

DIFFERENCES IN HIGH-SCHOOL STUDENT LEARNING BY INSTRUCTION TYPE AND
MBTI PERSONALITY TYPE

by

Jeffrey Ober

Liberty University

A Dissertation Proposal Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University

2018

DIFFERENCES IN HIGH-SCHOOL STUDENT LEARNING BY INSTRUCTION TYPE BY
MBTI PERSONALITY TYPE

by Jeffrey Ober

A Dissertation Proposal Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University, Lynchburg, VA

2018

APPROVED BY:

Wesley L. Scott, Ed.D, Committee Chair

Andrew Hanson, Ph.D., Committee Member

Michael Patrick, Ed. D., Committee Member

ABSTRACT

Differentiated instruction is a part of the education process today, and it is a time-consuming process used to attempt to reach more students and increase their learning and education. There is currently little empirical research dedicated to measuring the academic effects of differentiated instruction in the classroom. This research examined differentiated instruction in the form of learning styles (audio and visual) combined with personality types in an attempt to determine if there is a measurable significant effect on the academic achievement of students based on their own personality types and different applied learning styles in the classroom. No statistically significant differences were found between different personality types and instruction types.

Keywords: differentiated instruction, learning styles, Myers-Briggs personality types, introvert, learning methods

Table of Contents

ABSTRACT	3
List of Tables	6
List of Figures	7
List of Abbreviations	8
CHAPTER ONE: INTRODUCTION.....	9
Overview.....	9
Background.....	9
Problem Statement.....	14
Purpose Statement.....	15
Significance of the Study.....	16
Research Questions.....	17
Definitions.....	17
CHAPTER TWO: LITERATURE REVIEW.....	19
Overview.....	19
Theoretical Framework.....	19
Related Literature.....	22
Summary.....	48
CHAPTER THREE: METHODS.....	49
Overview.....	49
Design.....	49
Research Questions.....	50
Hypotheses.....	50
Participants and Setting.....	51
Instrumentation.....	51
Procedures.....	53
Data Analysis.....	54
CHAPTER FOUR: FINDINGS.....	55
Overview.....	55
Research Questions.....	55
Hypotheses.....	55

Descriptive Statistics.....	56
Results.....	58
Results Summary:	72
CHAPTER FIVE: CONCLUSIONS	75
Overview.....	75
Discussion.....	75
Implications.....	78
Limitations	79
Recommendations for Future Research	80
Conclusion	81
REFERENCES	82
Appendix A.....	102
Appendix B.....	104

List of Tables

Table 1: Personality descriptive statistics	56
Table 2: Instruction type descriptive statistics	57
Table 3: Combination group descriptive statistics	57
Table 4: Personalty type analysis.....	60
Table 5: Instruction type analysis	61
Table 6: Combination group analysis	61
Table 7: Personality type Kolmogorov-Smirnov	62
Table 8: Instruction type Kolmogorov-Smirnov	62
Table 9: Combination group Kolmogorov-Smirnov	62
Table 10: Levine's Test for personality type	65
Table 11: Levine's Test for instruction type.....	66
Table 12: Levine's Test for combination groups	66
Table 13: Instruction type descriptive statistics.....	67
Table 14: Between-Subject effects for instruction type.....	67
Table 15: Pairwise comparisons for instruction type.....	68
Table 16: Personality type descriptive statistics	69
Table 17: Between-Subject effects for personality type	69
Table 18: Combination group descriptive statistics	70
Table 19: Between-Subject effects for combination groups.....	70
Table 20: Pairwise comparisons for combination groups.....	71

List of Figures

Figure 1: Personality type linear assumption graph.....	58
Figure 2: Instruction type linear assumption graph	59
Figure 3: Combination group linear assumption graph	60
Figure 4: Personality type homoscedasticity charts.....	63
Figure 5: Instruction type homoscedasticity charts	64
Figure 6: Combination group homoscedasticity charts	65

List of Abbreviations

Myers-Briggs Personality Type Indicator (MBTI)

CHAPTER ONE: INTRODUCTION

Overview

Learning methods have been used in various forms in an attempt to reach students in academic settings for decades. There is little research to support the idea that increased academic achievement is realized by using differentiated learning methods. This research examined differentiated learning methods in conjunction with personality types to determine if there is an interaction and a potential way to use learning methods to achieve higher academic achievement.

Background

Differentiated instruction in the form of different learning methods is a trend in many educational settings that is used to attempt to increase the learning occurring in the classroom. It is used in grade school from the time students start in kindergarten (Al Otaiba, et al., 2011). These ideas are being taught in teacher education classes (De Neve, Devos, & Tuytens, 2014) and teacher in-service instruction (Dee, 2011). There is little research to indicate that the idea of differentiated instruction actually helps increase test scores and learning in the classroom.

Historical Overview

Differentiated instruction has been successful for increasing learning in a few narrow instances. Deaf students who had difficulty learning using traditional methods were taught using differentiated instruction and technology (Shepherd & Alpert, 2015). This research showed that students who were unable to learn with traditional methods were able to learn more by integrating differentiated instruction into their learning schedule. For this research, the differentiated instruction primarily involved adding computers and technology to the learning

process. This method may have worked well because the students were pre-selected as students who were not already learning effectively by using traditional learning methods.

Darrow (2015) found differentiated instruction to be successful in music education. In this research, the students were also disabled students who were not learning successfully using traditional learning methods. Researchers worked with students here who had no arms or legs and practiced learning music with computer applications. The students composed music that was performed by the high school orchestra, allowing the student to participate in the orchestra in a significantly different way from the typical high school student. This showed that a very limited application of differentiated instruction can be successful when used on a narrow, targeted section of students that is not already successfully learning using traditional learning methods. It also showed that the applications of differentiated instruction can be very different from traditional expectations. When differentiated instruction includes different focus and different tasks with different goals, it can be applied effectively to help include more students in the process of learning.

When asked, students will show an individual preference for a specific learning style (Ali, 2011). This research showed that students have a way that they would prefer to learn, and that research simply backs up common sense: nearly anyone who is asked would say that they have a preference for simple learning styles like audio (hearing) or visual (seeing) learning and teaching methods. This research was completed not to determine if the styles are effective or not, but was instead done to help students understand how they learn individually and help them continue to learn using those methods. In other words, this research showed that students can actually take any teaching method and effectively adapt it to their preferred learning style to ensure that they are learning.

Reiner and Willingham (2010) have suggested that learning styles are actually a myth and that students will find ways to learn despite the different methods that are used to teach them. Their research indicated that the measures of effectiveness in learning are more a factor of the motivations and backgrounds of the students than the way the information is presented to the students. Their research indicated that students do learn differently, but it is simply impossible for a teacher of any number of students to adjust their learning methods in a way that would be effective for students to learn more effectively.

The Myers-Briggs Personality Type Indicator (MBTI) was developed in 1962 by Myers (1962). This work was an extension of the work of Jung (1921) that suggested that individuals have different parts of their personality that affects how they see and view the world. This work suggested that individuals could be categorized into different groups and that individuals who were members of those groups would have similar characteristics and views on the world. The MBTI has been used in various studies since that time, including screening for jobs and attempts to predict future actions of individuals. This examination is a questionnaire that attempts to divide people into one of 16 different types.

The personality types have been used to determine how individuals will relate to one another in personal relationships (Honeycutt & Keaton, 2012), and even to determine how individuals will perceive commercial offers (Walczak & Borkan, 2016). Personality types have been related to professional career positions (Cohen, Ornoy, & Keren, 2013), showing a direct correlation between measured personality types and personal selection of professional careers. These types have also been used to compare and relate different types of adult learning experiences (Daisley, 2011).

Society at Large Discussion

Differentiated instruction today is implemented and taught in teacher education programs as an effective way to reach students with educational ideas (Dee, 2011). These teachers are taught that differentiated instruction can be used when teaching all groups of students because the more the instruction can be differentiated, the more chances that different students will have a chance to learn that subject or topic. Some schools even have entire departments and individuals who are responsible for ensuring that differentiated instruction is included in all classrooms and by all teachers (Cha & Ahn, 2014).

The effects of differentiated instruction are being studied in middle school (Little, McCoach, & Reis, 2014), elementary school (Chien, 2015), and kindergarten (Al Otaiba, et al., 2011). The results of these studies show that differentiated instruction can be implemented in different settings and by different people. Research does show that differentiated instruction can get students more engaged in classes (Kizas, 2016), but there is little current research showing the direct educational benefits of differentiated instruction in the classroom.

Rogowsky, Calhoun, and Tallal (2014) completed research attempting to match students' preferred learning styles and teaching methods. They found that there was no statistical significant influence on educational learning based on learning styles, even when the students were taught using the methods they preferred. Additional research has attempted to develop a mesh of different learning styles in an effort to increase education and learning (Andres & Akan, 2015). This research found that there may be significance to teaching using a blend of different learning methods, similar to what many teachers do in the classroom today.

Research has also shown that interacting with different types of teaching methods may show preferences from the point of view of the student. Johnson and Cooke (2014) showed that students preferred to include audio feedback when receiving grades from an online class. This

research did not show any concrete educational increases in performance, but did show that the type of method used could influence the perceptions of the students.

The MBTI has been used to research and help determine how different fields of study tend to attract certain different MBTI personality types (Cohen, Ornoy, & Keren, 2013). These same personality types help show how a person views and interacts with the world, so it makes logical sense that people with similar views on the world around them would tend to gravitate to similar positions and similar career aspirations. Some careers work with MBTI tests to attempt to screen out different MBTI types that might not fit with that career.

These different personality types have been compared to personal preferences in learning styles (Conti & McNeil, 2011). This research showed that while personality types might lead toward showing a person's learning strategies and might describe how a person can learn, there is no direct relationship between the MBTI and personal learning style types. These personality types can describe how a person learns, but does not appear to limit them from learning using other methods.

Conceptual Framework

Differentiated instruction has continued to expand and be used in teaching applications because it simply makes sense to individuals. Each individual is different and nearly every teacher wants to reach every individual. If a teacher believes that by adding a few different types of instruction that they will reach more students, then they will work to add that instruction in the hopes of reaching more students.

Learning styles are also apparently logical. When an individual is asked if they have a preferred way to learn and be presented with new material, many people will indicate a clear preference. As seen by the various research outlined here, there is no research-based evidence to

to suggest that these learning styles are required, or that they support higher academic success. Instead, it appears that individuals manage to learn whether they are presented with their preferred method of learning or not.

The MBTI describes how an individual sees and interacts with the world around them. This personality type can describe a person and how they work. If the MBTI can be combined with specific learning methods, regardless of the individual's preferred learning style, there may be an effective way to reach more students that can be applied in a uniform manner to maximize teacher time and effort in a way that helps increase learning.

Problem Statement

The problem is that while research suggests that differentiated instruction should be integrated into the classroom and into the philosophy of teaching for all teachers (Benjamin, 2006), there is little quantitative research showing the practical effects and results of differentiated instruction and the interaction with personality types. Reiner and Willingham (2010) suggest that there is no current research that shows there is an academic benefit to differentiated instruction in the form of learning styles. Proponents of the integration of differentiated instruction back up their suggestions with ideas, but little academic research supports the idea that differentiated instruction can effectively increase educational ability for all students.

Learning styles can indicate how students will perceive different types of learning and feedback based on that learning (Cavanaugh & Song, 2014). This research shows how different people will perceive the feedback and how students with different learning styles prefer different types of feedback, but it does not show how these different learning style preferences can lead to different outcomes in education and educational ability. These different learning styles can even

be applied to students' preferences in sporting activities (Braakhuis, Williams, Fusco, Hueglin, & Popple, 2015), but there is no clear evidence in that research to indicate there is any increases in educational learning or ability.

Myers-Briggs personality types have been used to help predict different strategies that students use to learn in the classroom (Ginevra, Nota, Heppner, Heppner, & Soresi, 2014). These types can also be related to teachers and the methods that different teachers use when instructing students (Zafarghandi, Salehi, & Sabet, 2016). The Myers-Briggs personality type has been in use since 1962 (Myers, 1962), yet it is still used in current studies and more is being learned about how those internal personality types of individuals affect how they interact with the world around them. It may be easier for certain individual personality types to learn using methods that help them see and understand the world around them.

Purpose Statement

The purpose of this study was to determine if specific applications of differentiated instruction can be applied to different personality types resulting in a measurable increase in learning. For this study, the types of learning methods to be used for the differentiated instruction will be two common and unique learning methods: audio and visual. Some students will indicate that they have a preference for one of the learning methods over the other. This research attempts to combine those different teaching methods in an experimental environment and then combine those teaching methods with personality types, using just the introvert/extrovert scale on the MBTI test. This study attempts to measure how students perform in the different teaching environments. The study also attempts to examine if there is any difference between introverts and extroverts (according to MBTI) academic scores. The study

also looks to see if there is any interaction between the personality types, teaching methods, and academic scores.

For this study, the post-experiment test score is the dependent variable; the learning method used and the student's personality type are independent variables; and the pre-experiment test score is the covariate. The population for this study includes all the high school students at a private Christian high school, which includes grades nine through twelve.

Significance of the Study

Knowing your own personality style can help understand how you learn (Alecú, 2011). Identifying preferred learning styles can also help a person know where they have strengths and weaknesses in problem-solving strategies (Metallidou & Platsidou, 2007). Combining these two strategies and thought processes may help an individual understand how they are able to learn new ideas and topics. Armed with this information, an individual may be able to determine which methods to use on their own, outside formal learning settings, to most effectively make use of their own time when attempting to learn a new concept.

Personality types have also been closely related to careers in teaching (Wong & Zhang, 2014). The MBTI personality type has also been related to differences in evaluations and perceptions of teaching and the classroom (Bell, et al., 2011). Research has also been completed to determine how to effectively reach both introverts and extroverts in the classroom environment (Martin E. L., 2014).

Differentiated instruction can be time-consuming to promote and effectively use in the classroom (Cha & Ahn, 2014). If differentiated instruction is not effectively increasing the educational process and resulting in educated students, is this a wise use of the time for the teacher and the administration? This study proposes to add additional information to the field in

the area of differentiated instruction as it relates to specific types of teaching and to specific types of student personalities.

Research Questions

RQ1: Do the academic scores on Biblical knowledge tests for high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

RQ2: Do the academic scores on Biblical knowledge tests for high school students differ for students with introverted and extroverted personality types?

RQ3: Do the academic scores on Biblical knowledge tests for introverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

RQ4: Do the academic scores on Biblical knowledge tests for extraverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

Definitions

1. *MBTI* - Myers-Brigs Personality Type Indicator. This is a classification of a personality type developed by Myers (1962) and based on Jung's (1921) personality classifications.
2. *Learning Styles* - These are proposed different styles that individual use in training their mind to learn and understand new ideas (Lauria, 2010).
3. *Differentiated Instruction* - This is the theory that individual students will learn in different ways and therefore different types of teaching and instruction should be used in order to reach as many students as possible (Scigliano & Hipsky, 2010).
4. *Introverts* – These are individuals who have a tendency towards inward flowing of energy, who learns and focuses more on the self than on others (Jung, 1921).

5. *Extroverts* – There are individuals who have a tendency towards outward flowing of energy, who learns and focuses more on others and things around them than themselves (Jung, 1921).

CHAPTER TWO: LITERATURE REVIEW

Overview

In the field of education there has been much discussion around the idea of differentiated instruction and teaching to different types of students. This literature review will be limited to including works published on the subjects of differentiated instruction, learning styles, and personality types from the years 2006 to 2016 and will only be concerned with scholarly publications including journals and conference proceedings both in print and on-line.

Theoretical Framework

Learning Styles

Learning styles are simply a preference that a person will state in relation to how they prefer to receive new information (Hatami, 2013). Each individual may indicate a preference for the way that they prefer to learn new information. People often indicate a preference for one type, such as audio, visual, or even kinesthetic. Even when people do not make a specific indication, that preference can often be observed by looking for different phrases like, “I can only learn directions when I take the trip.” These different preferred learning styles can be addressed in the classroom by using differentiated instruction, an attempt to teach different ways to different students in order to reach more students effectively with the instructional material.

The most common type of learning style identified for business students is visual learning (Shoemaker & Kelly, 2015). Middleton (2016) suggests that audio interfaces are required for learning and will substantially increase the learning and study environment for students. Fleming and Mills (1992) suggest that the most common learning styles are visual, auditory, kinesthetic, and read/write. The most commonly used of these different types of learning styles in education today are audio and visual (Cuevas, 2016).

A wide variety of individual learning styles can be expected in any given classroom (Gyanchandani, 2013; Obralic & Akbarov, 2012). Some students will have a preference for a learning style in certain majors, but other students with different learning styles are clearly present in standard classrooms (Obralic & Akbarov, 2012). This research also showed that the entire range of preferred learning styles is likely to be encountered in any given classroom.

Theories of Differentiated Instruction

Researchers have suggested there are different ways that can increase the use of differentiated instruction using tools such as Internet blogs (Colombo & Colombo, 2007). This is an example of the different ways that promoters of differentiated instruction have attempted to apply differentiated instruction in the classroom. Using these different types of instruction has not provided any measurable increase in learning. While the researchers suggested that the Internet could be used as a way to increase differentiated instruction, they did not include any evidence that the increase in differentiated instruction would result in increased test scores or increased learning outcomes.

Parsons, Dodman, and Burrowbridge (2013) suggest that differentiated instruction will work if the ideas and concepts are expanded beyond just lesson planning. This example also looks at new and different ways to implement differentiated instruction. The researchers propose that because differentiated instruction is not fully implemented in all aspects of the classroom and classroom preparation, the differentiated instruction is not working as well as it could be working. This research is not supported with any evidence of how the increased use of differentiated instruction will increase the learning outcomes of the students. This research simply focuses on the expansion of the idea of differentiated instruction.

Research also suggests that differentiated instruction may help students with different backgrounds succeed in the classroom (Logan, 2008). While this research does suggest that differentiated instruction can make a difference in some instances, this research is very narrowly defined and does not appear to be applicable to larger population groups. These backgrounds of the students may have an effect on the personality types and personality preferences of the students, but there is no clear relationship between the two in this research.

