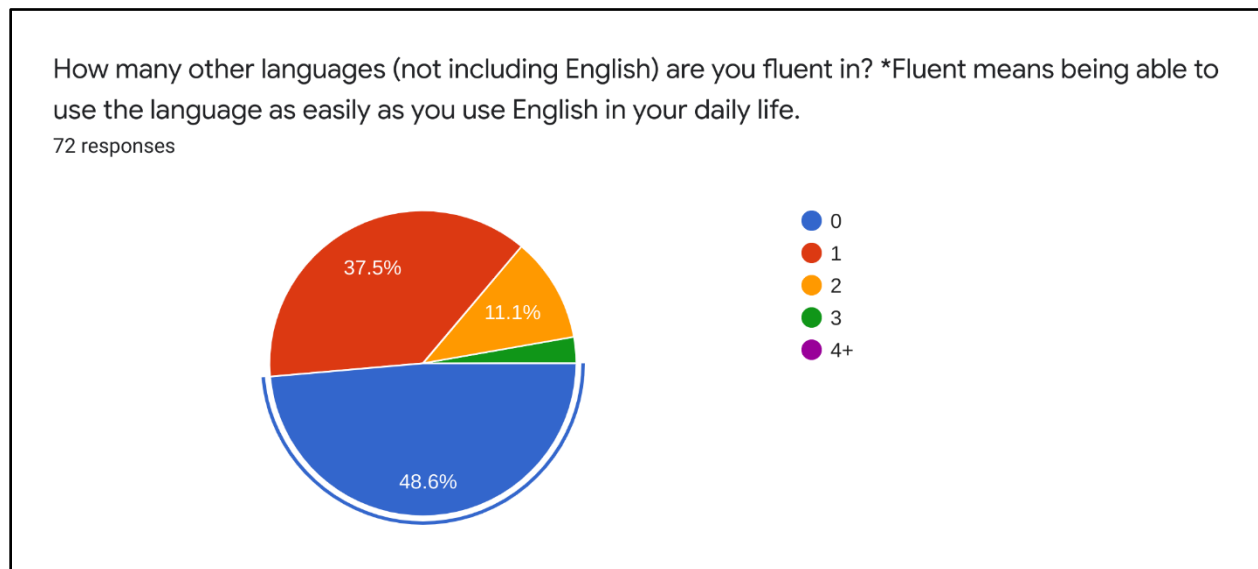


Figure 1. Number of languages the participants are fluent in

Out of my multilingual participants, 23.4% (11 participants) have been found to be fluent in Spanish in addition to other languages (Figure 2). 12.8% (6 participants) have been found to be fluent in French (Figure 2). 10.6% (5 participants) are fluent in German (Figure 2). 8.5% (4 participants) have been found to be fluent in Korean (Figure 2). Another 4 participants (8.5%) are fluent in Dutch (Figure 2). 6.4% of the multilinguals (3 participants) are fluent in Swedish (Figure 2). 4.3% of multilinguals (2 participants) have been found to be fluent in Norwegian (Figure 2). Other languages that multilinguals have been found to be fluent in were Latin, Greek, Welsh, Russian, Mandarin,

Japanese, Hungarian, Arabic, Portuguese, Serbian, Danish, and Slovene, and these languages each had one participant that was fluent in them (Figure 2).

