Student Age, Grade, and Years of Online Experience as Predictors of Agentic
Engagement in K-12 Virtual Education

Submitted by

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I verify that my dissertation represents original research, is not falsified or plagiarized, and that I have accurately reported, cited, and referenced all sources within this manuscript in strict compliance with APA and Grand Canyon University (GCU) guidelines. I also verify my dissertation complies with the approval(s) granted for this research investigation by GCU Institutional Review Board (IRB).

Elijah True Lefkowitz

Date
Abstract

The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience with virtual learning, age, and grade level were significant predictors of agentic engagement, and if overall agentic engagement changed from earlier brick-and-mortar school experience to current virtual school experience. Agentic engagement is a measure of the student’s constructive contribution to the education they receive. Constructivism and self-determination theory formed the theoretical foundation of the study. The researcher collected primary data via a cross-sectional, online survey from a convenience sample of 79 students recruited from the population of 168 full-time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida. The analysis showed collinearity between age/grade, $r = 0.971, p < 0.001$, $VIF = 18.07$, and the researcher discarded age as a predictor of agentic engagement. The hierarchical multiple linear regression analysis performed to assess the impact of grade and experience with virtual learning on agentic engagement produced a statistically significant model, $F(2, 75) = 3.717$, adjusted $R^2 = .09$, $p = 0.029$. Years of experience with virtual learning was the only statistically significant predictor, standardized Beta = 0.275, $t = 2.41$, $p = 0.018$. The paired-samples $t$ test performed to assess the difference in the respondents’ agentic engagement between earlier brick-and-mortar school experience ($M = 17.683$) and current virtual school experience ($M = 20.220$) showed a significantly higher agentic engagement in the virtual school, $t(78) = 5.135$, $p < 0.001$. Experience in virtual education had an impact on overall agentic engagement.

Keywords: Agentic engagement, student engagement, K-12, virtual school
Dedication

This hard work and effort is dedicated to my son, Sawyer. If you want to accomplish something, you can do whatever you put your mind to.
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As much as I would like this dissertation to only be completed by myself, I had plenty of help and support along the way. I would like to acknowledge my mother and editor for reading and rereading my dissertation countless times. Without her help, my dissertation would have taken longer and cost more money. Dr. Smith, my dissertation chair, put up with a lot of my frustrations, and I probably frustrated her a few times. She was very calm and never let it show. Dr. Miron offered some statistical help that was above and beyond her duties at Grand Canyon University. I would like to acknowledge the Lee County School District for allowing to me to collect data within one of their schools. My Principal, Mr. Shilling, was very supportive and allowed complete access to Lee Virtual in whatever dissertation topic I chose. Dr. Itzen reviewed my proposal, granted site approval, and made some great suggestions that strengthened my dissertation. I would like to also thank Taylor Swift and her song “Blank Space”. That song was on continual repeat during my dissertation writing. Swiftamine kept me going through my work.
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Chapter 1: Introduction to the Study

Introduction

The focus of this study was to determine if secondary student experience in the virtual learning environment, age, and grade level were significant predictors of agentic engagement in Lee Virtual School. Academic progress and achievement are educationally valuable outcomes that can be predicted by measuring student engagement (Gerber, Mans-Kemp, & Schlecter, 2013). Agentic engagement is the “student’s constructive contribution into the flow of the instruction they receive” (Reeve & Tseng, 2011, p. 258). Agentic engagement is a construct of total student engagement and is provided by the student from the instruction they receive. Students who are agentically engaged negotiate their own supportive learning environment (Reeve, 2013). Reeve (2013) hypothesized this type of engagement and developed an Agentic Engagement Scale (AES) to measure the construct.