The implementation of differentiated instruction varies by teacher, school, and physical area. Some university instructors are integrating differentiated instruction in their classrooms, while others are not (Williams-Black, Bailey, & Coleman Lawson, 2010). Some of these instructors appear to believe the differentiated instruction is helping create a better classroom environment, but there is no clear evidence of an increase in learning or learning outcomes in these classrooms. There is also no evidence that the university classrooms in this research that do not use differentiated instruction have any different learning outcomes when compared to those who do use differentiated instruction.

Benjamin (2006) suggests that differentiated instruction is not working simply because it is not being used and emphasized enough. This research suggests that differentiated instruction should be used in more classrooms and should be integrated into curriculum and teacher education courses. With a more complete integration there is potential for a greater effect but there is still no direct evidence that even a complete integration will have any direct, measurable effect on the student learning and learning outcomes at any level of education.

Myers-Briggs Personality Type Indicator

The original ideas of the concept of personality type can be traced back to the works of Jung (1921). These theories were further refined by Myers (1962) to define the Myers-Briggs

type indicator (MBTI) personality measure. The first indicator of this type is the index EI type, indicating a preference between extraversion and introversion. In general, the preference towards extraversion is related to external thinking and processing of thoughts, ideas, and interactions with others. The person with a preference for extraversion often prefers speaking out loud to thinking quietly. The introversion preference relates to thinking, processing, and interactions that generally occur internally, or nonverbally, for the individual. The person with a preference towards introversion often prefers thinking quietly to outward, verbal interaction with other individuals.

Related Literature

Learning Styles

Scigliano and Hipsky (2010) suggest that differentiated instruction and learning styles can be confusing and expensive, but it can be applied more narrowly to make it more effective and useful. There are large volumes of information that have been written suggesting differentiated instruction and describing ways that differentiated instruction can be applied in the classroom. Implementing differentiated instruction in the classroom can be expensive and time-consuming. There is little research that has been done to determine how effective this type of instruction can be in the classroom and whether it actually increases the educational outcomes or experiences.

Preferences. Teachers can indicate a preferred learning style and a preferred teaching style. There is no relationship between learning styles of teachers and students and learning outcomes (Berry & Settle, 2011). When the teachers used their own preferred learning styles with students who had the same preferred learning styles, it was expected that there would be

increased learning. This research indicates there was no measurable increase in the learning or learning outcomes when these methods and combinations were applied in any combination.

Pashler, McDaniel, Rohrer, and Bjork explain that while students will always express a preference to a specific learning style, there is little evidence to indicate that these preferences can be related to successful learning outcomes (2009). This is an area where what appears to be common sense cannot be backed up with concrete research. While nearly every person can clearly state the way that they would prefer to learn, that does not appear to matter in the educational process when considering academic outcomes. Students appear to learn the new material at the same rate as other students in the classroom, no matter what method they indicate they prefer to be used for teaching them or what method is actually used.

In an attempt to more accurately measure learning styles, learning style scales have been developed that can accurately measure learning styles for individuals (Abdollahimohammad & Ja'afar, 2014). These studies show that the idea of the learning style is concrete and measurable for each individual: individuals can show a clear preference for specific different styles of learning. Research by Ali (2011) has indicated that when students have a preferred learning style, they are capable of learning how to use other, different learning styles despite their preference.

Research has shown that student demographics have a significant influence on preferred learning styles (D'Amore, James, & Mitchell, 2012). For example, female students have been shown to have more observational learning skills than males (D'Amore, James, & Mitchell, 2012). Engineering students strongly prefer visual learning styles over audio learning styles (Hill, Tomkinson, Hiley, & Dobson, 2016). When demographics are combined with disciplinary backgrounds, there are further correlations between learning styles and learning style preferences

(Hill, Tomkinson, Hiley, & Dobson, 2016). For example, engineering students are noted to have significantly different learning styles than those of social science students (Gyanchandani, 2013). Research has not clearly identified if the source of this preference is ingrained in the students and their personalities or if the differences are a result of students selecting disciplines based on their own preferred learning styles.

Graduate students show a preference away from group learning styles (Naserieh & Sarab, 2013). Graduate students tend to have a different view on education and on learning. These students illustrate a different style of learning, and that can help illuminate a difference in the perceptions of learning and how learners who are advanced in their skills view the educational process. This study specifically examined Iranian graduate students who were attempting to learn another language, English. The results showed that a significant number of students had preferences for auditory styles, visual styles, kinesthetic styles, and tactile styles; but overall had a significantly lower preference for group learning methods. When adjusted for field of study, there were significant differences in preferences with those in technical fields preferring tactile methods while those in more social science fields did not have as strong feelings towards tactile methods.

Learning styles of students does not appear to have an effect on the preferred methods of receiving instruction using multimedia (Ocepek, Bosnic, Nancovska, & Rugelj, 2013). By some measures of learning styles, multimedia can be considered a single learning style method. When students are presented with this single method of instruction, the students appear to adjust to the teaching style and their own preferred learning style does not appear to determine their ability to receive the information and instruction.

Student perceptions of tools such as audio books can be related to their own preferred learning styles (Gray, David, & Liu, 2012). This is a strong indicator that the student's learning styles can be related to practical applications of delivery methods of teaching. This also shows that the preferred learning style of the student can clearly manifest itself in a personal preference of the student, even when the student is unaware of a specific learning style preference.

Johnson and Cooke showed that students tend to prefer a mix of different types of feedback (2014) despite their preferences of learning style. This research shows that even when a student does have a preferred learning style, they still prefer different types of feedback using different styles of delivery. This suggests that personality types and feedback may not have any effect on the way the student learns.

Audio feedback has been identified as generating more interest and a sense of community among online students (Olesova, Richardson, Weasenforth, & Meloni, 2011). This research shows a specific group of students that show a clear preference for a specific type of feedback and interaction. This is a limited group of students and the preference may be related to the students who select online studies or even because they feel separated from others and desire the audio interaction to generate a greater sense of community. Audio recording has been shown to provide more effective feedback and learning opportunities in some fields, such as literature and poetry (Phillips, 2011), but not in others. The research describes how certain fields are open to specific types of feedback and potentially to similar types of instruction. This is limited by the fields represented in this study and may imply that the students that have selected these fields have similar preferences for learning styles. Students have perceived audio feedback as more personal, but there were no measurable differences between the comprehension and academic measures of audio versus written feedback (Bourgault, Mundy, & Joshua, 2013). This example

illustrates how individuals can have different perceptions of communications related to learning, but not have a measurable effect on that learning. Academic measures and ability appear to be independent of method of feedback delivery.

Outcomes. There can be a relationship between Kolb's learning styles and time spent reading in relation to a class, but no relationship between these learning styles and learning outcomes or results (Lu, Jia, Gong, & Clark, 2007). While students can express a preference to a specific learning style, this research showed that even when taught using that preference, there was no increase in educational outcomes. Students may enjoy the subject more, and may enjoy the educational process when their preferred learning style is used, but that does not translate into higher test score, at least in this case.

Other research suggests that there is currently no verifiable research that shows that teaching different ways to different learning styles will increase learning outcomes in any way (Reiner & Willingham, 2010). The study looked at the different learning styles and attempted to find ways to teach to the groups of students using their preferred learning style and combinations of learning styles. The research showed that there was not a clear combination of styles or a way of teaching that was specifically more effective than other styles, no matter the stated learning style preference of the student.

Using combinations of learning methods also appears to have little measurable effect on the learning outcomes of students (Rogowsky, Calhoun, & Tallal, 2014). This research attempted to see if there were different combinations of learning styles that could be used to help students learn. The students indicated their preferred learning styles and the experiment used that learning style and other learning styles in different combinations to see if there were any combinations that would allow the learning outcomes to increase. The result was that there was

not an effective way to modify learning styles in relation to student learning preferences to increase the learning outcomes.

There appear to be no clear relationships between learning styles and academic achievement (Bhalli, Khan, & Sattar, 2015). When students learn using their preferred learning style, they appear to do well in academic achievement. When students learn without using their preferred learning style, they also appear to do well in academic achievement. The actual learning style used with the students does not appear to affect the ability of the students to learn. The research does not attempt to identify why there is no relationship, but does confirm that there appears to be no increase in academic performance based entirely on the preferred learning style of the individual student.

Choices. Learning styles of particular groups of students that have selected a single major in college have been shown to be measurably similar (AlQahani & Al-Gahtani, 2014). This research has been repeated in different environments, countries, careers, and college majors and the studies indicate that there is a clear and measurable relationship between fields of study and preferred learning styles. In some academic disciplines, such as allied health, there is a wide variety of learning styles present in the students (Cox, Clutter, Sergakis, & Harris, 2013). Successful interior architecture students were found to all have similar learning style preferences (Demirkan, 2016). Emergency medical resident students have been shown to have similar learning styles (Fredette, O'Brien, Poole, & Nomura, 2015). Most general surgery residents have also been shown to have similar learning styles (Kim & Gilbert, 2015). Research has shown that students who enrolled in automotive technology classes also all have a similar preferred learning style (Threeton, Walter, & Evanski, 2013). Undergraduate pharmacy students had a similar homogeneity of preferred learning styles (Williams, Brown, & Etherington, 2013). Social work

students also had similar personal learning style preferences (Williams, Brown, & Etherington, 2013).

Students with certain learning styles tend to stay in a career that is suited for them, but may abandon a career that does not match the most common learning style of others in that career (Borracci & Arribalzaga, 2015). This is a logical extension of the research that shows learning styles appear to be related within an academic subject and is significant because the students tend to make major life decisions based on these choices. These learning styles have been used to predict the degree to which individuals may be successful in careers that have strong preferred learning styles.

Athletes have a preferred learning style and female athletes tend to have a preferred learning style of their own (Braakhuis, Williams, Fusco, Hueglin, & Popple, 2015). Research has suggested that female students have a significantly different measured learning style than male students (Buaraphan, 2015). Other studies have suggested that the gender of a student has no effect on the preferred learning style of the student (Negari & Barghi, 2014) and the gender of a student does not appear to have an effect on the perceptions of learning styles as well (Radwan, 2014).

The preferred learning style of a student can have a measurable effect on the student's academic scores for online courses (Chang, Hung, & Lin, 2015). This environment is different from that of the traditional student. Using differentiated instruction and different learning styles can be difficult in the area of online education, especially when attempting to use different types of instruction. This research shows that the online learning environment may be much more applicable to students that have certain learning styles.

Proficiency level in a subject may have an influence on the preferred learning style of students in that subject (Palabryik, 2014). This research continues to support the idea that certain learning styles tend to congregate together in different subject areas. When a student is interested in the subject and proficient in the subject, that may have an effect of the preferred learning style of the individual, or the opposite may be true.

Students tend to gravitate towards teachers who have teaching styles similar to their preferred learning styles (Franzoni-Velazquez, Cervantes-Perez, & Assar, 2012). This shows that students have a relationship with the preferred learning style and will act in a way to help enforce that learning style, but does not indicate any significance in academic outcomes. This may indicate a preference related to the personality of the student. Teaching and learning styles can be clearly identified and matched together (Gilakjani, 2012), if desired. This research shows that these different styles can be clearly categorized and related for analysis. This idea applies both to the teaching styles of teachers and learning styles of the students.

Personalities and types. Problem solving ability may be directly related to preferred learning styles of students (Hung, Chang, & Lin, 2016) and may be influenced by the selection of class and subject. This research also shows that reliability in determining problem-solving technique can be predicted from the preferred learning style of an individual. This only affects the problem-solved skills and methods for problem solving and does not have a clear, significant relationship to the academic scores or outcomes for the students.

There is a relationship between preferred learning style and psychopathic personality traits (Moul & Dadds, 2013). This research shows that the preferred learning style of an individual is closely related to other personality traits. This implies that the preferred learning style is more a part of self-identification of an individual, and potentially affected by

development of the individual. These personality traits have not been directly linked to academic performance or outcomes in individual learning activities.

Research has identified different ways to measure learning style in addition to Kolb's methods (Manolis, Burns, Assudani, & Chinta, 2013), and some have suggested that Kolb's styles are not accurate enough to be consistent over time (Petchboonmee, Phonak, & Tiantong, 2015). Kolb's learning styles are often listed as the traditional starting point for defining learning styles. These researchers have shown that there are varieties of different ways to attempt to measure the preferred learning styles of individuals. These different methods show that the personality traits are not completely well defined in the literature.

Students in e-learning classes have shown that their learning style influences their perception of e-learning class effectiveness (Mohr, Holtbrugge, & Berg, 2012). This shows another way that learning style can help determine how an individual views the world around them. Individuals in the same class have different perceptions because of the preferred learning style of the student and not because of the topic, the subject, or even the grades received in the class. Norel and Laurentiu (2011) showed that there is also a significant difference between the learning styles of full-time students and distance-learning students. From this one understands that these learning style differences can appear in ways that influence how a learner prefers to receive their education and their training. Full-time students focus and approach education in a different manner than distance-learning students and this can be indicated by the learning style preferences of the individuals.

When learning a foreign language, students with stronger visual abilities have shown slightly stronger academic skills (Chen C.-J. , 2014). This research shows that the abilities of the students may play a significant role in how the students learn. It also may indicate a correlation

between visual ability and preferences for academics. The research did not measure any possible correlation between the student's indicated preferred learning style and their visual abilities.

Differentiated Instruction

Implementation. Differentiated instruction has been implemented at different levels at different schools (Adebayo & Shumba, 2014). A trend in education is to attempt to meet the needs of a varied and different student body, including students with different cultural backgrounds. This trend has resulted in schools and school districts supporting the idea of differentiated instruction, including some that have full-time faculty positions dedicated to implementing and improving differentiated instruction (Subban, 2006). Schools are strongly investing in differentiated instruction as a way to reach more students and improve the learning experience for all students.

Effective implementation of differentiated instruction depends on the skills and abilities of the general education teacher (Dee, 2011). Different teachers have different skills and backgrounds that they bring to the classroom environment. These different skills and abilities have an effect on the setup and the theme of the classroom. When the teachers are taught and have more effective skills, they are able to more effectively implement differentiated instruction in their classroom. Time is needed for teachers to effectively implement differentiated instruction in the classroom (De Neve, Devos, & Tuytens, 2014). When teachers are not provided with additional time to prepare and setup differentiated instruction, their classrooms are found to not have effective implementations of differentiated instruction. This study also indicated that when teachers lose time, they tend to move away from differentiated instruction and back towards the more traditional style of teaching environment.

Many instances of the use of differentiated instruction have been shown to require substantial preparation outside of the classroom (Maeng & Bell, 2015). This has been one of the drawbacks in the implementation of differentiated instruction in the classroom. This study showed how the increased time outside the classroom was needed but could be used to effectively implement differentiated instruction. Without the additional time, the teachers were unable to create an environment of differentiated instruction in the classroom.

Implementation of differentiated instruction can be hampered by teachers not seeing effective use of differentiated instruction in other classrooms (Martin, 2013). In addition to the time requirements for differentiated instruction, some teachers do not see the benefits to differentiated instruction. When teachers were asked to spend the time to create an environment of differentiated instruction, teachers who had not seen differentiated instruction were hesitant to attempt to create that atmosphere. This study did not indicate if the hesitation was due to not knowing or understanding differentiated instruction or if it was because the teachers did not know how to implement it. The study did show that teachers who saw it in use were able to effectively implement differentiated instruction in their own classrooms. Teachers can implement differentiated instruction more effectively when they have been shown models of how differentiated instruction can be implemented (Taylor, 2015).

Not all students appear to be affected at the same rate with differentiated instruction (Roy, Guay, & Valois, 2015). In this research, students that were low achieving showed the largest increase, but only for those who received a relatively smaller amount of differentiated instruction from the teachers. This seemed to imply that there is a level of differentiated instruction that leads to reduced increases in educational outcome. With the knowledge that an extreme of differentiated instruction is personalized, individual instruction, this research implies

there may be a point of diminishing returns for the implementation of differentiated instruction with the exception of individualized instruction.

Teachers. Tools have been identified that can help teachers implement differentiated instruction in their classrooms (Cha & Ahn, 2014). This research shows that teachers can effectively implement differentiated instruction with the aid of some tools and instruction. When the teachers were provided with the effective tools, they were able to create a classroom environment that supported differentiated instruction. When teachers are introduced to differentiated instruction, they are able to effectively implement it in their classrooms (Chien, 2015).

Using differentiated instruction has also been shown to help teachers fill gaps in knowledge related to the subject being taught (Salar & Turgut, 2015). This is an aspect of differentiated instruction that does not measure the success with the students. Instead, there may be a more long-term benefit to differentiated instruction for the teachers and not just a short-term benefit for the students. This study showed that instructors would actually learn from implementing differentiated instruction because they are forced to teach in different ways, exposing gaps in their own education in relation to the subject being taught.

Implementing differentiated instruction does increase teachers' perception of the educational process (Sornson, 2015). This research did not show differences in the educational process or in educational outcomes for the students. It did show that teachers were more involved in the instructional process when they implemented differentiated instruction in their classrooms. This seems logical as in order to implement differentiated instruction the teachers will have to be more involved and teaching different ways to different students. The research showed the end result was that teachers perceived the educational process was better than

without the differentiated instruction. Care should be taken to ensure that this perception can be traced to actual increases in educational outcomes.

Different subjects. Alavinia and Farhady (2012) suggested that differentiated instruction may have a significant effect on students when learning vocabulary. While this is a limited application study, it does tend to show that it is possible that differentiated instruction can be used to improve learning. This study showed that when differentiated instruction is applied to all students, there are some students that receive benefit from the instruction. It is not clear from this study why some students received a larger educational benefit than others from similar differentiated instruction processes.

Other studies suggest that differentiated instruction can be used to help English language learners (Beacher, Artigliere, Patterson, & Spatzer, 2012). This is another instance where the students were in a specific situation with narrow confines. In most cases the groups of students receiving different types of instruction were very small groups, in some cases as small as a single student. Personalized, individualized instruction should not be confused with, nor compared to practical differentiated instruction in the classroom.