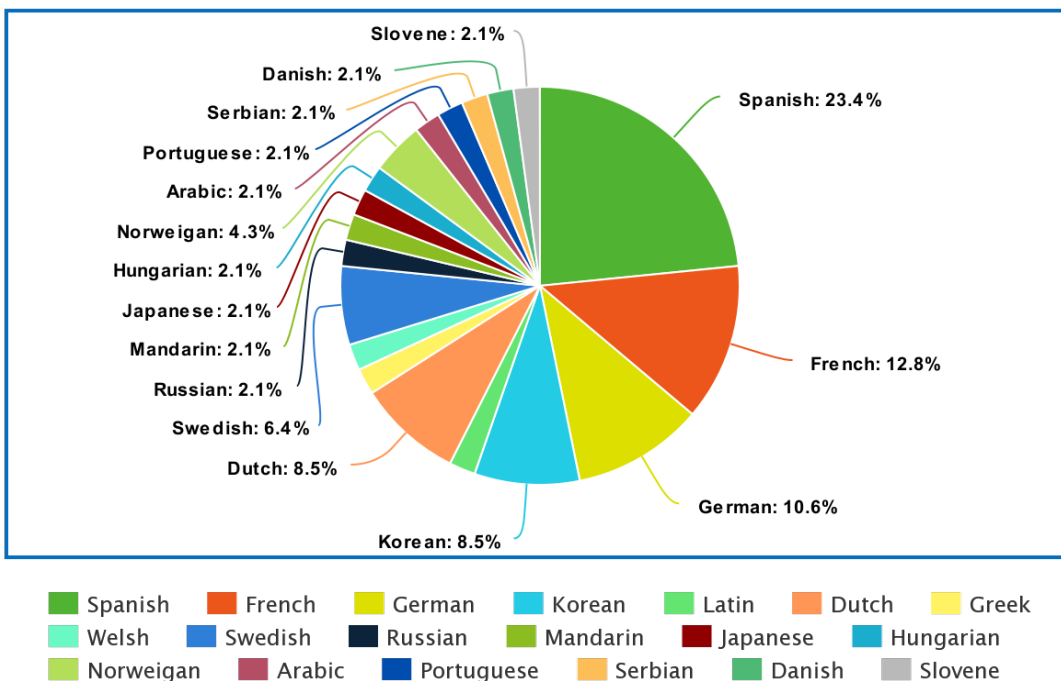
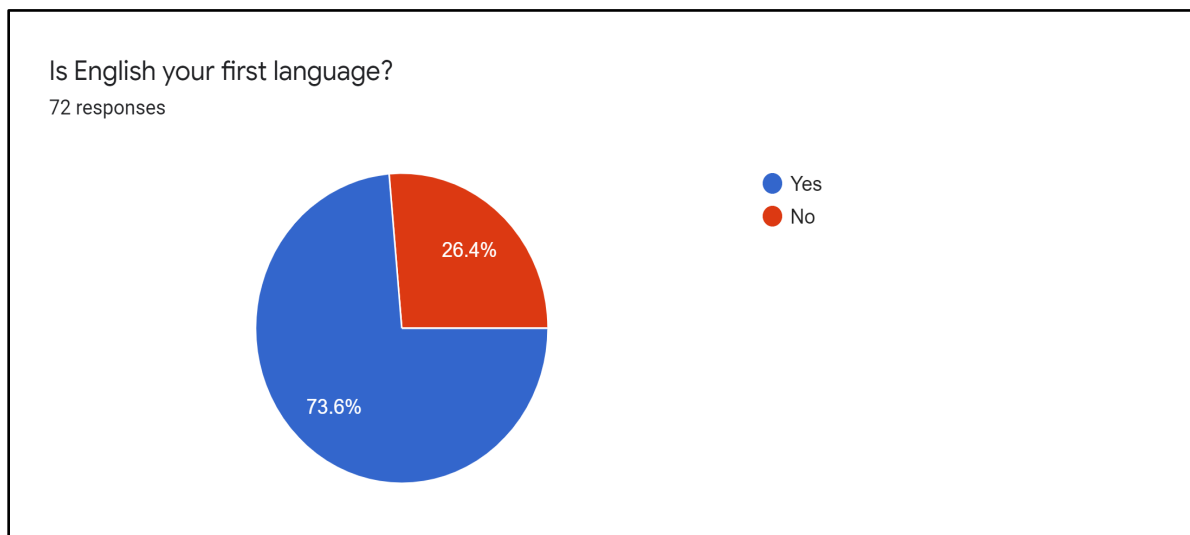


Figure 2. Specific languages the participants are fluent in

According to Figure 3, 73.6% of all my participants stated that English was their first language.



In addition, 88.9% of the entire sample size enjoy reading in their free time (Figure 4).