Virtual education is learning that takes place primarily over the internet (iNACOL, 2011). The International Association for K-12 Online Learning (iNACOL) estimated that there were over 1.8 million enrollments in some type of distance learning which constitutes primarily virtual learning in the 2009 school year. In addition, iNACOL (2013) estimated another 310,000 full time students were enrolled in the 2012 school year. In virtual education, students are tasked with motivating themselves and being stewards of their own education (Barbour, 2009). This study sought to determine if agentic engagement was a predictor of student success in virtual education.

This study is significant on many levels within kindergarten through 12th grade (K-12) educational constructs. The study’s most apparent significance is the addition of
agentic engagement to virtual K-12 education, where there is a gap in the literature with respect to agentic engagement and how students can contribute to their own academic engagement (Reeve & Lee, 2014). Additionally, there is a gap with respect to student experiences in virtual compared with brick-and-mortar (Pleau, 2012). This quantitative study utilized Reeve’s (2013) Agentic Engagement Scale and extended prior research on agentic student engagement to students in the virtual setting and contributed to the overall research on student engagement. This study addressed whether agentic engagement increases with experience in virtual education.

**Background of the Study**

As a multidimensional construct, there are varying theories on what parts constitute a portion of engagement. Appleton, Christensen and Furlong (2008) described engagement in four factors: behavioral, academic, cognitive, and affective. Lester (2013) defined three areas of engagement as behavioral, emotional, and cognitive. Lam et al. (2014) argued that academic engagement is a form of behavioral engagement. Behavioral engagement is the “student’s involvement in academic and social activities” (Lester, 2013, p. 3). “Cognitive engagement refers to strategies that students adopt and employ during the learning process” (Lam et al., 2014, p. 216). Reeve and Tseng (2011) also stated that there are three main constructs of engagement.

Agentic engagement is a relatively new construct that has limited administration outside of Korea (Reeve & Lee, 2014). Agentic engagement is the “student’s constructive contribution into the flow of the instruction they receive” (Reeve & Tseng, 2011, p. 258). Reeve and Lee (2014) stated that research on agentic engagement should be extended outside of Korea to diverse populations. This study extended prior research on agentic
student engagement to students in the virtual setting and contributed to the overall research on student engagement. In addition, it addressed if experience in a virtual school increased overall agentic engagement.

Student achievement has been a focus of higher level and K-12 education. Student engagement has been brought to the forefront of education from its beginnings in 1985 with two studies measuring student disengagement (Appleton, et al., 2008). Over its history, studies in student engagement have shown the possibility to predict student educational outcomes (Lam et al., 2014). Lester (2013) found that student engagement was unclear and broad in its definition. The common elements of multiple definitions from various authors define student engagement as the overall participation and success a student exhibits with respect to effort in class and schoolwork (Appleton et al., 2008; Lam et al., 2014; Lester, 2013).

**Problem Statement**

It was not known if and to what extent student experience in the Lee Virtual School virtual learning environment, age, and grade level were significant predictors of agentic engagement of secondary students, and if overall agentic engagement significantly changed from previous brick-and-mortar school experience to current virtual school experience. There was a gap in the literature with respect to agentic engagement and how students can contribute to their own academic engagement (Reeve & Lee, 2014). Additionally, there is a gap with respect to student experiences in virtual compared with brick-and-mortar (Pleau, 2012). Virtual education is a fairly new pathway in education. Virtual education is learning that takes place primarily over the internet (iNACOL, 2011). Agentic engagement is a construct that has a unique fit with virtual
instruction in that students who work virtually are more responsible for their own education than traditional students.

Virtual education has seen great success in growth in its short existence. In Kansas, the number of K-12 public virtual schools increased from five (5) in 2000 to 25 in 2006 (Hawkins, Graham, Sudweeks, & Barbour, 2013). Florida was one of the early adopters of virtual education and several other states are now working to incorporate virtual education within their education systems (Millet, 2012). In 2013, there were 428,315 high school students enrolled in a virtual course (iNACOL, 2013).