Research has shown that differentiated instruction can be effective in multiple-grade music classes when teaching to students with different skill levels (Kizas, 2016). This research looked to find ways that the teachers can be more effective when there is a shortage of teachers and teachers in very small schools. The old “one-room schoolhouse” style environment is an environment where the idea of differentiated instruction can work well and help the students and the teachers with the educational process. In small schools, differentiated instruction can be helpful in allowing teachers to reach a large group of students including groups of students that stretch across grades and ability levels (Smit & Humpert, 2012).

When students have been presented with choices related to reading and instruction, similar to differentiated instruction, there has been success in student achievement (Little, McCoach, & Reis, 2014). This study indicates that the students may indicate a preference for a learning style, and that learning style preference may lead to a process that leads to a more successful educational outcome. It did not identify the preferences of the students, but it did draw a clear relationship between the students selecting their preference and increased outcome of learning. The side effect of the student selections was that the classroom ended up using differentiated instruction to meet all the requests and needs of the students in that environment.

Differentiated instruction combined with an enriched reading program has been shown to be effective in increasing student achievement (Reis, McCoach, Little, Muller, & Kaniskan, 2011). This research combined the idea of differentiated instruction with an enriched learning program. In this research, the students were exposed to a reading enrichment program and also to differentiated instruction in conjunction with that enriched learning program. The combination of differentiated instruction and enriched learning resulted in a measurable increase in educational outcomes for the students in the study.

Differentiated instruction can help change the way that mathematics is taught in the primary grades (Trinter, Brighton, & Moon, 2015). This research showed that differentiated instruction can have a drastic effect on the overall classroom. When differentiated instruction was implemented in the mathematics class, the environment and perception of the class changed. Teachers and students alike determine that the subject was being taught in a different way while the educational goals were not changed. This research did not measure if the educational outcomes were changed by this situation and environment.

Virtual reality learning systems may assist students that are not able to learn through traditional learning styles, focusing on highly structured and visual environments (Lorenzo, Pomares, & Lledo, 2013). When students have some limitations from learning using some learning styles, they are able to learn using different learning styles and methods. This suggests that students are able to adapt a change their personal preferences to learn using the methods that are presented.

Instruction. Personalized, individual instruction can help students in kindergarten to learn reading more effectively than students without that personal instruction (Otaiba, et al., 2011). This study shows that a very narrow and specific segment of the student population can be helped with a form of differentiated instruction. In this study, the idea of differentiated instruction actually was applied in a manner where each student received their own personalized instruction. It would be hard to argue that personalized instruction would not be helpful for all students at all times. It is very difficult to provide this level of personalized instruction in a practical situation. Differentiated instruction in practice attempts to find ways to group those students into similar groups where they can potentially benefit from similar types of instruction.

Individual instruction in the form of differentiated instruction can be an effective method of dealing with responses to intervention requests (Jones, Yssel, & Grant, 2012). Students who have requests for interventions may have different reasons for these requests and issues. The students may be capable of learning through common channels of learning, but they may have other distractions that are preventing them from learning. This research shows that individualized differentiated instruction can be very effective in increasing the success levels of learning for this type of student and student situation.

One specific type of instruction, interactive constructive activities, can increase student learning over other types of instruction (Meneske, Stump, Krause, & Chi, 2013). This research specifically examined the effects of this one type of instruction in comparison to other, more traditional, types of instruction. The research did indicate an increase in learning outcomes for the students exposed to the specific type of instruction. It did not show the instruction compared to other types of instruction, so this is only a limited example of differentiated instruction in that it only included interactive constructive activities.

Differentiated instruction has shown to be very effective when used in a one-on-one situation with students who have shown difficulty learning (Morgan, 2014). When students have a difficulty learning, it would seem obvious that one-on-one training would enable the student to increase in learning. This study emphasized that it was indeed the case with the students involved in the study. Personalized, individualized instruction appears to nearly always assist with learning outcomes. Personalized, individualized instruction is an extreme example of differentiated instruction and cannot be practically implemented in any sort of mass education classroom situation.

Research suggests that differentiated instruction can be effective regardless of the preferred learning styles of the students (Pham, 2012). This research showed that students who indicated a basic preference for a learning style benefitted from differentiated instruction even when the differentiated instruction did not match their preferred learning style. The research used simple preferences for learning styles and did not attempt to relate these indicated preferences with other data. Differentiated instruction with small groups can help influence the learning outcomes in the classroom.

Differentiated instruction should be used to help students that are gifted or disabled (Trotman, 2016). This is a clear application of differentiated instruction that has often been used in the past without being called differentiated instruction. Students who have a clear different set of needs from the general population of the classroom will logically need different teaching methods to reach those students. This study showed that differentiated instruction can be effective when teaching to these different student populations. Differentiated instruction can also help deaf students learn more than if they are immersed in traditional instructional methods and classes (Shepherd & Alpert, 2015).

Adding differentiated instruction to a class with mixed ability students has been shown to help those students reach the average level of other students in the classroom (Valiandes, 2015). This study showed the application of differentiated instruction in a classroom, but only showed effectiveness with students who were below average. This research implied that differentiated instruction was not helpful to students who were already understanding and comprehending the subject and the lessons, but was helpful to those students who were not.

Personalities

Experiments have shown that there are no significant differences between preferences for introversion or extraversion in students that are physically impaired (Bak, 2012). This helps show that there are different sources for the preferences for extraversion and introversion. The sources of the personality preferences may help determine how these personality types learn. Physically impaired students, in most cases, are capable of learning using the same methods as other students.

The traits of extraversion and introversion have been accepted by the professional psychology community as clearly defined traits of individuals (Lloyd, 2012). This study helps

support the idea that the personality types of introversion and extraversion as formal preferences. The types of personalities can be determined in different manners and practitioners can disagree about the applications of those personality types, but in general these types are accepted personality types that can be identified in individual students.

Perceptions. When students' perceptions are measured of personal interaction during clerkships, differences in personality types appear to affect those perceptions (Bell, et al., 2011). This research shows that the different personality types do have an effect on how those students perceive the world around them. This perception clearly exists in the classroom and during the learning process. This research did not measure if there is any related effect between the perceptions of these students and their learning outcomes. The personality types may affect the learning outcomes of these students, or it may only affect their perceptions of the learning outcomes, as implied in this research.

Different personality traits can be associated with different perceptions of benefits and features in the case of credit card payment systems (Walczak & Borkan, 2016). This research shows how the different Myers-Briggs personality trait preferences can have different perceptions of information presented to them. These different perceptions of the same information can be related to perceptions of new information presented to students in a classroom. If individuals with different personality type preferences can perceive identical information in different ways, students with different personality types may also perceive educational lessons in different ways. This research did not indicate how the different personality types related these perceptions or how they can change these perceptions. Differentiated instruction may be a way that these perceptions can be changed and influenced to help increase educational outcomes for the students.

When students describe ratings for instructors, students of all personality types tend to rate instructors with extroverted traits higher than others (Patrick, 2011). This research shows how students of different personality types tend to view instructors in the same manner. It shows that the personality types of the instructors are more related to the perceptions of the students and how the personality types can be meet the expectations of the students and their interactions with the instructors.

Research has shown that personality types can have a strong influence on the preferences and perceptions of various university major fields (Psaltou-Joycey & Kantaridou, 2011). Personality types appear to influence how students perceive future work and classes that lead to that future work. This research shows that the personality type of the student changes how the perceive the world around them and how they wish to interact with that world.

Introverts and extroverts have no significant difference in performance on speaking examinations (Souzandehfar, Soozandehfar, Farsi, & Sharif, 2014). This research indicates that students can perform in certain fields and academic tests without regard for their personality type. Students may be able to learn with the same level of ability no matter their personality type or learning style preference. Instructors at a computer science department in South Africa said that students who had the introverted traits were more likely to be effective computer science students (Thiniane, 2013). The perception of students and where they should interact with the world can be affected by those around them. These perceptions that personality types are significant to the career of an individual are not just related to students in colleges, but also to adults who are working in the colleges.

Cavanaugh and Song found that students' methods of revising papers affect their perception of the type of feedback they receive: audio or written (Cavanaugh & Song, 2014).

This research shows that students have a different way of working and understanding their own methods of working. This also shows that audio and visual components may play a part on how students perceive and process learning.

Careers. For some careers, such as project management, those who are successful generally have the same personality type preferences (Cohen, Ornoy, & Keren, 2013). Personality type preferences can aid an individual in their selection of career and help them select careers where they will tend to be more successful. Students may be interested in this effect to help direct them into preparation for different careers. This research did not analyze how those students did in preparing for those careers and how their personality may have influence the selection of their career, or how that personality type may have affected their learning outcomes for classes related to that career.

Research by Kun, Kiss, and Kapitany (2015) posits that the MTBI personality type preference can also be an indicator in selecting which type of college major and career to pursue. When a student makes the selection of college major and career, this is a function of the personality type preference of the student. The student may simply feel more comfortable in the selected career field and classes that lead to the career field. Since the student may be more comfortable with a specific type of class, they may also be more comfortable with specific learning styles, and that may lead to a more effective education and educational outcome for the student.

Rashid and Duys suggest that there is a clear relationship between some Myers-Briggs personality types and performance on some types of career tests (2015). These preferences can be reflected in a desire and suitability for different career types. This research shows that those who are successful, potentially effective, and interested in teaching may have a specific

personality type preference that may not be predisposed to specific learning types. This may show that teachers have a disproportionate amount of certain personality type preferences that may affect how they interact with students in general, and students who have other personality type preferences.

Introversion and extroversion traits have been identified as leading to different levels of stress for students taking medical courses (Davidson, Gillies, & Pelletier, 2015). This is an area where the personality of the student appears to have an effect on how the student reacts to the class and to learning. These different levels of stress may lead to different levels of academic achievement, based on the student's personality types. Studies have shown that introverted students use a larger range of metacognitive strategies than extroverted learners (Kayaoglu, 2013). This research shows that students with different personalities have different strategies when dealing with problems and thinking. This may help show that these students with different personalities may have different ways of learning and interacting with the world around them. Some research suggests that introverts can benefit from different teaching strategies (Martin E. L., 2014). This research is not backed up with measurable experiments or academic measurements. This research does support the idea that students with different personalities can potentially benefit from receiving instruction using different methods.

Students in the field of otolaryngology have a strong preference towards extroverted personality traits (Zardouz, German, Wu, & Djalilian, 2011). This research is an example of students who have similar personality types gathering together and self-segregating themselves into a related group. This also shows how students of similar personality types tend to have similar preferences in careers, classes, and types of education. Research shows that a majority of medical students have a general preference towards multi-mode learning as opposed to a single

learning style preference (Brumpton & Kitchener, 2013). This research shows that when students are given the opportunity, they prefer to learn using a number of different methods instead of receiving instruction using just one method. This suggests that individuals have different preferences towards learning styles.

Learning styles. Conti and McNeil suggest that students may indicate a preference in their learning style based on their MBTI personality type (2011). There was a close relationship between the learning preference of an individual and their preferred personality type. The learning preference may be an expression of the function of the individual's personality type. These two issues appear to be closely related and might show how differentiated instruction may help students with learning outcomes in different situations.

There may be ways that a personality type can be matched to a learning style (Daisley, 2011), but there is little evidence that this match will result in increased learning. This research extended the idea that a Myers-Briggs personality type preference can be related to a preferred learning style. While the personality type preference may help predict a learning style preference, this research did not indicate any difference in learning outcomes for students based on personality type preference or learning style preference.

Research has shown relationships between a student's expressed preferred learning style and their Myers-Briggs personality type (Chen & Hung, 2012). This is a logical relationship in that it shows how the personality type can be expressed in a student's perception of the world and how they desire to perceive the world. This research shows that there may also be a relationship between their personalities and how they learn.

Teachers. Kindergarten teachers who have a tendency towards extraversion have higher levels of job satisfaction and view their school more positively than those who have stronger

introvert tendencies (Wong & Zhang, 2014). This research also shows how different personality types can have different perceptions in certain situations. The research shows positive relationships between Myers-Briggs personality type preferences and job experiences. There may be a way to apply this research in the educational environment in a way that helps students view their educational situation more positively. This may help the student education and may increase educational outcomes.

A teacher with an extraverted tendency will use more verbal communication in their lessons (Zafarghandi, Salehi, & Sabet, 2016). This research shows that one group of those with certain personality type preferences already uses one learning style in preference to other learning styles. This can help explain and show that some learning style preferences are already in place and implemented by certain types of instructors. There may be a way to have instructors with these preferences reach out to students with other preferences and preferred learning styles in order to increase their educational outcomes.

Public sector teachers tend to exhibit more extroverted personality types and teaching styles, while private sector teachers tend to exhibit more introverted personality types (Larenas, Moran, & Rivera, 2011). This study shows that teachers have clearly defined personality types and those personality types tend to influence how the teachers approach their class and how they teach their students. The study further relates how teachers with different styles and personality types tend to gather together in similar situations and environments.

Quality teachers and teaching methods can lead to increased academic achievement, independent of other factors such as school size and location (Ngware, Oketch, & Mutisya, 2014). This research suggests that the largest factor in the academic learning area is the teacher and the quality of the teacher. This suggests that learning styles and methods may not be as

significant as the methods the teacher uses in attempting to teach and reach the individual students.

Relationships. The Myers-Briggs personality type may also be related to the Type A behaviors exhibited by individuals (Fretwell, Lewis, & Hannay, 2013). These Type A behaviors can help influence how an individual acts and interacts with other individuals. This type of interaction may also help determine the preferred learning styles of an individual. This research did not indicate learning outcome results for individuals who exhibit Type A behaviors. The personality type may be related to external personality behaviors, those behaviors may not be related to learning outcomes or learning style preferences.

Beyond personality behavior types, individuals have different methods that they use to solve problems in different situations. Problem solving ability has been shown to be directly related to Myers-Briggs personality types (Ginevra, Nota, Heppner, Heppner, & Soresi, 2014). This also may be an extension of the personality of the individual and shows another way that individuals interact with the world and those around them based on their personalities. These personalities and interactions can indicate problem-solving processes. It is possible that the problem-solving processes can be related to learning styles. Teaching to different personality preference types with related problem-solving solutions may allow students to have an increased learning outcomes with a better education process.

Myers-Briggs personality types have been shown to be a reliable indicator of successful and satisfactory relationships (Honeycutt & Keaton, 2012). Because the Myers-Briggs personality types are measurements of personality, it makes sense that the personality type can be used as a measure of successfulness in a relationship with another person. This research supports the idea that the Myers-Briggs personality type has direct interactions and effects on

interactions with other individuals. This research suggests that since the Myers-Briggs personality type preference can predict successful relationships, there may be a way that this can be applied to the relationship between the teacher and the student to help increase the learning outcome for the student.

Experiments show that there appears to be no relationship between the introvert-extravert personality type and the ability to translate languages (Karimina & Mahjubi, 2013). This research indicates that there may be some level of language or learning process that is not related to the Myers-Briggs personality type preferences. This was a narrow, specific examination of one aspect of learning, language translation, and how it relates to the personality type preference of the individual.

Research shows that the characteristics of introversion and extraversion do not have any effect on learning in a team-building environment (Persky, Henry, & Campbell, 2015). The team-building environment can be similar to a school classroom. Some classrooms are even designed around teams to attempt to emulate the business world and prepare students for experiences outside the classroom. When specifically in a team-building environment, the atmosphere is slightly different with different goals and purposes than the schoolroom and education setting. This research shows that individuals with different personality types can work together effectively, but does not address the potential for learning by individuals with different personality type preferences.

Introverted and extraverted personality characteristics can have an influence on the creative abilities of students (Chang, Peng, Lin, & Liang, 2015). This research shows that students have different actions and reactions to creative-typed assignments based on their personality type. This is evidence that personality types can affect how a person sees and

interacts with the world around them. Andres and Akan conducted research that suggested there are ways to combine teaching styles with a mesh between more than one style that is more effective than a single teaching style or teaching method (2015). This mesh type of learning style actually combines a number of different teaching styles, attempting to find ways to integrate parts of a number of styles into a single style that is designed to reach a larger number of students. The research supports the idea that students are able to learn no matter what teaching style is used to teach them.

Best practices for teaching online courses include teaching to multiple learning styles (Collins, Weber, & Zambrano, 2014). These best practices show different ways that teachers can work to engage students and keep students involved in the classroom. There is no evidence from this study that teaching to multiple learning styles will result in increased academic performance of the students.

Van Klaveren found that there is no relationship between the time spent by a teacher lecturing in a classroom and student performance (2011). This study shows that students have different ways to process information. When a teacher engages in traditional lecture, students can only absorb a certain amount of information in the classroom.

Research has suggested that adult learners have different needs and different ways of learning than child learners (Beagley, 2011). This research suggests that different individuals will relate to learning and learn using different methods. This supports the idea that there are different ways to present learning and different ways that individuals will effectively learn.

The lecture-style of teaching is still an effective way of teaching (Camargo-Uribe & Hederich-Martinez, 2014). This research suggests that the lecture style of teaching is effective, no matter the personality type or preferred learning type of a student. This tends to show that

students are able to adapt their own preferences to learn from different types of instruction, no matter their personality type.

Teaching style has been observed to change when teachers are exposed to teaching styles of other teachers, especially in other cultures (Sandlin, Murphey, Lindner, & Dooley, 2013). This research shows that instructors may change their types of teaching styles and methods because they are exposed to other methods. These changes may be an attempt to reach more students, but there is no evidence from this study that suggests these different methods are more effective at reaching more students, and there is no evidence that the new types of instruction are useful in increasing academic performance.