Figure 3. English as participant's first language

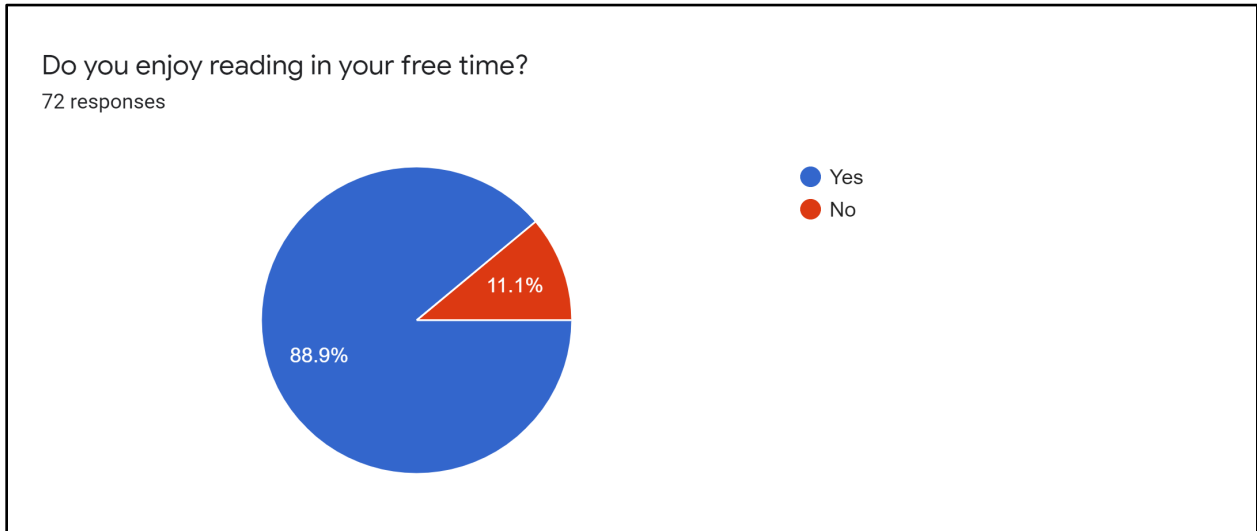


Figure 4. Enjoyment in reading in free time

Furthermore, 54.2% of my participants have an occupation that does not require spending most of their time reading any type of document, paper, book, etc. (Figure 5).

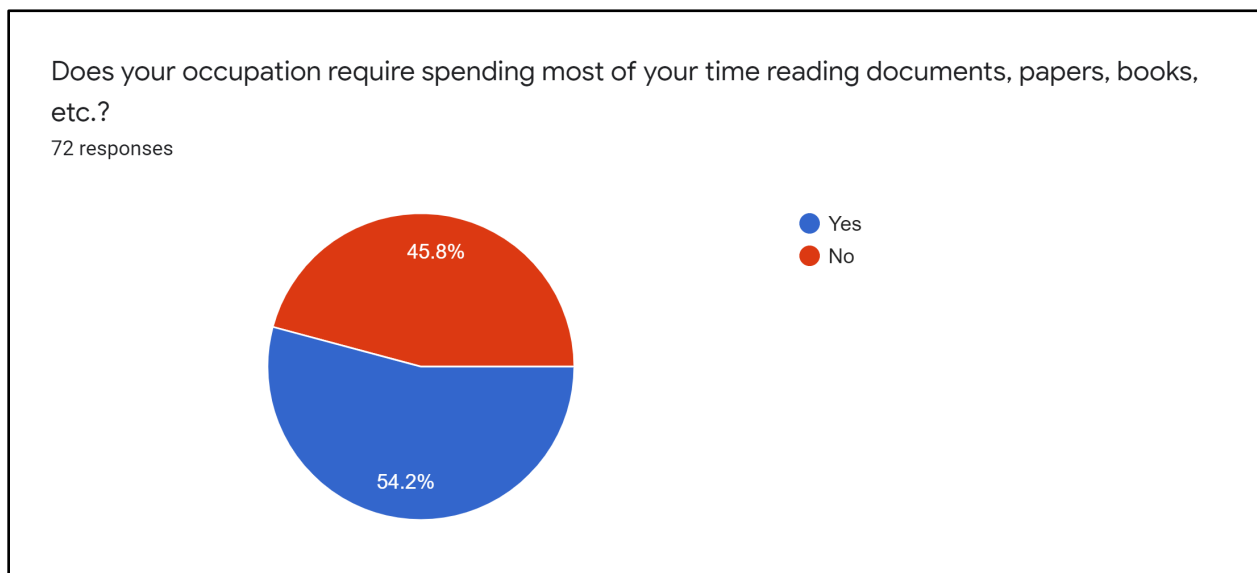


Figure 5. Reading required at occupation

As shown in Figure 6, 83.3% of my participants did not major in a specific language in college.