According to Lam and colleagues (2014), there is a positive correlation between student engagement and academic achievement. Lester (2013) defined three areas of engagement: behavioral, emotional, and cognitive. Reeve and Tseng (2011) developed a fourth construct of student engagement with the foundation of self-efficacy. The foundation of agentic engagement is developed from Bandura’s (1997) “efficacious learners” (p. 579) and Ryan and Deci’s (2000) “autonomously motivated students” (as cited in Reeve 2013 p. 580). Agentic engagement is the “constructive contribution into the flow of the instruction they receive” (Reeve & Tseng, 2011, p. 258). There are five characteristics of agentic engagement:

- It is proactive.
- It is intentional.
- It tries to enrich the learning opportunity.
- It contributes constructive input into planning or on-going flow of instruction so that the student has a say in the conditions under which he or she learns.
- It does not connote teacher incompetence or ineffectiveness. (Reeve & Tseng, 2011)

These characteristics differentiate agentic engagement from other constructs of engagement. Agentic engagement is a measure of the students’ ability to self-regulate and
self-monitor with respect to their own education. Students who are engaged in this manner are agents of their own education and seek out learning that best fits their needs (Reeve & Tseng, 2011). For example, students proactively inform teachers of their needs for learning in the classroom. The importance of this study will determine if the experience in Lee Virtual School increases a secondary student’s self-motivation through the measure of agentic engagement. It is anticipated that the data on agentic engagement can help administrators predict success in virtual school by linking agentic engagement and virtual education. In virtual education, students are tasked with motivating themselves and being stewards of their own education.

**Purpose of the Study**

The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience in the Lee Virtual School virtual learning environment, age and grade level were significant predictors of agentic engagement, and if overall agentic engagement changed from previous brick-and-mortar school experience to current virtual school experience. The study involved the collection of primary data using a cross-sectional online survey. The population is 168 full time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida.

Lee Virtual School is the only public virtual school in Lee County Florida. The students of Lee Virtual School follow the Lee County school district calendar. The population includes full time K-12 students and part time 8th-12th grade students. Part-time students are enrolled at a brick-and-mortar school and take a class with Lee Virtual School. Students are required to visit a physical location for statewide and district testing. There is not a requirement for in person classes. Teachers at Lee Virtual School offer
office hours and host optional, but recommended academic days each week. Academic days are opportunities for students to receive help from all of their instructors at the physical location. Out-of-county students can enroll with Lee Virtual School during a current semester, but they are encouraged to enroll at the beginning of the next semester. In-county students cannot enroll in Lee Virtual School during an in progress semester.

The researcher recruited a convenience sample of 82 full-time students from a total population of 168 full-time students enrolled at Lee Virtual School in Lee County, Florida. The a priori minimal sample size computed on G*Power was \( N = 77 \) (Appendix D). The researcher collected information from the students regarding their agentic engagement (dependent variable), number of years of experience in the virtual learning environment, age and grade level (independent variables). The data were analyzed in SPSS using multiple linear regression analyses. The multiple linear regression analysis assessed the statistical significance of the three hypothesized predictors, age, grade, and experience with virtual learning (independent variables) using agentic engagement as a criterion (dependent variable). The level of statistical significance was 0.05.

The Lee County School District manifested interest in assessing change in students’ agentic engagement. To meet the district’s needs, the researcher asked students the AES questions both in reference to their current experience and their past experience in brick-and-mortar schools, before attending virtual school. The researcher used SPSS to determine if there was a difference between the current and past experience AES scores to measure the change in students’ agentic engagement. The data analysis involved a paired-samples \( t \) test that compared the means of current and past experiences. This analysis determined if there was a significant change in agentic engagement from the
students’ earlier traditional brick-and-mortar school experiences to their current virtual school experiences.

This study provided more tools to administrators interested in measuring engagement of virtual students. In addition, this study contributed to the overall field of agentic engagement. In virtual education, students are tasked with motivating themselves and being stewards of their own education. This study determined if the attendance in virtual school increased a student’s self-motivation through the measure of agentic engagement. Virtual education encourages student self-efficacy and self-efficacy is the foundation of agentic engagement (Reeve & Tseng, 2011).