Summary

Research has been completed on how a student learns new information and how that information is perceived by the student. There is evidence that each student may learn in a way unique to that student, but with similar end results as far as measurable retention of the information. Personality type appears to have an influence on the individual and how they see and perceive the world around them, including how they learn new information. There is no research that attempts to relate the personality type of a student with the preferred learning style of the student and that attempts to determine if the combination of the two have an effect on the academic results and academic outcome for the student. There may be a relationship between personality type and learning style that can have a significant effect on the academic outcomes for the student. If that is the case, research may show an effective way to implement differentiated instruction so that it can be useful in relation to academic results.

CHAPTER THREE: METHODS

Overview

This research was completed in a classroom of high school students over the period of two weeks. The students completed a test to determine their personality type (introvert or extrovert). The Myers-Briggs test examined four different aspects of personality, but for this research, only the first indicator related to introvert or extrovert has been used. The CPP company currently owns the Myers-Briggs test and agreed to help administer the test. The students completed a test related to Biblical knowledge at the start of the experiment; then received instruction using different teaching methods; then will completed a test after a week of the instruction. The data collected from the tests was analyzed to determine if there are any relationships or interactions between learning styles, personality types, and academic achievement.

Design

This research is a nonequivalent control-group design study to compare groups of students, instruction types, and personality types. This study is the appropriate study for this research because there are groups of students that will be grouped into two groups and the groups will be convenience groups instead of truly random groups (Gall, Gall, & Borg, 2015). Warner (2013) describes that this type of research should be used when there are means scores on quantitative variables compared across groups while controlling for a covariate. In this case, the factors are the student personality types and the teaching methods; and the outcome variable is their test score. The students in the different classrooms completed a pre-test to determine a baseline score on the test; received teaching via different methods; then completed a post-test to

determine their final scores on the test. Students also received a test to determine their personality type to be used in the analysis.

Research Questions

RQ1: Do the academic scores on Biblical knowledge tests for high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

RQ2: Do the academic scores on Biblical knowledge tests for high school students differ for students with introverted and extroverted personality types?

RQ3: Do the academic scores on Biblical knowledge tests for introverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

RQ4: Do the academic scores on Biblical knowledge tests for extraverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

Hypotheses

The null hypotheses for this study are:

H01: There is no statistically significant difference in test scores for high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

H02: There is no statistically significant difference in test scores for introverted or extroverted high school students (as indicated by the Myers-Briggs personality tests), on An Assessment of Bible Knowledge Test.

H03: There is no statistically significant difference in test scores for introverted high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

H04: There is no statistically significant difference in test scores for extraverted high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

Participants and Setting

The target population is high school students in a private Christian high school in western North Carolina. The students selected are all students taking a required Bible study class. The accessible population for this study are all the students enrolled in the high school. The sample size for this study is 100 students selected from the six Bible classes taught at the school. The study included all the students in attendance in the Bible classrooms on the days of the study. Subjects were informed of the purpose of the study and provided written consent (from parents) to participate.

The students selected completed a 100-question test to determine a baseline of their Biblical knowledge. The test was developed and used by Reese at the Southern Baptist Theological Seminary (Reese, 2010). The students also completed a Myers-Brigg personality test to determine their personality type (Myers, 1962). The CPP company that currently owns the rights for the Myers-Briggs personality test agreed to assist with the administration of the test for research purposes. For this study, the number of subjects required for an adequate sample size is 32 students, which according to Gall, Gall, and Borg (2007), fulfil the minimum for a medium effect size with a statistical power of .5 at the .05 alpha level (p.145).

Instrumentation

The test used by the students to test their Bible knowledge was An Assessment of Bible Knowledge Test (see Appendix A for instrument) created by Reese (2010). Permission has been obtained via email to use this test in this study. This test was validated by Reese and used by

Dennerly (2012) and Gourlay (2013) and used by Reese (2010) and Dennerly (2012) as well. This test consists of 100 questions related to specific instances and people in the Bible. The statistic for both the Spearman-Brown coefficient and the Guttman split-half coefficient test was .944. These questions have a single correct answer and each test was scored by the researchers to determine the number that were answered correctly (see Appendix B for correct answers). The total possible score for this test will range from 0 points to 100 points. This test was administered via paper tests given in the classroom (see Appendix C for instruction). There was no time limit for the administration of the test, but the approximate time required to take the test is 45 minutes. The purpose of this test is to measure the knowledge of general topics and facts contained in the Bible. The test was developed as part of a dissertation project to measure and compare general Biblical knowledge of students in Sunday school classes. It was developed by a dissertation student with the guidance of experienced Biblical scholars and advisors.

The Myers-Briggs Type Indicator (MBTI) is a 94-item untimed questionnaire developed by Myers (1962). This questionnaire has been used by a number of researchers including Furnham, Moutafi, and Crump (2003), Bak (2012), Kun, Kiss, & Kapitany (2015), and Walczak & Borkan (2016); and has been validated by Furnham and Stringfield (1993). Carskadon (1977) reports a reliability range of .74 to .84. Capraro and Capraro (2002) reported the validity of the MBTI test to also have a range of Cronbach's alpha of .74 to .84 in various different studies over time. Test and retest reliability has been shown to be as high as .93 (Capraro & Capraro, 2002). The purpose of the test is to determine an individuals' tendencies and preferences for certain specific personality types. This test was developed by Myers (1962) to support ideas of personality in further development of research and theories initially supported by Jung (1921). The questionnaire has a list of questions and for each question the participant selects one of two

possible responses, indicating which response they prefer of the two. When complete, a compilation of the results of the answers will provide a score that will indicate which area the subject has a preference for: introvert or extrovert. It will also indicate the percentage of a preference of one area over the other. This test was administered through the CPP, the published of the Myers-Briggs test, through individual access accounts via the Internet. The test owners also scored the exam, produced the results, and provided the results of the exam to the researchers. The test was taken completely on-line through the CPP web site during classroom time. Students provided assent forms before they completed the exam.

Procedures

The research proposal was submitted to the Institutional Review Board for review and approval. The IRB approved this research. Consent was obtained from the school board of the school involved in the study. The research proposal was hand-delivered to the headmaster of the school for approval. After approval, the headmaster and researcher met with the Bible class teacher for scheduling the experiment.

Prior to the administration of the test, the researchers trained the administrators of the test to ensure understanding of the survey and the process. The researcher met with the Bible teacher to explain the test and the experimental process including the requirements for the experiment and the learning styles to be used in each classroom.

At the start of the experiment, the teacher administered the Bible pre-test. After the Bible pre-test, the teacher administered the Myers-Briggs personality indicator test. The experiment continued for two weeks in the classrooms with different teaching methods for the two groups of students. For one group of students, there was only visual instruction with PowerPoint presentations and absolutely no verbal communication from the instructor for that group. A

second group received only audio instruction from the teacher without any other visual or teaching aids. A third group received instruction using both audio and visual methods. After the two weeks, the administrators of the test administered the Bible post-test. The research team collected the instruments from the school and then entered the results into Microsoft Excel. Results were compiled and entered in SPSS software for further analysis.

Data Analysis

For statistical analysis, multiple ANCOVAs were conducted on the data collected for this research to examine the hypotheses. Analysis used the conventional alpha of .05. A Levine test was also conducted for homogeneity of variances: when $p < .05$, the researchers will reject the null hypotheses. The population of students in each group was greater than 36, which meets the requirements for .80 power where $\eta^2 = .10$ (Warner, 2013). Independent variables: Personality types (introvert, extrovert), type of instruction group (audio, visual, control). Dependent variable: test score on Biblical knowledge test. The covariate was the Biblical knowledge test score before the instruction.

CHAPTER FOUR: FINDINGS

Overview

Learning methods have been used in various forms in an attempt to reach students in academic settings for decade. Different methods have been tried in different situations, but there have not been many academic research reports measuring the success of learning and teaching methods in the classroom. This research attempts to add to this body of research and looks for a measurable relationship between learning methods, teaching styles, and personality types.

Research Questions

RQ1: Do the academic scores on Biblical knowledge tests for high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

RQ2: Do the academic scores on Biblical knowledge tests for high school students differ for students with introverted and extroverted personality types?

RQ3: Do the academic scores on Biblical knowledge tests for introverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

RQ4: Do the academic scores on Biblical knowledge tests for extraverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

Hypotheses

The null hypotheses for this study are:

H01: There is no statistically significant difference in test scores for high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

H02: There is no statistically significant difference in test scores for introverted or extroverted high school students (as indicated by the Myers-Briggs personality tests), on An Assessment of Bible Knowledge Test.

H03: There is no statistically significant difference in test scores for introverted high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

H04: There is no statistically significant difference in test scores for extraverted high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

Descriptive Statistics

There was a total of 93 students who participated in the experiment that completed all aspects of the experiment: pre-test, MBTI test, and post-test. The 93 students were high school students at a private school in North Carolina. These students took the various tests in the classrooms of the school. There were additional students at points in the study, but due to absences at certain points (test days), only 93 were able to complete all aspects of the study.

Table 1:

Personality Descriptive Statistics

Between-Subjects Factors			
		Value Label	N
MTBI	1	Introvert	43
	2	Extrovert	50

The total number of students who completed the personality test portion of the experiment was 93 with 43 introverts ($n = 43$) and 50 extroverts ($n = 50$). These measures are relatively close to the average of all people who have taken the Myers-Briggs test (Myers, 1962).

The manual states that in general 49.3% of people will be extroverts. If this were a perfect sample, the total number of extroverts in the sample would be 46 with 47 introverts.

Table 2:

Instruction Type Descriptive Statistics

Between-Subjects Factors			
		Value Label	N
GROUP	1	Control	26
	2	Visual	44
	3	Audio	30

The total number of students who were divided into the three groups was 100 with 26 in the control group (n = 26), 44 in the visual instruction group (n = 44), and 30 in the audio instruction group (n = 30). These measures show that there is a reasonable number of students in each group, as might be expected with a cross-section of the general public.

Table 3:

Combination Groups Descriptive Statistics

Between-Subjects Factors			
		Value Label	N
COMBGROUP	1	Introvert- Control	12
	2	Introvert-Visual	18
	3	Introvert-Audio	13
	4	Extrovert- Control	12
	5	Extrovert- Visual	23
	6	Extrovert-Audio	15

The total number of students that completed the personality test and were divided up in the groups was 93 students with 12 introverts in the control group (n = 12), 18 introverts in the visual group (n = 18), 13 introverts in the audio group (n = 13), 12 extroverts in the control group

(n = 12), 23 extroverts in the visual group (n = 23), and 15 extroverts in the audio group (n = 15). The division of groups was done by convenience, by classes that the students were already separated into. The numbers of students in each group appears to be relatively evenly spread across the different classrooms, showing that there does not appear to be any strong concentration of one personality type in any of the classes at the school.

Results

Assumption Tests

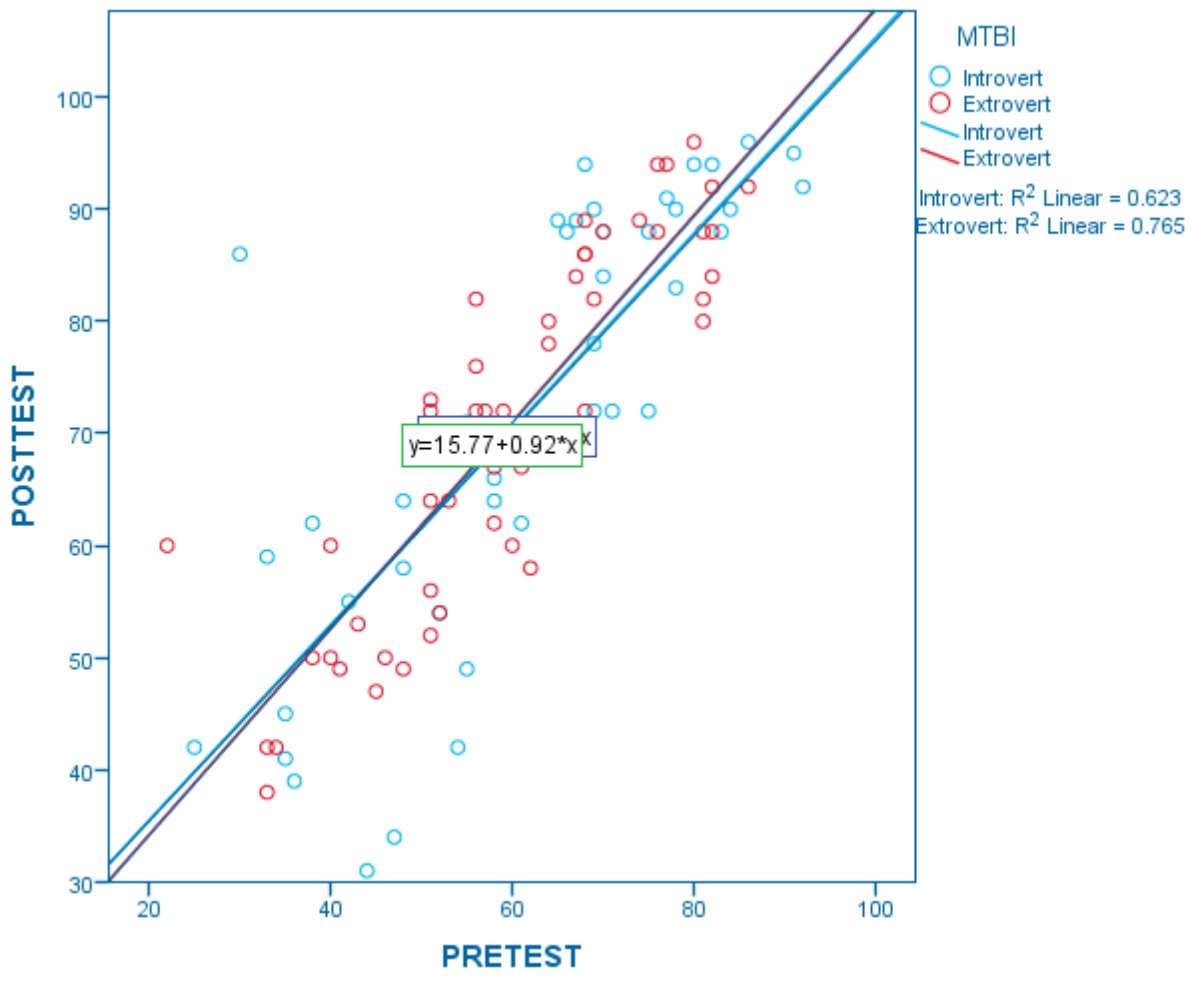


Figure 1: Personality type linear assumption graph

There was a linear relationship between pre- and post-test scores on the Biblical knowledge test for each personality type, as assessed by a visual inspection of a scatterplot.

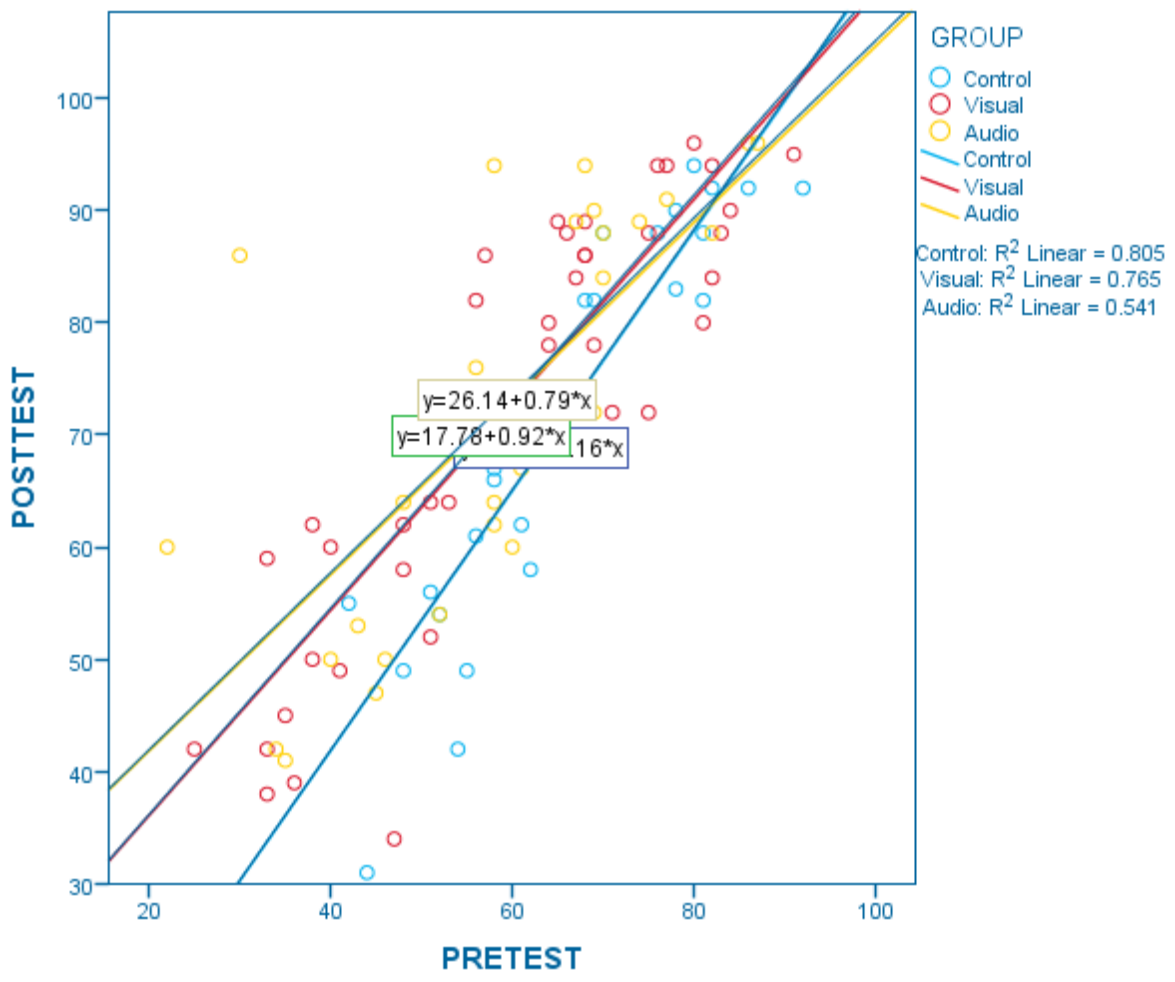


Figure 2: Instruction type linear assumption graph

There was a linear relationship between pre- and post-test scores on the Biblical knowledge test for each type of instruction group, as assessed by a visual inspection of a scatterplot.