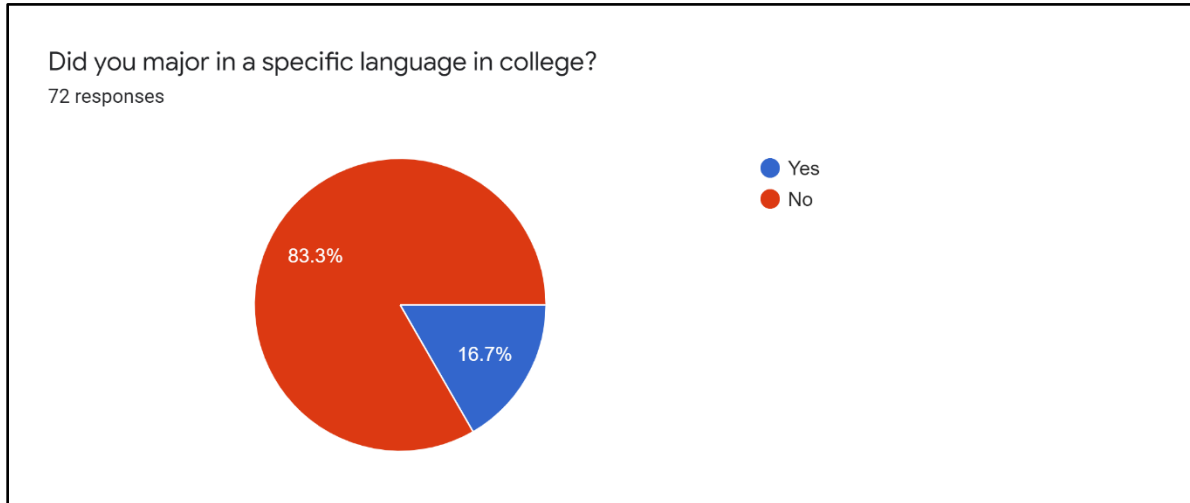


Figure 6. College major in a language

Additionally, as shown in Figure 7, 66.7% of the responses got 100% on the quiz, and 33.3% passed with a $\frac{2}{3}$ on the quiz.

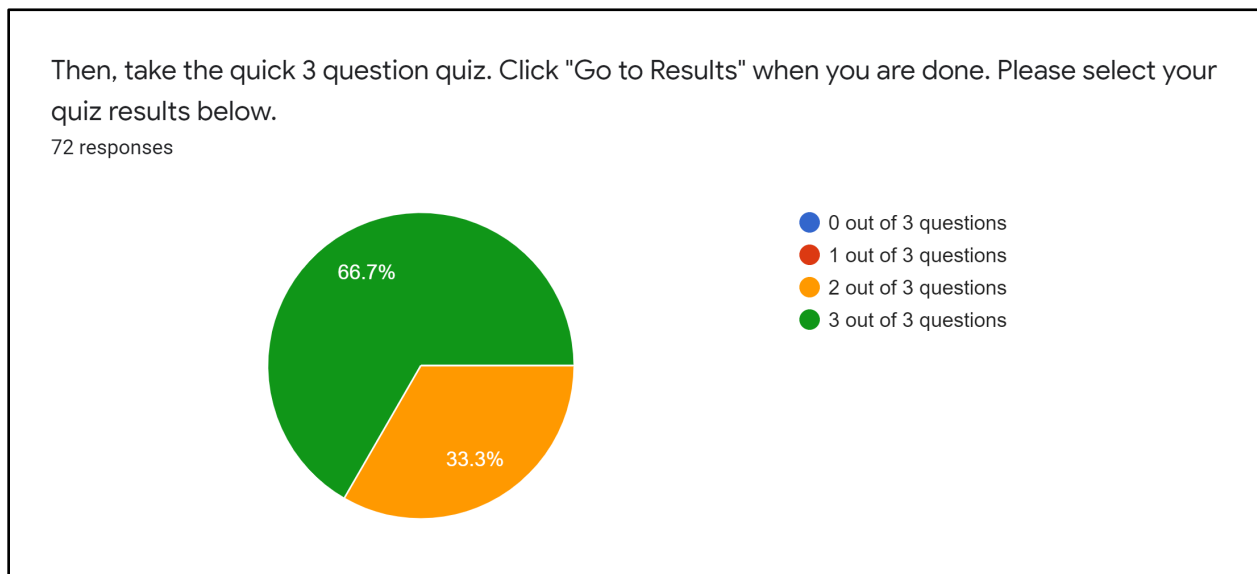


Figure 7. Scores of participant's reading speed quiz

I organized the reading speed of my participants into intervals. Since the majority of the reading speeds were all different values, I grouped them into 5 categories. Every 100 words per minute were a different category. As shown in Figure 8, 15.5% were in the range of 100-199 words per minute. 23.9% had a reading speed in the range of 200-299 words per minute (Figure 8). 26.8% of the participants read 300-399 words per minute (Figure 8). 12.7% had a reading speed of 400-499 words per minute (Figure 8). 21.1% were able to read 500+ words per minute (Figure 8).

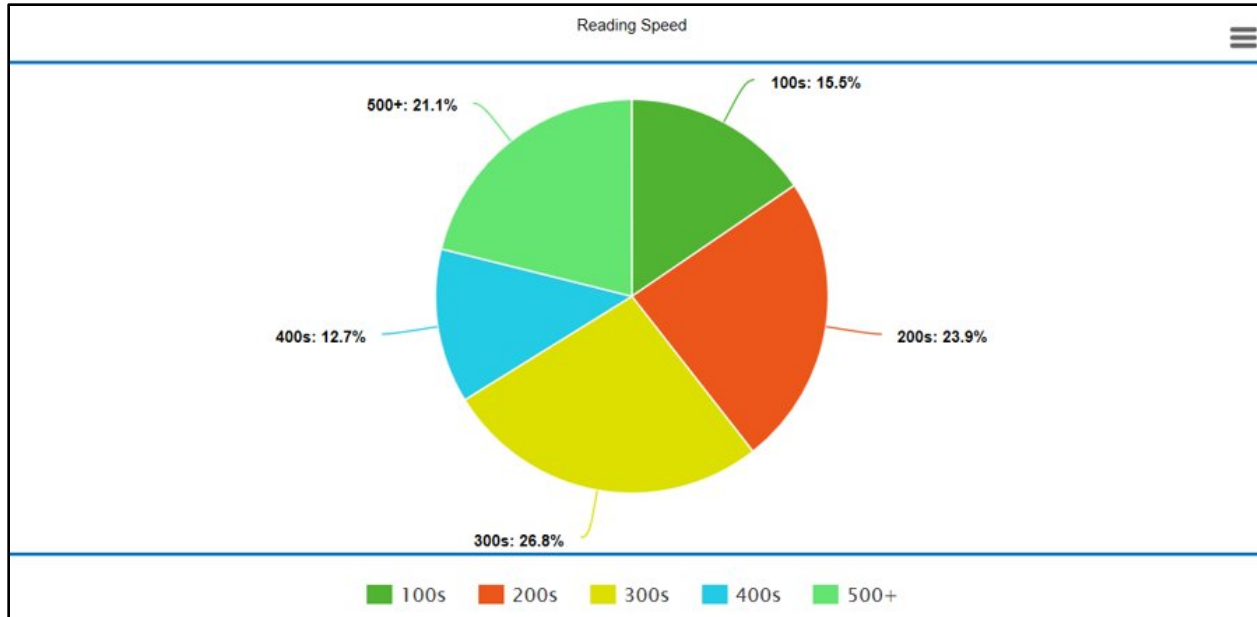


Figure 8. Participant’s reading speed interval percentages
These responses came from participants ages 30-59 that are fluent in at least one language: English.