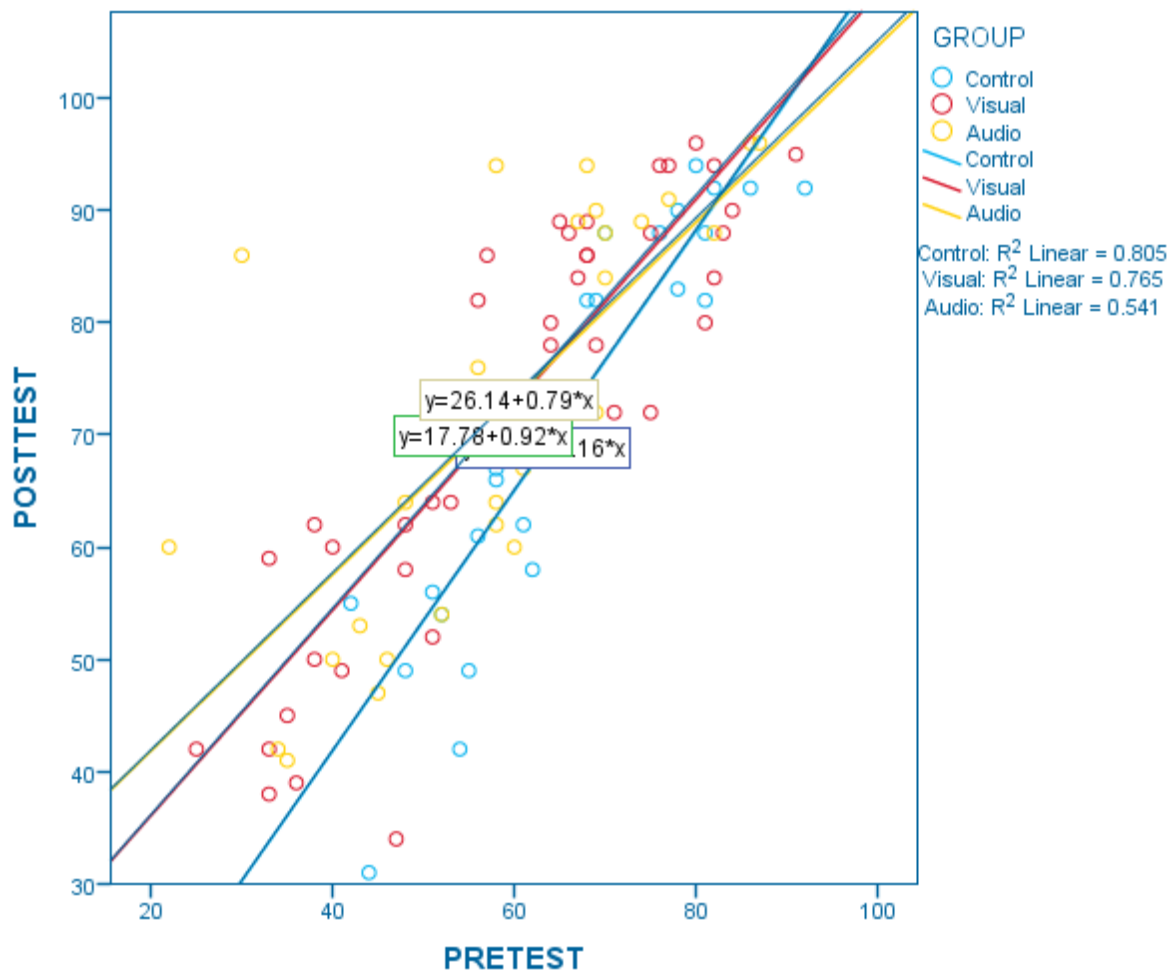


Figure 3: Combination group linear assumption graph

There was a linear relationship between pre- and post-test scores on the Biblical knowledge test for the combinations of groups considering personality type and instruction type, as assessed by a visual inspection of a scatterplot.

Table 4:

Personality type analysis

POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	20185.216 ^a	3	6728.405	65.397	.000
Intercept	1828.039	1	1828.039	17.768	.000
MTBI	8.203	1	8.203	.080	.778
PRETEST	20153.619	1	20153.619	195.885	.000
MTBI * PRETEST	14.755	1	14.755	.143	.706

Error	9156.784	89	102.885
Total	498155.000	93	
Corrected Total	29342.000	92	

a. R Squared = .688 (Adjusted R Squared = .677)

There was homogeneity of regression slopes as the interaction term was not statistically significant, $F(1,89) = 0.143, p = 0.71$.

Table 5:

*Instruction type analysis***POSTTEST**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22031.226 ^a	5	4406.245	46.208	.000
Intercept	932.733	1	932.733	9.781	.002
PRETEST	19906.031	1	19906.031	208.751	.000
GROUP	689.001	2	344.501	3.613	.031
GROUP * PRETEST	420.904	2	210.452	2.207	.116
Error	8963.614	94	95.358		
Total	542792.000	100			
Corrected Total	30994.840	99			

a. R Squared = .711 (Adjusted R Squared = .695)

There was a homogeneity of regression slopes as the interaction term was not statistically significant, $F(2,94) = 2.207, p = 0.12$.

Table 6:

*Combination group analysis***POSTTEST**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22190.852 ^a	11	2017.350	22.850	.000
Intercept	1035.884	1	1035.884	11.733	.001
PRETEST	17024.918	1	17024.918	192.839	.000
COMBGROUP	993.850	5	198.770	2.251	.057
COMBGROUP * PRETEST	686.813	5	137.363	1.556	.182
Error	7151.148	81	88.286		
Total	498155.000	93			
Corrected Total	29342.000	92			

a. R Squared = .756 (Adjusted R Squared = .723)

There was a homogeneity of regression slopes as the interaction term was not statistically significant, $F(5,81) = 1.556, p = 0.18$.

Table 7:

Personality type Kolmogorov-Smirnov

	MTBI	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for POSTTEST	Introvert	.108	43	.200*	.937	43	.020
	Extrovert	.087	50	.200*	.967	50	.176

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Standardized residuals for the personality types were normally distributed, as assessed by Kolmogorov-Smirnov, ($p > .05$).

Table 8:

Instruction type Kolmogorov-Smirnov

	GROUP	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for POSTTEST	Control	.117	26	.200*	.932	26	.088
	Visual	.097	44	.200*	.970	44	.311
	Audio	.154	30	.067	.855	30	.001

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Standardized residuals for the instruction type groups were normally distributed for the control and visual groups, as assessed by Kolmogorov-Smirnov, ($p > .05$). ANCOVA is fairly robust to deviations from normality.

Table 9:

Combination group Kolmogorov-Smirnov

	COMBGROUP	Kolmogorov-Smirnov ^a	Shapiro-Wilk
--	-----------	---------------------------------	--------------

		Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for POSTTEST	Introvert-Control	.149	12	.200*	.951	12	.646
	Introvert-Visual	.145	18	.200*	.944	18	.344
	Introvert-Audio	.227	13	.065	.814	13	.010
	Extrovert-Control	.173	12	.200*	.927	12	.349
	Extrovert-Visual	.184	23	.041	.930	23	.109
	Extrovert-Audio	.267	15	.005	.833	15	.010

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Standardized residuals for the combination of instruction type and personality type were generally normally distributed with four of the six combination groups normally distributed as assessed by Kolmogorov-Smirnov, ($p > .05$).

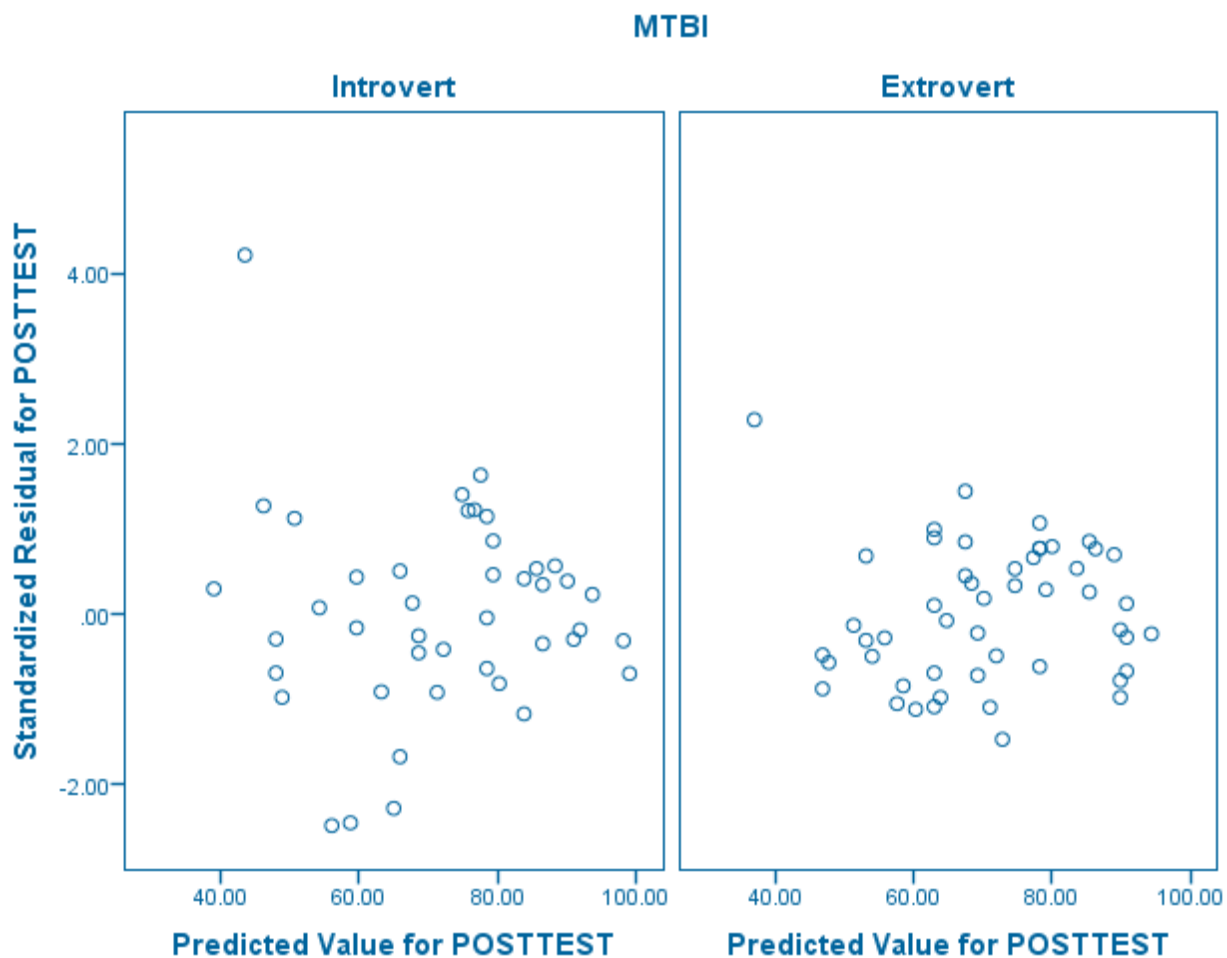


Figure 4: Personality type homoscedasticity charts

There was homoscedasticity, as assessed by visual inspection of the standardized residuals plotted against the predicted values for personality type groups.

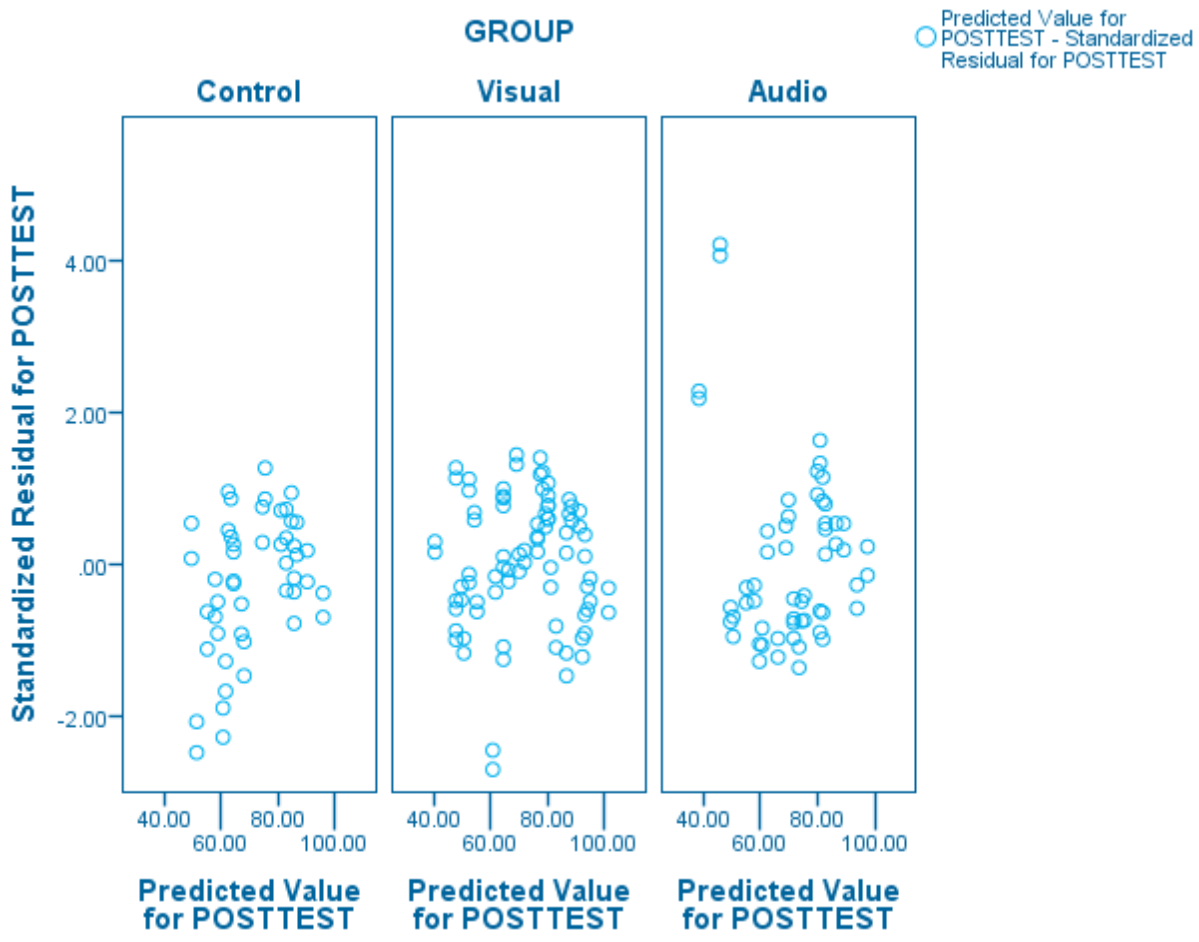


Figure 5: Instruction type homoscedasticity charts

There was homoscedasticity, as assessed by visual inspection of the standardized residuals plotted against the predicted values for instruction type groups.

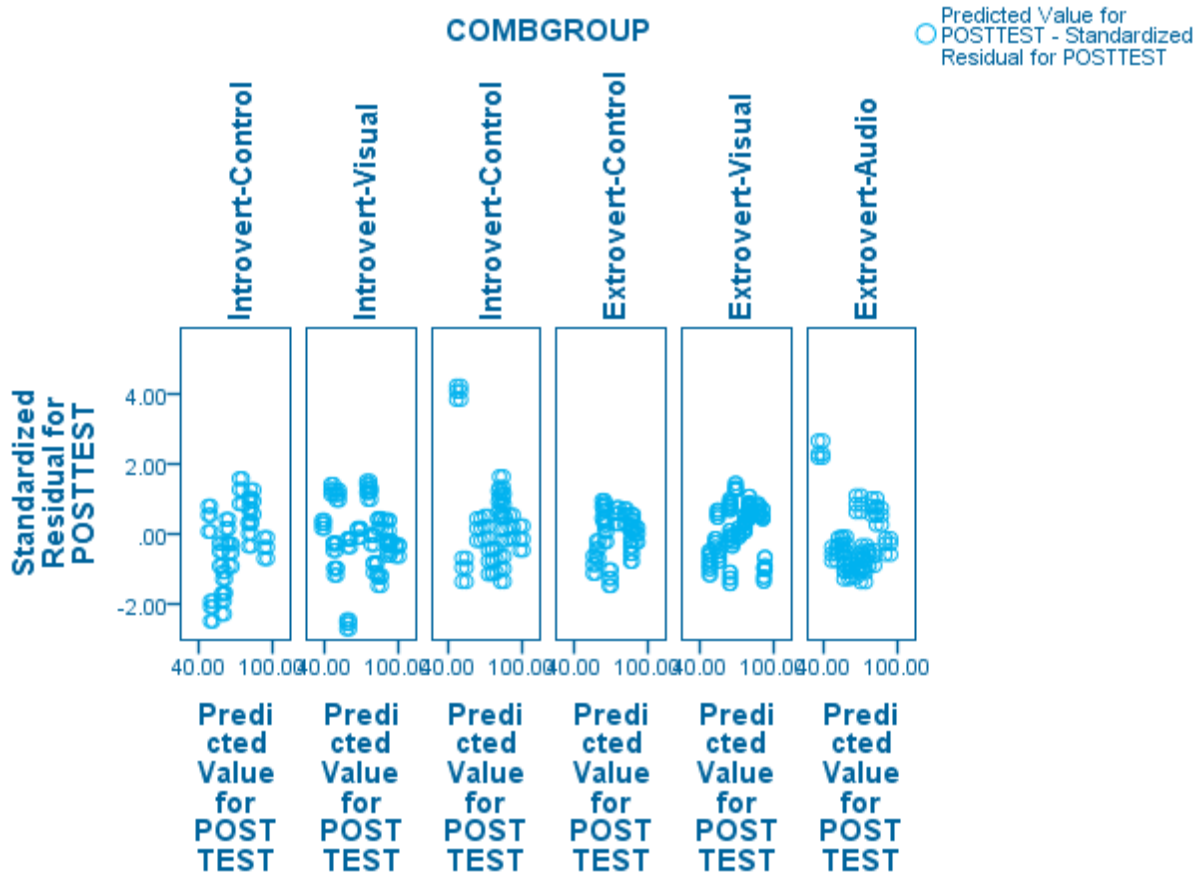


Figure 6: Combination group homoscedasticity charts

There was homoscedasticity, as assessed by visual inspection of the standardized residuals plotted against the predicted values for the combination of instruction types and personality type groups.

Table 10:

Levine's Test for personality type

Levene's Test of Equality of Error Variances^a

POSTTEST

F	df1	df2	Sig.
2.128	1	91	.148

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + PRETEST + MTBI

There was homogeneity of variances for the personality type groups, as assessed by Levene's test of homogeneity of variance ($p = 0.15$)

Table 11:

Levine's Test for instruction type

Levene's Test of Equality of Error Variances^a

POSTTEST

F	df1	df2	Sig.
1.283	2	97	.282

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + PRETEST + GROUP

There was homogeneity of variances for the instruction type groups, as assessed by Levene's test of homogeneity of variance ($p = 0.28$).

Table 12:

Levine's Test for combination groups

Levene's Test of Equality of Error Variances^a

POSTTEST

F	df1	df2	Sig.
.794	5	87	.557

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + PRETEST + COMBGROUP

There was homogeneity of variances for the combination of instruction type and personality type groups, as assessed by Levene's test of homogeneity of variance ($p = 0.56$).

There were no outliers in the data, as assessed by no cases with standardized residuals greater than ± 3 standard deviations.

Hypotheses

H01: There is no statistically significant difference in test scores for high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

Table 13:

Instruction type descriptive statistics

Descriptive Statistics (Adjusted for covariate)			
POSTTEST			
GROUP	Mean	Std. Deviation	N
Control	71.04	18.065	26
Visual	71.57	17.964	44
Audio	71.93	17.566	30
Total	71.54	17.694	100

Test scores for the three groups of instruction type were all very similar for the control group ($M = 71.04$, $SD = 18.07$), the visual instruction group ($M = 71.57$, $SD = 17.96$), and the audio instruction group ($M = 71.93$, $SD = 17.57$).

Table 14:

Between-Subject effects for instruction type

Tests of Between-Subjects Effects						
POSTTEST						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	21610.322 ^a	3	7203.441	73.688	.000	.697
Intercept	1541.417	1	1541.417	15.768	.000	.141
PRETEST	21599.106	1	21599.106	220.951	.000	.697
GROUP	861.329	2	430.664	4.406	.015	.084
Error	9384.518	96	97.755			
Total	542792.000	100				
Corrected Total	30994.840	99				

a. R Squared = .697 (Adjusted R Squared = .688)

After adjustment for pre-test knowledge, there was a statistically significant difference in post-test knowledge test scores between the instruction groups $F(2,96) = 4.41, p < .05$, partial $\eta^2 = 0.08$.

Table 15:

Pairwise comparisons for instruction type

Pairwise Comparisons						
POSTTEST						
(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Control	Visual	-6.448*	2.478	.032	-12.485	-.410
	Audio	-7.218*	2.683	.025	-13.756	-.680
Visual	Control	6.448*	2.478	.032	.410	12.485
	Audio	-.770	2.341	1.000	-6.475	4.934
Audio	Control	7.218*	2.683	.025	.680	13.756
	Visual	.770	2.341	1.000	-4.934	6.475

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Post test scores were statistically significantly greater in the visual group ($M = 72.99, SE = 1.50$) when compared to the control group ($M = 66.54, SE = 1.96$), a mean difference of 6.45 points, $p = 0.03$. Post test scores were also statistically significantly greater in the audio group ($M = 73.76, SE = 1.81$) when compared to the control group ($M = 66.54, SE = 1.96$), a mean difference of 7.22 points. There was not a statistically significant difference between the audio and visual groups, so null hypotheses one cannot be rejected.

H02: There is no statistically significant difference in test scores for introverted or extroverted high school students (as indicated by the Myers-Briggs personality tests), on An Assessment of Bible Knowledge Test.

Table 16:

Personality type descriptive statistics

Descriptive Statistics (Adjusted for covariate)			
POSTTEST			
MTBI	Mean	Std. Deviation	N
Introvert	71.58	19.507	43
Extrovert	70.50	16.495	50
Total	71.00	17.859	93

Adjusted means are presented, unless otherwise stated. Scores were slightly higher for introverts ($M = 71.58$, $SD = 19.51$) as compared to extroverts ($M = 70.50$, $SD = 16.495$).

Table 17:

Between-Subject effects for personality types

POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	20170.462 ^a	2	10085.231	98.966	.000	.687
Intercept	1837.429	1	1837.429	18.031	.000	.167
PRETEST	20143.427	1	20143.427	197.667	.000	.687
MTBI	10.188	1	10.188	.100	.753	.001
Error	9171.538	90	101.906			
Total	498155.000	93				
Corrected Total	29342.000	92				

a. R Squared = .687 (Adjusted R Squared = .680)

After adjustment for pre-test knowledge, there was not a statistically significant difference in post-test knowledge test scores between the personality type groups $F(1,90) = 10.188$, $p = 0.75$, partial $\eta^2 = 0.00$. Because there was no significant difference, no further analysis was completed for the personality type group. Hypothesis two cannot be rejected.

H03: There is no statistically significant difference in test scores for introverted high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

H04: There is no statistically significant difference in test scores for extraverted high school students who receive teaching via visual-only teaching or audio-only teaching on An Assessment of Bible Knowledge Test.

Table 18:

Combination group descriptive statistics

Descriptive Statistics (Adjusted for covariate)			
POSTTEST			
COMBGROUP	Mean	Std. Deviation	N
Introvert-Control	67.17	21.666	12
Introvert-Visual	70.11	20.295	18
Introvert-Audio	77.69	15.966	13
Extrovert-Control	74.83	14.838	12
Extrovert-Visual	72.57	17.204	23
Extrovert-Audio	63.87	15.620	15
Total	71.00	17.859	93

Test scores for the control groups, when taking into consideration personality types, were the highest for introverts in the audio group ($M = 77.69$, $SD = 15.97$) while for extroverts the highest scores were in the control group ($M = 74.83$, $SD = 14.84$). The lowest scores for introverts were the control group ($M = 67.17$, $SD = 21.67$) and for the extroverts was the audio group ($M = 63.87$, $SD = 15.62$).

Table 19:

Between-Subject effects for combination groups

Tests of Between-Subjects Effects						
POSTTEST						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared

Corrected Model	21504.038a	6	3584.006	39.325	.000	.733
Intercept	1475.245	1	1475.245	16.187	.000	.158
PRETEST	19735.304	1	19735.304	216.541	.000	.716
COMBGROUP	1343.765	5	268.753	2.949	.017	.146
Error	7837.962	86	91.139			
Total	498155.000	93				
Corrected Total	29342.000	92				

a. R Squared = .733 (Adjusted R Squared = .714)

After adjustment for pre-test knowledge, there was a statistically significant difference in post-test knowledge test scores between the combination of instruction groups and personality type groups $F(5,86) = 2.95, p < .05, \text{partial } \eta^2 = 0.15$.

Table 20:

Pairwise comparisons for combination groups

Pairwise Comparisons						
POSTTEST						
(I) COMBGROUP	(J) COMBGROUP	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Introvert-Control	Introvert-Visual	-6.283	3.565	1.000	-17.047	4.482
	Introvert-Audio	-12.883*	3.825	.017	-24.433	-1.334
	Extrovert-Control	-4.404	3.904	1.000	-16.191	7.383
	Extrovert-Visual	-9.845	3.413	.074	-20.150	.460
	Extrovert-Audio	-5.440	3.745	1.000	-16.747	5.867
Introvert-Visual	Introvert-Control	6.283	3.565	1.000	-4.482	17.047
	Introvert-Audio	-6.601	3.475	.913	-17.094	3.893
	Extrovert-Control	1.878	3.586	1.000	-8.949	12.706
	Extrovert-Visual	-3.562	3.005	1.000	-12.636	5.512
	Extrovert-Audio	.843	3.358	1.000	-9.295	10.981
Introvert-Audio	Introvert-Control	12.883*	3.825	.017	1.334	24.433
	Introvert-Visual	6.601	3.475	.913	-3.893	17.094
	Extrovert-Control	8.479	3.841	.449	-3.118	20.076
	Extrovert-Visual	3.038	3.316	1.000	-6.973	13.050
	Extrovert-Audio	7.443	3.643	.662	-3.558	18.444
Extrovert-Control	Introvert-Control	4.404	3.904	1.000	-7.383	16.191
	Introvert-Visual	-1.878	3.586	1.000	-12.706	8.949
	Introvert-Audio	-8.479	3.841	.449	-20.076	3.118
	Extrovert-Visual	-5.441	3.440	1.000	-15.827	4.945

	Extrovert-Audio	-1.036	3.786	1.000	-12.468	10.397
Extrovert-Visual	Introvert-Control	9.845	3.413	.074	-.460	20.150
	Introvert-Visual	3.562	3.005	1.000	-5.512	12.636
	Introvert-Audio	-3.038	3.316	1.000	-13.050	6.973
	Extrovert-Control	5.441	3.440	1.000	-4.945	15.827
Extrovert-Audio	Extrovert-Audio	4.405	3.182	1.000	-5.202	14.012
	Introvert-Control	5.440	3.745	1.000	-5.867	16.747
	Introvert-Visual	-.843	3.358	1.000	-10.981	9.295
	Introvert-Audio	-7.443	3.643	.662	-18.444	3.558
	Extrovert-Control	1.036	3.786	1.000	-10.397	12.468
	Extrovert-Visual	-4.405	3.182	1.000	-14.012	5.202

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

When examining combination groups of personality types and instruction type, post test scores were statistically significant in only one comparison: students in the introvert-audio group ($M = 76.99$, $SE = 2.65$) had statistically significantly higher scores when compared to the introvert-control group ($M = 64.10$, $SE = 2.76$), a mean difference of 12.88 points. No other combinations of groups had a statistically significant difference. Therefore, neither hypothesis three or hypothesis four can be rejected.

Results Summary:

An ANCOVA was run to determine the effect of different instruction types, different personality types, and the combinations of personality types and instruction types on a test of Biblical knowledge after controlling for Biblical knowledge before the test.

There was a linear relationship between pre- and post-instruction for each type of instruction, each personality, and each combination of instruction type and personality, as assessed by a visual inspection of a scatterplot. There was homogeneity of regression slopes as the interaction was not statistically significant for personality types, $F(1,89) = 0.143$, $p = 0.71$,

instruction types, $F(2,94) = 2.207$, $p = 0.12$, and combinations of personality types and instruction types $F(5,81) = 1.556$, $p = 0.18$.

Standardized residuals for the personality types were normally distributed, as assessed by Kolmogorov-Smirnov, ($p > .05$). Standardized residuals for the instruction type groups were normally distributed for the control and visual groups, as assessed by Kolmogorov-Smirnov, ($p > .05$). Standardized residuals for the combination of instruction type and personality type were generally normally distributed with four of the six combination groups normally distributed as assessed by Kolmogorov-Smirnov, ($p > .05$).

There was homoscedasticity and homogeneity of variances, as assessed by visual inspection of scatterplots and Levene's test of homogeneity of variance for the personality types ($p = 0.15$), instruction type ($p = 0.28$), and combination of instruction type and personality type ($p = 0.56$). There were no outliers in the data, as assessed by no cases with standardized residuals greater than ± 3 standard deviations.

After adjustment for pre-test knowledge, there was a statistically significant difference in post-instruction test scores between the instruction groups $F(2,96) = 4.41$, $p < .05$, partial $\eta^2 = 0.08$ and between the combination of instruction groups and personality type groups $F(5,86) = 2.95$, $p < .05$, partial $\eta^2 = 0.15$. Post hoc analysis was performed with a Bonferroni adjustment. Post test scores were statistically significantly greater in the visual group ($M = 72.99$, $SE = 1.50$) when compared to the control group ($M = 66.54$, $SE = 1.96$), a mean difference of 6.45 points, $p = 0.03$. Post test scores were also statistically significantly greater in the audio group ($M = 73.76$, $SE = 1.81$) when compared to the control group ($M = 66.54$, $SE = 1.96$), a mean difference of 7.22 points. When examining combination groups of personality types and instruction type, post test scores were statistically significant in only one comparison: students in the introvert-audio

group ($M = 76.99$, $SE = 2.65$) had statistically significantly higher scores when compared to the introvert-control group ($M = 64.10$, $SE = 2.76$), a mean difference of 12.88 points.

CHAPTER FIVE: CONCLUSIONS

Overview

Many types of research have been conducted to determine the effectiveness of instruction type on the learning process. This research can add to that volume of research with an additional type of research by adding personality type to the instruction type matrix. In this research, there was not statistically significant difference in instruction types for different students; or a difference in instruction types by personality of different students.

Discussion

The purpose of this study was to determine if specific applications of differentiated instruction can be applied to different personality types resulting in a measurable increase in learning. For this study, the types of learning methods used for the differentiated instruction were two common and unique learning methods: audio and visual. The study also looked at personality types to attempt to determine if there were differences in academic scores based on instruction type for different types of personality, specifically, introverted and extroverted students.

The study also included a control group that would attempt to control for differences in ability to learn by the students. The students in the control group received both audio and visual instruction. If there were clear differences in the academic measures, it could be expected that those who received both audio and visual instruction in the control group would perform statistically significantly better because they received the instruction type they desired or needed in the control group. If a certain personality group performed statistically significantly worse than the control group, then conclusions may have been drawn that the specific personality type required a specific teaching style for more effective learning. In fact, students might have done

better with a specific teaching style, whether they had one specific personality or the other. Because there were not statistically significant differences, it may mean that the human mind and the students are able to quickly and easily adapt to learn at the rate they learn without consideration for specific teaching styles. While the student may actually have a preferred learning style, learning via that style appears to have no measurable effect on the actual way or amount that the student learns.

Research Questions

RQ1: Do the academic scores on Biblical knowledge tests for high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

This research did not find a statistically significant difference between students who received audio-only teaching and those who received visual-only teaching. While Ali (2011) found that people will indicate that they have a preference for learning styles, this research supports the idea that while it may be a preference, that preference may not actually make any difference when students are attempting to learn a topic. It takes a good deal of time to setup lessons for differentiated instruction (Cha & Ahn, 2014), but this research has not shown there is a measurable, significant effect on the learning process via test scores, so spending time differentiating instruction may not be a valuable use of instructor's limited time.

In the case of the research discussed here, it did not appear to make any difference to students if they received audio-only or visual-only instruction. The students may have found ways to adapt so that they could learn how they needed to learn: for example, audio-only students may have taken notes to learn visually. Students who have a preference for visual-only learning could have read the audio out loud. However, there is no evidence that this occurred, but the students were not observed for this phenomenon during the experimental period.

RQ2: Do the academic scores on Biblical knowledge tests for high school students differ for students with introverted and extroverted personality types?

Personality types appear to be clearly related to different types of desires for careers (Rashid & Duys, 2015). There also appears to be a relationship between students stated learning type preferences and their personality type (Ginevra, Nota, Heppner, Heppner, & Soresi, 2014). This research found no statistically significant relationship between the test scores for either personality type.

Personality types do appear to have an effect on individuals and can help shape their life and their careers. However, based on this research, there does not appear to be a statistically significant difference in how individuals of personality types learn. Both extroverted and introverted students appear to learn at the same rate and with the same abilities no matter what type of instruction they receive.

RQ3: Do the academic scores on Biblical knowledge tests for introverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

RQ4: Do the academic scores on Biblical knowledge tests for extraverted high school students differ for those who receive visual-only teaching and those who receive audio-only teaching?

Other researchers have attempted to show that despite using different learning styles, students do not perform measurably better in the classroom (Pashler, McDaniel, Rohrer, & Bjork, 2009). The research in this paper supported that idea by not finding a statistically significant difference with different learning styles. At the same time, this research added the additional factor of personality type to attempt to find a relationship or combination that could result in statistically significant additional learning. No clear relationship was found that led to a statistically significant difference in learning as measured by an academic test.

Personality types have been used to effectively estimate success in relationships (Honeycutt & Keaton, 2012), but this effect does not appear to apply to academic learning, either just when considering personality type and while considering personality type with different learning styles. These personality types are clearly defined traits of individuals (Lloyd, 2012), but these do not appear to affect the ways that people learn, at least when considering them learning via different types of instruction.

Teaching in a lecture-style setting is still an effective method of teaching (Camargo-Uribe & Hederich-Martinez, 2014). This method is primarily audio-based, though many teachers currently integrate visual styles into their lecture classes as well. However, these different methods do not appear to make a difference in how effectively students learn when taking into consideration a class full of students, no matter their personality types.

Implications

A good deal of effort is currently being spent in the education industry working to support the idea of differentiated instruction. While it is impossible to prove a negative, this research provides additional support and an additional case in which differentiated instruction, as described by audio and visual types, does not appear to significantly affect the learning process, even when considering different personality types.

The only measurement that showed a statistically significant difference was when the introverted students who received audio instruction were compared to the introverts in the control group. When all the groups of introverts are considered, the control group received both audio and visual instruction. When considering the different types of instruction used, it could be assumed that the control group would do better than either of the other groups simply because they received both types of instruction. However, the introverts with audio instruction did not do

significantly better than introverts who received visual instruction. This area could potentially be an area for more in-depth study to determine if there is there is potential for introverted students to learn more from audio-only instruction. At the same time, in this study, students in the audio group overall did significantly better than when compared to the control group, not considering personality type.