Analysis and Discussion

After ranking the reading speed of multilinguals and monolinguals, I found that monolinguals had more consistent reading speeds. There were around 7-8 monolinguals in each of the reading speed categories. The reading speed times were consistent meaning that monolinguals have very similar reading speeds and there are no drastic differences among monolinguals. In contrast, multilinguals have been found to have more diverse results. 5 people had a reading speed in the 100s, 10 people had a reading speed in the 200s, 11 people had a reading speed in the 300s, 3 people had a reading speed in the 400s, and 8 people had a reading speed in the 500+. The reading speed of multilinguals was majorly in the 200s-300s category and fewer multilinguals had reading speeds of slower or faster. Generally, my results prove that monolinguals have an advantage in reading speed consistency and more monolinguals scored faster reading speeds such as the 400-500+ category when compared to multilinguals. After calculating the averages all the reading speeds and comparing, there was no significant difference in the averages. Multilinguals had a reading speed average of 351.2 words per minute and monolinguals had a reading speed of 351.1 words per minute. This shows that when looking at the average reading speeds between monolinguals and multilinguals, multilingualism doesn’t have a significant impact on reading speed when reading in English. As aforementioned, there was a significant difference in reading speed consistency between monolinguals and multilinguals and a greater amount of monolinguals received faster reading speeds. However, the reading speed averages between monolinguals and multilinguals were very similar and had almost no significant difference. From my analysis, it can be stated that multilingualism may hinder the reading speed of students even if the averages have no significant differences. Monolingualism may allow for a greater number of students to have faster reading speeds compared to multilingualism. However, foreign language classes should still be enforced in the education system as multilingualism did not have significant negative impacts on one’s reading speed and foreign languages may have positive effects on one’s life outside of academics.

Limitations

A significant limitation of my survey could be that the environment of my participants when taking my survey was all different; thus questioning the outside factors that may influence the results. However, I allowed all my participants to choose a location they are most comfortable with prior to the survey so that the possibility of outside influences may be reduced. Another factor may be that since the education status of my participants is unknown, it is unclear whether this may affect their reading speed. Furthermore, it is unclear whether other factors may have influenced reading speed other than multilingualism. I tried to address this by asking other questions in the survey about the time the participants take reading daily or in their free time, etc., however, I did not find any factors that may have influenced reading speed. Because of the number of possible influences, it is unknown whether multilingualism is the only factor that influences reading speed. Also, it is impossible to know how much of the reading prompt my participants actually read. This could be a limitation as this factor could have altered my results. Furthermore, in my data, I found that most of the languages that people used were very repetitive, this could be a limitation as there is not a wide variety of different languages. Languages used were mostly Spanish, French, German, Korean, and Dutch. Additionally, my survey and reading speed test were only administered to people that I know in order to ensure my safety. However, this was a limitation as the people that I know are not from all regions of the United States.

Implications

Implications of my research would significantly contribute to the education system of schools in the United States. According to my research, multilingualism may not be useful for improving one's reading speed, which is tied to academic performance in various subjects. However, foreign language classes should still be enforced in the education system as multilingualism did not have significant negative impacts on one's reading speed. In addition, foreign language classes may have benefits towards students in other aspects other than academically such as culturally and socially. Knowing how to speak multiple languages allows one to connect with individuals from all over the world and be more knowledgeable of all the different cultures. Due to this, schools may want to change their education system to focus on reading speed first before mastering a language. Courses created specifically to help students with reading speed may be offered to students before foreign language classes so that students can start learning a new language with strong fundamental reading speeds. Conversely, schools could also implement foreign language classes with the addition of classes specifically designed to focus on students' reading speed so that both languages and reading speed could be improved at the same time. As another alternative, schools can alter foreign language courses slightly in order to include a focus on reading speed while teaching about the languages. This course could help students learn a new language while developing faster reading speeds in the same class. By doing this, schools will be able to improve their education systems for the betterment of the students both academically and culturally. Furthermore, during the college application process, colleges may consider multilingualism as a factor that defines one's cultural diversity and social abilities. As it is proven that multilingualism does not majorly impact an individual's academic performance, colleges can acknowledge the applicant's strength of being able to be fluent in multiple languages as the applicant's strength in other aspects aside from academics.

Conclusion

Multilingualism has been proven to have very little significance in influencing reading speed. Thus, leaving me to hypothesize that multilingualism also has very little influence on academic achievement due to the aforementioned conclusion made by Timothy Bell that reading speed directly impacts academic achievement. Future researchers should take into consideration my limitations of a limited scope and research on the validity of reading speed on

academic achievement. Future researchers may want to research in-depth how multilingualism affects individuals' everyday lives outside of academics such as culturally or socially. Additionally, follow up questions such as how children are affected by multilingualism and whether multilingualism affects adults and children differently can be addressed along with whether multilingualism affects people differently in other countries.

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