When considering extroverted students, there were no statistically significant differences for any of the groups and in any cases of different instruction types. This shows that in this study the type of instruction received by an extroverted student does not matter when it comes to measuring academic success of the student. Extroverted students may find different ways to learn no matter what type of instruction they receive, or they may easily receive and absorb any type of instruction that is used while they are in the classroom. This also shows that if instructors are spending additional time to attempt to teach in the classroom with different instruction types, that process is not something that is increasing the amount of learning occurring with the extroverted student.

Limitations

The risk of a Type I error is related to the nominal alpha selection, in the case of this research, .05 or 5%. The population used for this research used convenience groups, so there may have been an effect related to the groups – these different convenience groups were based on the current class structure and class layout, so the classes were taught at different times in the day and this may have had an effect on students in the classes. While the overall size of the study was reasonable ($n = 93$), but each individual personality and instruction group were relatively small, ranging from $n = 12$ to $n = 23$. The students were also from a relatively small, private school. This may have provided a group of students that have different reasonings for being in

the school and different socio-economic levels than a group of students from the overall population of all students. The study was also conducted in a single school which further limits the population to students that are familiar with one another any may have additional ways to provide learning in the smaller groups (such as sharing notes, lifelong friendships, and others). The study was conducted at a single school in suburban North Carolina, so the participants in the study did not include urban students, rural students, or students from other countries, all who may have different ways of learning and accepting different teaching styles.

Recommendations for Future Research

1. Additional research could be attempted to see if the statistically significant result in this research could be repeated in a different setting, where introverted students who received audio instruction scored significantly higher on their test scores.
2. Research that controlled for the time of day and instruction type may help support the data and results of this research.
3. Larger populations of students, or a narrower focus on one set of students and instruction type could be attempted to determine if there are other effects related to differentiated instruction.
4. Other factors related to the MBTI personality type could be used to attempt to determine if there are relationships between other personality characteristics and instructional types.
5. Because of the statistically significant difference for introverted students with audio instruction, additional research could focus on introverts and audio instruction to see if there is any advantage for introverted students that receive audio-only instruction.

Conclusion

Educators spend a great deal of time working on teaching strategies related to different learning styles (specifically audio and visual learning styles). There is an entire industry based on teaching to different learning styles, based on reported preferred learning styles. The research in this report attempts to find a relationship between different teaching styles and learning styles and also includes personality types. From what this research shows, there is not a statistically significant effect of different teaching styles, no matter the student or the student personality type.

REFERENCES

- Abdollahimohammad, A., & Ja'afar, R. (2014). Learning style scales: A valid and reliable questionnaire. *Journal of Educational Evaluation for Health Professions, 11*(22), 11-22. doi:<http://dx.doi.org/10.3352/jeehp.2014.11.22>
- Adebayo, A. S., & Shumba, C. B. (2014). An assessment of the implementation of differentiated instruction in primary schools, Kabwe district, Zambia. *European Scientific Journal, 10*(7), 295-308. Retrieved from <http://www.ejournal.org/index.php/esj>
- Al Otaiba, S., Connor, C. M., Folsom, J. S., Greulich, L., Meadows, J., & Li, Z. (2011). Assessment data-informed guidance to individualize kindergarten reading instruction: Findings from a cluster-randomized control field trial. *The Elementary School Journal, 111*(4), 535-560. Retrieved from <http://www.jstor.org/stable/10.1086/659031>
- Alavinia, P., & Farhady, S. (2012). Teaching vocabulary through differentiated instruction: Insights from multiple intelligences and learning styles. *Modern Journal of Language Teaching Methods, 2*(4), 73-92. Retrieved from <http://www.mjltm.com/>
- Alecu, I. (2011). Personality and learning styles. *Economics, Management, and Financial Markets, 6*(1), 1096-1103.
- Ali, S. (2011). Investigating students' main learning style preferences. *Arab World English Journal, 2*(2), 71-90. Retrieved from <http://www.awej.org/>
- AlQahani, D. A., & Al-Gahtani, S. M. (2014). Assessing learning styles of Saudi dental students using Kolb's learning style inventory. *Journal of Dental Education, 927-935*. Retrieved from <http://www.jdentaled.org/>

- American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: American Psychological Association.
- Andres, H. P., & Akan, O. H. (2015). A test of the teaching-learning style mesh hypothesis in a Chinese MBA. *Journal of International Education in Business*, 8(2), 145-163.
doi:10.1108/JIEB-12-2014-0021
- Bak, S. (2012). Personality characteristics of South Korean students with visual impairments using the Myers-Briggs type indicator. *Journal of Visual Impairment & Blindness*, 106(5), 287. Retrieved from <http://www.afb.org/info/publications/jvib/12>
- Beacher, L., Artigliere, M., Patterson, D. K., & Spatzer, A. (2012). Differentiated instruction for English language learners as "variations on a theme". *Middle School Journal*, 43(3), 14-21. Retrieved from <http://www.amle.org/ServicesEvents/MiddleSchoolJournal/tabid/175/Default.aspx>
- Beagley, L. (2011). Educating Patients: Understanding barriers, learning styles, and teaching techniques. *Journal of PeriAnesthesia Nursing*, 26(5), 331-337.
doi:10.1016/j.jopan.2011.06.002
- Bell, M. A., Wales, P. S., Torbeck, L. J., Kunzer, J. M., Thurston, V. C., & Brokaw, J. J. (2011). Do personality differences between teachers and learners impact students' evaluations of a surgery clerkship? *Journal of Surgical Education*, 68(3), 190-193.
doi:10.1016/j.jsurg.2011.01.003
- Benjamin, A. (2006). Valuing differentiated instruction. *The Education Digest*, 72(1), 57-59.

- Berry, T., & Settle, A. (2011). Learning style differences. *International Journal of Education Research*, 6(1), 1-8. Retrieved from <http://www.ijern.com/>
- Bhalli, M. A., Khan, I. A., & Sattar, A. (2015). Learning style of medical students and its correlation with preferred teaching methodologies and academic achievement. *Journal of Ayub Medical College Abbottabad-Pakistan*, 27(4), 837-842. Retrieved from <http://www.jamc.ayubmed.edu.pk>
- Borracci, R. A., & Arribalzaga, E. B. (2015). Kolb's learning styles in medical students. *Medicina (Buenos Aires)*, 75(1), 73-80. Retrieved from <https://doaj.org/toc/1669-9106/66/2>
- Bourgault, A. M., Mundy, C., & Joshua, T. (2013). Comparison of audio vs written feedback on clinical assignments of nursing students. *Teaching with Technology*, 34(1), 43-47. Retrieved from <http://jotlt.indiana.edu/index>
- Braakhuis, A., Williams, T., Fusco, E., Hueglin, S., & Popple, A. (2015). A comparison between learning style preferences, gender, sport and achievement in elite team sport athletes. *Sports*, 3, 325-334. doi:10.3390/sports3040325
- Brumpton, K., & Kitchener, S. (2013). Learning styles in vertically integrated teaching. *The Clinical Teacher*, 10, 282-286. Retrieved from <http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291743-498X>
- Buaraphan, K. (2015). Grades 1-12 Thai students' learning styles according to Kolb's model. *Asian Social Science*, 11(10), 186-200. doi:10.5539/ass.v11n10p186

- Camargo-Uribe, A., & Hederich-Martinez, C. (2014). Patterns of classroom participation as teaching styles: A comparison of six natural science classes. *Forma y Funcion*, 27, 67-87. doi:10.15446/fyf.v27n1.46945
- Capraro, R. M., & Capraro, M. M. (2002). Myers-Briggs Type Indicator score reliability across: Studies a meta-analytic reliability generalization study. *Educational and Psychological Measurement*, 62(4), 590-600. doi:10.1177/0013164402062004004
- Carskadon, T. G. (1977). Test-retest reliabilities of continuous scores on the Myers-Briggs Type Indicator. *Psychological Reports*, 41, 1011-1012.
- Cavanaugh, A. J., & Song, L. (2014). Audio feedback versus written feedback: Instructors' and students' perspectives. *Journal of Online Learning and Teaching*, 10(1), 122-140. Retrieved from <http://jolt.merlot.org/>
- Cha, H. J., & Ahn, M. L. (2014). Development of design guidelines for tools to promote differentiated instruction in classroom teaching. *Asia Pacific Educ. Rev.*, 15(1), 511-523. doi:10.1007/s12564-014-9337-6
- Chang, C.-C., Peng, L.-P., Lin, J.-S., & Liang, C. (2015). Predicting the creativity of design majors based on the interaction of diverse personality traits. *Innovations in Education and Teaching International*, 52(4), 371-382. doi:10.1080/14703297.2014.999697
- Chang, R. I., Hung, Y. H., & Lin, C. F. (2015). Survey of learning experiences and influences of learning style preferences on user intentions regarding MOOCs. *British Journal of Educational Technology*, 46(3), 528-541. doi:10.1111/bjet.12275

- Chen, C.-J. (2014). Differences between visual style and verbal style learners in learning English. *International Journal of Distance Education Technologies*, 12(1), 91-104.
doi:10.4018/ijdet.2014010106
- Chen, M.-L., & Hung, L.-M. (2012). Personality type, perceptual style preferences, and strategies for learning English as a foreign language. *Social Behavior and Personality*, 40(9), 1501-1510. doi:10.2224/sbp.2012.40.9.1501
- Chien, C.-W. (2015). Influence of differentiated instruction workshop on Taiwanese elementary school English teachers' activity design. *Theory and Practice in Language Studies*, 5(2), 270-281. doi:10.17507/tpls.0502.06
- Cohen, Y., Ornoy, H., & Keren, B. (2013). MBTI personality types of project managers and their success: A field survey. *Project Management Journal*, 44(3), 78-89.
doi:10.1002/pmj.21338
- Collins, D., Weber, J., & Zambrano, R. (2014). Teaching business ethics online: Perspectives on course design, delivery, student engagement, and assessment. *Journal of Business Ethics*, 125, 513-529. doi:10.1007/s10551-013-1932-7
- Colombo, M. W., & Colombo, P. D. (2007). Using blogs to improve differentiated instruction. *Phi Delta Kappan*, 10-14. Retrieved from eddigest.com
- Conti, G. J., & McNeil, R. C. (2011). Learning strategy preferences and personality type: Are they related? *Journal of Adult Education*, 40(2), 1-9. Retrieved from <http://www.worldcat.org/title/journal-of-adult-education/oclc/1645883>

- Cox, L., Clutter, J., Sergakis, G., & Harris, L. (2013). Learning style of undergraduate allied health students: Clinical versus classroom. *Journal of Allied Health, 42*(4), 223-228. Retrieved from <http://www.asahp.org/publications/journal-of-allied-health/>
- Creswell, J. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (5th ed.). Boston, MA: Pearson.
- Cuevas, J. (2016). An analysis of current evidence supporting two alternate learning models: learning styles and dual coding. *Journal of Educational Sciences and Psychology, 6*(1), 01-13. Retrieved from <http://jesp.upg-ploiesti.ro/>
- Daisley, R. J. (2011). Considering personality type in adult learning: Using the Myers-Briggs type indicator in instructor preparation at Pricewaterhousecoopers. *Performance Improvement, 50*(2), 15-25. doi:10.1002/pfi.20196
- D'Amore, A., James, S., & Mitchell, E. K. (2012). Learning styles of first-year undergraduate nursing and midwifery students: A cross-sectional survey utilising the Kolb learning style inventory. *Nurse Education Today, 32*(1), 506-515. Retrieved from www.elsevier.com/nedt
- Darrow, A.-A. (2015). Differentiated instruction for students with disabilities: Using DI in the music classroom. *General Music Today, 28*(2). Retrieved from <http://gmt.sagepub.com/>
- Davidson, B., Gillies, R. A., & Pelletier, A. L. (2015). Introversion and medical student education: Challenges for both students and educators. *Teaching and Learning in Medicine, 27*(1), 99-104. doi:10.1080/10401334.2014.979183

- De Neve, D., Devos, G., & Tuytens, M. (2014). The importance of job resources and self-efficacy for beginning teachers' professional learning in differentiated instruction. *Teaching and Teacher Education, 47*(1), 30-41. Retrieved from www.elsevier.com/locate/tate
- Dee, A. L. (2011). Preservice teacher application of differentiated instruction. *The Teacher Educator, 46*(1), 53-70. doi:10.1080/08878730.2010.529987
- Demirkan, H. (2016). An inquiry into the learning-style and knowledge-building preferences of interior architecture students. *Design Studies, 44*(1), 28-51. Retrieved from www.elsevier.com/locate/destud
- Dennery, C. A. (2012). A correlational study of biblical literacy and the level of leadership, discipleship, and demographics in an African American church in Delaware. (*Doctoral Dissertation*).
- Fleming, N. D., & Mills, C. (1992). Not another inventory, rather a catalyst for reflection. *To Improve the Academy, 11*, 137-155.
- Franzoni-Velazquez, A. L., Cervantes-Perez, F., & Assar, S. (2012). A quantitative analysis of student learning styles and teacher teachings strategies in a Mexican higher education institution. *Journal of Applied Research and Teaching, 10*, 289-309. Retrieved from <http://www.journals.elsevier.com/journal-of-applied-research-and-technology/>
- Fredette, J., O'Brien, C., Poole, C., & Nomura, J. (2015). Do emergency medicine residents and faculty have simliar learning styles when assessed with the Kolb learning style

- assessment tool? *Delaware Medical Journal*, 87(4), 109-114. Retrieved from <http://medsocdel.org/Communications/DelawareMedicalJournal.aspx>
- Fretwell, C. E., Lewis, C. C., & Hannay, M. (2013). Myers-Briggs type indicator, A/B personality types, and locus of control: Where do they intersect? *American Journal of Management*, 13(3), 57-68. Retrieved from <http://www.na-businesspress.com/ajmopen.html>
- Furnham, A., & Stringfield, P. (1993). Personality and work performance: Myers-Briggs type indicator correlates of managerial performance in two cultures. *Personality and Individual Differences*, 14, 145-153.
- Furnham, A., Moutafi, J., & Crump, J. (2003). The relationship between the revised NEO-personality inventory and the Myers-Briggs type indicator. *Social Behavior and Personality*, 31(6), 577-584. Retrieved from <https://www.sbp-journal.com/index.php/sbp>
- Gall, M. D., Gall, J. P., & Borg, W. R. (2015). *Applying educational research: How to read, do, and use research to solve problems of practice*. Boston, MA: Prentice Hall, Inc.
- Gilakjani, A. P. (2012). A match of mismatch between learning styles of the learners and teaching styles of the teachers. *I.J. Modern Education and Computer Science*, 11, 51-60. doi:10.5815/ijmeecs.2012.11.05
- Ginevra, M. C., Nota, L., Heppner, P. P., Heppner, M., & Soresi, S. (2014). The relationship of personality type, problem-solving appraisal, and learning strategies. *Journal of Career Assessment*, 23(4), 545-558. doi:10.1177/1069072714553075

- Gourlay, K. H. (2013). An assessment of Bible knowledge among adult Southern Baptist Sunday school participants. *Christian Education Journal*, 10(1), 7-29. Retrieved from <http://journals.biola.edu/ns/cej/>
- Gray, H. J., David, P., & Liu, X. (2012). Keeping up with the technologically savvy student: Student perceptions of audio books. *A Journal of Leisure Studies and Recreation Education*, 26(2), 28-38. Retrieved from <http://js.sagamorepub.com/schole>
- Green, S. B., & Salkind, N. J. (2014). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (7th ed.). Boston, MA: Pearson.
- Gyanchandani, R. (2013). A study on learning style of students of b-school. *International Journal of Entrepreneurship & Business Environment Perspectives*, 2(2), 416-421. Retrieved from <http://pezzottaitejournals.net/pezzottaite/>
- Hatami, S. (2013). Learning styles. *ELT Journal*, 67(4), 488-490. doi:10.1093/elt/ccso83
- Hill, F., Tomkinson, B., Hiley, A., & Dobson, H. (2016). Learning style preferences: an examination of differences amongst students with different disciplinary backgrounds. *Innovations in Education and Teaching International*, 53(2), 122-134. doi:10.1080/14703297.2014.961504
- Honeycutt, J. M., & Keaton, S. A. (2012). Imagined interactions and personality preferences as predictors of relationship quality. *Imagination, Cognition and Personality*, 32(1), 3-21. doi:dx.doi.org/10.2190/IC.32.1.b

- Hung, Y. H., Chang, R. I., & Lin, C. F. (2016). Hybrid learning style identification and developing adaptive problem-solving learning activities. *Computers in Human Behavior*, 55(1), 552-561. Retrieved from www.elsevier.com/locate/comphumbeh
- Johnson, G. M., & Cooke, A. (2014). Student use of audio, video, and written teacher feedback: The predictive utility of learning modality preference, self-regulated learning, and learning style. *International Journal of University Teaching and Faculty Development*, 5(2), 111-129. Retrieved from https://www.novapublishers.com/catalog/product_info.php?products_id=10541
- Jones, R. E., Yssel, N., & Grant, C. (2012). Reading instruction in tier 1: Bridging the gaps by nesting evidence-based interventions within differentiated instruction. *Psychology in the Schools*, 49(3), 210-219. doi:10.1002/pits.21591
- Jung, C. G. (1921). *Psychology of the unconscious: A study of the transformations and symbolisms of the libido: A contribution to the history of evolution of thought*. New York, NY: Moffat, Yard, and Company.
- Karimina, A., & Mahjubi, M. (2013). Individual differences and quality of translation: A personality-based perspective. *Psychology of Language and Communication*, 17(1), 1-28. doi:10.2478/plc-2013-0003
- Kayaoglu, M. N. (2013). Impact of extroversion and introversion on language-learning behaviors. *Social Behavior and Personality*, 41(5), 819-826. doi:10.2224/sbp.2013.41.5.819

- Kim, R. H., & Gilbert, T. (2015). Learning style preferences of surgical residency applicants. *Journal of Surgical Research*, 198, 61-65. Retrieved from www.JournalofSurgicalResearch.com
- Kizas, A. (2016). Differentiated instruction and student engagement: Effective strategies for teaching combined-grade classes at the secondary level. *Canadian Music Educator*, 32-37. Retrieved from <http://cmea.ca/journal/>
- Kun, A. I., Kiss, M., & Kapitany, A. (2015). The effect of personality on academic performance: Evidence from two university majors. *Business Education & Accreditation*, 7(1), 13-24. Retrieved from www.theIBFR.com
- Larenas, C. H., Moran, A. V., & Rivera, K. J. (2011). Comparing teaching styles and personality types of EFL instructors in the public and private sectors. *Profile*, 13(1), 111-127. Retrieved from <http://www.revistas.unal.edu.co/index.php/profile/>
- Lauria, J. (2010). Differentiation through learning-style responsive strategies. *Kappa Delta Pi Record*, 47(1), 24. Retrieved from <http://www.kdp.org/publications/kdprecord/index.php>
- Little, C. A., McCoach, D. B., & Reis, S. M. (2014). Effects of differentiated reading instruction on student achievement in middle school. *Journal of Advanced Academics*, 25(4), 384-402. doi:10.1177/1932202X14549250
- Lloyd, J. B. (2012). The Myers-Briggs type indicator and mainstream psychology: Analysis and evaluation of an unresolved hostility. *Journal of Beliefs & Values*, 33(1), 23-34. doi:dx.doi.org/10.1080/13617672.2012.650028

- Logan, B. (2008). Examining differentiated instruction: Teachers respond. *Research in Higher Education Journal*, 1-14.
- Lorenzo, G., Pomares, J., & Lledo, A. (2013). Inclusion of immersive virtual learning environments and visual control systems to support the learning of students with Asperger syndrome. *Computers & Education*, 62, 88-101. Retrieved from www.elsevier.com/locate/compedu
- Lu, H., Jia, L., Gong, S.-h., & Clark, B. (2007). The relationship of Kolb learning styles, online learning behaviors and learning outcomes. *Educational Technology & Society*, 10(4), 187-196. Retrieved from <http://www.ifets.info/>
- Maeng, J. L., & Bell, R. L. (2015). Differentiating science instruction: Secondary science teachers' practices. *International Journal of Science Education*, 37(13), 2065-2090. doi:10.1080/09500693.2015.1064553
- Manolis, C., Burns, D. J., Assudani, R., & Chinta, R. (2013). Assessing experiential learning styles: A methodological reconstruction and validation of the Kolb learning style inventory. *Learning and Individual Differences*, 23, 44-52. Retrieved from www.elsevier.com/locate/lindif
- Martin, E. L. (2014). Teaching strategies for introverted vs. extroverted students. *Bulletin for the Study of Religion*, 43(3), 39-48. doi:10.558/bsor.v43i39
- Martin, P. C. (2013). Role-playing in an inclusive classroom: Using realistic simulation to explore differentiated instruction. *Issues in Teacher Education*, 22(2), 93-108. Retrieved from <http://www.itejournal.org/>

- Meneske, M., Stump, G. S., Krause, S., & Chi, M. T. (2013). Differentiated overt learning activities for effective instruction in engineering classrooms. *Journal of Engineering Education, 102*(3), 346-375. Retrieved from <http://wileyonlinelibrary.com/journal/jee>
- Metallidou, P., & Platsidou, M. (2007). Kolb's learning style inventory-1985: Validity issues and relations with metacognitive knowledge about problem-solving strategies. *Learning and Individual Differences, 18*(1), 114-119. Retrieved from www.elsevier.com/locate/lindif
- Middleton, A. (2016). Reconsidering the role of recorded audio as a rich, flexible and engaging learning space. *Research in Learning Technology, 24*(1).
doi:[dx.doi.org/10.3402/rlt.v24.28035](https://doi.org/10.3402/rlt.v24.28035)
- Mohr, A. T., Holtbrugge, D., & Berg, N. (2012). Learning style preferences and the perceived usefulness of e-learning. *Teaching in Higher Education, 17*(3), 309-322. Retrieved from <http://www.tandfonline.com/toc/cthe20/current>
- Morgan, H. (2014). Maximizing student success with differentiated learning. *The Clearing House, 87*(1), 34-38. doi:[10.1080/00098655.2013.832130](https://doi.org/10.1080/00098655.2013.832130)
- Moul, C., & Dadds, M. R. (2013). Learning-style bias and the development of psychopathy. *Journal of Personality Disorders, 27*(1), 85-98. Retrieved from <http://guilfordjournals.com/loi/pedi>
- Myers, I. B. (1962). *The Myers-Briggs type indicator: Manual*. Palo Alto, CA: Consulting Psychologists Press. doi:[dx.doi.org/10.1037/14404-000](https://doi.org/10.1037/14404-000)
- Naserieh, F., & Sarab, M. R. (2013). Perceptual learning style preferences among Iranian graduate students. *System, 41*, 122-133. doi:[10.1016/j.system.2013.01.018](https://doi.org/10.1016/j.system.2013.01.018)

- Negari, G. M., & Barghi, E. (2014). An exploration on Iranian EFL learners' learning style preferences. *Modern Journal of Language Teaching Methods*, 4(2), 17-26. Retrieved from <http://www.mjltm.com/>
- Ngware, M. W., Oketch, M., & Mutisya, M. (2014). Does teaching style explain differences in learner achievement in low and high performing schools in Kenya? *International Journal of Educational Development*, 36, 3-12. Retrieved from www.elsevier.com/locate/ijedudev
- Norel, M., & Laurentiu, R. (2011). Student's learning style and multiple intelligence profile. *Journal of Educational Sciences and Psychology*, 1(1), 80-85. Retrieved from <http://jesp.upg-ploiesti.ro/>
- Obralic, N., & Akbarov, A. (2012). Students preference on perceptual learning style. *Acta Didactica Napocensia*, 5(3), 31-44. Retrieved from <http://adn.teaching.ro/>
- Ocepek, U., Bosnic, Z., Nancovska, I., & Rugelj, J. (2013). Exploring the relation between learning style models and preferred multimedia types. *Computers & Education*, 69, 343-355. Retrieved from www.elsevier.com/locate/compedu
- Olesova, L. A., Richardson, J. C., Weasenforth, D., & Meloni, C. (2011). Asynchronous instructional audio feedback in online environments: A mixed methods study. *Journal of Online Learning and Teaching*, 7(1). Retrieved from <http://jolt.merlot.org/>
- Otaiba, S. A., Connor, C. M., Folsom, J. S., Greulich, L., Meadows, J., & Li, Z. (2011). Assessment data-informed guidance to individualize kindergarten reading instruction. *The Elementary School Journal*, 111(4), 535-560. Retrieved from <http://www.jstor.org/stable/10.1086/659031>

- Palabryik, P. Y. (2014). Perceptual learning style preferences among Turkish junior high school students. *Journal of Education and Future*, 59-70. Retrieved from <http://oaji.net/journal-detail.html?number=320>
- Parsons, S. A., Dodman, S. L., & Burrowbridge, S. C. (2013). Broadening the view of differentiated instruction. *Phi Delta Kappa International*, 95(1), 38-42. Retrieved from <http://www.jstor.org/stable/23617757>
- Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009). Learning styles: Concepts and evidence. *Psychological Science in The Public Interest*, 9(3), 105-119. Retrieved from <http://www.psychologicalscience.org/index.php/publications/journals/pspi>
- Patrick, C. L. (2011). Student evaluations of teaching: Effects of the big five personality traits, grades and the validity hypothesis. *Assessment & Evaluation in Higher Education*, 36(2), 239-249. doi:10.1080/02602930903308258
- Persky, A. M., Henry, T., & Campbell, A. (2015). An exploratory analysis of personality, attitudes, and study skills on the learning curve within a team-based learning environment. *American Journal of Pharmaceutical Education*, 79(2), 1-12. Retrieved from <http://www.ajpe.org/>
- Petchboonmee, P., Phonak, D., & Tiantong, M. (2015). A comparative data mining technique for David Kolb's experiential learning style classification. *International Journal of Information and Education Technology*, 5(9), 672-677. Retrieved from <http://ijiet.org/>

Pham, H. L. (2012). Differentiated instruction and the need to integrate teaching and practice.

Journal of College Teaching and Learning, 9(1), 13-22. Retrieved from

<http://www.cluteinstitute.com/journals/journal-of-college-teaching-learning-tlc/>

Phillips, C. (2011). Performing criticism: How digital audio can help students learn (and teach)

poetry. *Transformations: The Journal of Inclusive Scholarship and Pedagogy*, 22(1), 53-

71. Retrieved from <http://web.njcu.edu/sites/transformations>

Psaltou-Joycey, A., & Kantaridou, Z. (2011). Major, minor, and negative learning style

preferences of university students. *System*, 39, 103-112. Retrieved from

www.elsevier.com/locate/system

Radwan, A. A. (2014). Gender and learning style preferences of EFL learner. *Arab World*

English Journal, 5(1), 21-32. Retrieved from www.awej.org

Rashid, G. J., & Duys, D. K. (2015). Counselor cognitive complexity: Correlating and comparing

the Myers-Briggs type indicator with the role category questionnaire. *Journal of*

Employment Counseling, 52(1), 77-87. doi:10.1002/joec.12006

Reese, M. P. (2010). An assessment of Bible knowledge of Churches of Christ in West Virginia

and related variables. (*Doctoral Dissertation*).

Reiner, C., & Willingham, D. (2010). The Myth of Learning Styles. *Change*, 42(5), 32-35.

Reis, S. M., McCoach, D. B., Little, C. A., Muller, L. M., & Kaniskan, R. B. (2011). The effects

of differentiated instruction and enrichment pedagogy on reading achievement in five

elementary schools. *American Educational Research Journal*, 48(2), 465-501.

doi:10.3102/0002831210382891

- Rogowsky, B. A., Calhoun, B., & Tallal, P. (2014). Matching learning style to instructional method: Effects on comprehension. *Journal of Educational Psychology, 107*(1), 64-78.
doi:<http://dx.doi.org/10.1037/a0037478>
- Roy, A., Guay, F., & Valois, P. (2015). The big-fish-little-pond effect on academic self-concept: The moderating role of differentiated instruction and individual achievement. *Learning and Individual Differences, 42*(1), 110-116. Retrieved from www.elsevier.com/locate/lindif
- Salar, R., & Turgut, U. (2015). Implementing differentiated instruction on pre-service physics teachers: Agendas. *Journal of Faculty of Education, 4*(2), 682-695.
doi:[10.14686/buefad.v4i2.5000136908](https://doi.org/10.14686/buefad.v4i2.5000136908)
- Sandlin, M. R., Murphey, T. P., Lindner, J. R., & Dooley, K. E. (2013). Impacts of a faculty abroad experience on teaching style and technology use in a college of agriculture and life sciences. *Journal of Agricultural Education, 54*(3), 186-197.
doi:[10.5032/jae.2013.03186](https://doi.org/10.5032/jae.2013.03186)
- Scigliano, D., & Hipsky, S. (2010). 3 ring circus of differentiated instruction. *Kappa Delta Pi Record, 46*(2), 82-86. Retrieved from <http://www.kdp.org/publications/kdprecord/index.php>
- Shepherd, C., & Alpert, M. (2015). Using technology to provide differentiated instruction for deaf learners. *Journal of Instructional Pedagogies, 16*(1), 1-7. Retrieved from <http://www.aabri.com/jip.html>

- Shoemaker, N., & Kelly, M. (2015). How college business students learn with emphasis on differences between majors. *Journal of College Teaching and Learning*, 12(4), 223-229. Retrieved from <https://www.cluteinstitute.com/journals/journal-of-college-teaching-learning-tlc/>
- Smit, R., & Humpert, W. (2012). Differentiated instruction in small schools. *Teaching and Teacher Education*, 28(1), 1152-1162. Retrieved from www.elsevier.com/locate/tate
- Sornson, B. (2015). The effects of using the essential skills inventory on teacher perception of high-quality classroom instruction. *Preventing School Failure*, 59(3), 161-169. doi:10.1080/1045988X.2014.886551
- Souzandehfar, M., Soozandehfar, S. M., Farsi, M., & Sharif, M. (2014). Which personality trait performs better on IELTS speaking test? Extroverted or introverted? *Advances in Environmental Biology*, 8(6), 2159-2168. Retrieved from <http://www.aensiweb.com/aeb.html>
- Subban, P. (2006). Differentiated instruction: A research bias. *International Education Journal*, 7(7), 935-947. Retrieved from <http://iej.com.au>
- Taylor, B. K. (2015). Content, process, and product: Modeling differentiated instruction. *Kappa Delta Pi Record*, 51(1), 13-17. doi:10.1080/00228958.2015.988559
- Thinnyane, H. (2013). Academic perceptions of the ideal computer science student. *South African Computer Journal*, 50, 28-41. Retrieved from <http://sacj.cs.uct.ac.za/>

- Threeton, M. D., Walter, R. A., & Evanski, D. C. (2013). Personality type and learning style: The tie that binds. *Career and Technical Education Research*, 38(1), 39-55.
doi:10.5328/cter38.1.39
- Trinter, C. P., Brighton, C. M., & Moon, T. R. (2015). Designing differentiated mathematics games: Discarding the one-size-fits-all approach to educational game play. *Gifted Child Today*, 38(2), 88-96. doi:10.1177/1076217514568560
- Trotman, M. (2016). Using the Blooms-Banks matrix to develop multicultural differentiated lessons for gifted students. *Gifted Child Today*, 37(3), 163-170.
doi:10.1177/1076217514532275
- Valiandes, S. (2015). Evaluating the impact of differentiated instruction on literacy and reading in mixed ability classrooms: Quality and equity dimensions of education effectiveness. *Studies in Educational Evaluation*, 45(1), 17-26. Retrieved from www.elsevier.com/stueduc
- Van Klaveren, C. (2011). Lecturing style teaching and student performance. *Economics of Education Review*, 30, 729-739. Retrieved from www.elsevier.com/locate/econedurev
- Walczak, S., & Borkan, G. L. (2016). Personality type effects on perceptions of online credit card payment services. *Journal of Theoretical and Applied Electronic Commerce Research*, 11(1), 67-83. doi:10.4067/S0718-18762016000100005
- Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques* (2nd ed.). Thousand Oaks, CA: SAGE Publications, Inc.

- Williams, B., Brown, T., & Etherington, J. (2013). Learning style preferences of undergraduate pharmacy students. *Currents in Pharmacy Teaching & Learning*, 5, 110-119.
doi:10.1016/j.cptl.2012.09.003
- Williams, B., Brown, T., & Etherington, J. (2013). Learning style preferences of undergraduate social work students. *Social Work Education*, 32(8), 972-990.
doi:10.1080/02615479.2012.730142
- Williams-Black, T. H., Bailey, J. P., & Coleman Lawson, P. D. (2010). Differentiated instruction: Are university reading professors implementing it? *Reading Matrix: An International Online Journal*, 10(1).
- Wong, Y.-h. P., & Zhang, L.-f. (2014). Perceived school culture, personality types, and wellbeing among kindergarten teachers in Hong Kong. *Australasian Journal of Early Childhood*, 39(2), 100-110. Retrieved from
<http://www.earlychildhoodaustralia.org.au/our-publications/australasian-journal-early-childhood/>
- Zafarghandi, A. M., Salehi, S., & Sabet, M. K. (2016). The effect of EFL teachers' extrovert and introvert personality on their instructional immediacy. *International Journal of Applied Linguistics & English Literature*, 5(1), 57-65. doi:10.7575/aiac.ijalel.v.5n.1p.57
- Zardouz, S., German, M. A., Wu, E. C., & Djalilian, H. R. (2011). Personality types of otolaryngology resident applicants as described by the Myers-Briggs type indicator. *Otolaryngology - Head and Neck Surgery*, 144(5), 714-718.
doi:10.1177/0194599810397793

Appendix A

INSTRUCTIONS FOR TEST ADMINISTRATOR

Dear Brother,

Thank you so much for agreeing to participate in this Assessment of Bible Knowledge research project. As a faithful Christian leader you realize the importance of Bible knowledge as the foundation for Christian discipleship. My research project is two-fold. There is a 100 question multiple-choice Assessment of Bible Knowledge Test. It is to be completed by each student Bible class participant in your classes. Only those who have provided an asset form should participate in this survey.

The instructions are as follows:

1. Complete the Assessment of Bible Knowledge Test during Bible class

PLEASE FOLLOW THESE INSTRUCTIONS WORD FOR WORD AND STEP BY STEP.

1. Student Information:

- a. Administrator Statement/script - "I am going to administer a Bible Knowledge Survey. This Assessment of Bible Knowledge Survey is part of an EDD research project. All individual scores and answers are anonymous and will be kept confidential.

- b. "Please answer the questions honestly and do not share answers with each other. Remember, this is a research project and your answers need to reflect your sincerity. Please take this seriously. Please complete the entire survey. I will pick up the finished surveys after everyone is finished. "

- c. Administrator - pass out the Assessment of Bible Knowledge Test booklets with blank answer sheets.

2. Upon completion collect the completed answer sheets and place in test envelope.

(Please Do Not Look At The Survey Answers In Order To Preserve Complete Confidentiality).

3. Please provide completed answer sheets back to me after the tests are complete.

If you have any questions please contact me at 980-318-3728

I thank you in advance for taking the time to assist in this valuable research project.

May all results be used to the glory of God.

In His Service,

Jeffrey Ober

Liberty University Graduate School of Education

Appendix B**IRB Approval:****LIBERTY UNIVERSITY.**
INSTITUTIONAL REVIEW BOARD

December 11, 2017

Jeffrey Ober

IRB Approval 3011.121117: Differences in High-School Student Learning by Instruction Type and MBTI Personality Type

Dear Jeffrey Ober,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

LIBERTY
UNIVERSITY.

Liberty University | Training Champions for Christ since 1971