**Research Questions and Hypotheses**

The central research question related to the ability for students to be stewards of their own education and if the experience in virtual school enhanced that ability. The central research question addressed in this study was: Does experience at Lee Virtual School foster agentic engagement, and does agentic engagement increase in each subsequent year of attendance in virtual school? The researcher stated the following four research questions and corresponding pairs of hypotheses as a framework for this study:

R1: Is student experience in the virtual learning environment a significant predictor of agentic engagement?

H1a: Student experience in a virtual learning environment is a significant predictor of agentic engagement.

H10: Student experience in a virtual learning environment is not a significant predictor of agentic engagement.
The researcher used two control variables as possible co-predictors of agentic engagement, student age and student grade. The corresponding research questions and pairs of hypotheses were the following:

R2: Is the age of virtual students a significant predictor of agentic engagement?
H2a: The age of virtual students is a significant predictor of agentic engagement.
H20: The age of virtual students is not a significant predictor of agentic engagement.

R3: Is the grade level of virtual students a significant predictor of agentic engagement?
H3a: The grade level of virtual students is a significant predictor of agentic engagement.
H30: The grade level of virtual students is not a significant predictor of agentic engagement.

The fourth research question regarded the change in students’ agentic engagement from the brick-and-mortar school environment to the virtual school environment:

R4: Is there a difference in agentic engagement with previous experience in a brick-and-mortar school and current virtual experience?
H4a: There is a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.
H40: There is not a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.

The independent variables (predictors) were defined as student experience in the virtual learning environment, age and grade level. The information regarding student
experience in the virtual learning environment, age and grade level were collected by three demographic questions on the survey administered to students. The dependent variable was defined as agentic engagement as reported by students on the AES instrument, which was the main component of the online survey. The researcher asked students the AES questions both in reference to their current experience in the virtual school and their past experience in brick-and-mortar schools, before attending virtual school. The researcher used SPSS to determine if there was a difference between the virtual school and brick-and-mortar school AES scores. The data analysis involved a hierarchical multiple linear regression to answer the first three research questions and a paired-samples t test to answer the fourth question.

The AES showed strong internal consistency, produced a normal distribution of scores, was associated positively with autonomous motivation, was associated negatively with controlled motivation, and explained independent variance in student achievement that the other three aspects of engagement were unable to explain. (Reeve, 2013, p. 586)

The AES is a five-item questionnaire that includes the following statements:

1. I let my teacher know what I need and want.
2. During this class, I express my preferences and opinions.
3. When I need something in this class, I’ll ask the teacher for it.
4. During class, I ask questions to help me learn.
5. I let my teacher know what I am interested in. (Reeve, 2013, p. 585)

The survey respondents expressed their agreement to these statements using scores on five-point Likert scales.

The four research questions and hypotheses aligned with the purpose of this study, which was to determine whether student experience in the virtual learning
environment, age and grade level were significant predictors of agentic engagement, and if agentic engagement changed from previous brick-and-mortar to current virtual experience. Students in virtual school are tasked with moving through courses and exercising self-regulation and self-motivation (Hamane, 2014). Agentic engagement is a unique construct that focuses on students motivating themselves and being proactive to ask for help from teachers (Reeve, 2013). Students who are engaged in this manner are agents of their own education and seek out learning that best fits their needs (Reeve & Tseng, 2011). In virtual education students and teacher are separated by time and space, which is why in this environment it is imperative for the student to self-monitor and self-regulate (Hamane, 2014). These skills contribute to a student becoming an agent of their own educational success (Reeve & Tseng, 2011).

Virtual education is based on constructivist theory (Shih-Chyueh, Fu-Kwun, & Chin-Chung, 2008). Baviskar, Hartle, and Whitney (2009) and Brooks and Brooks (1999) discussed essential features of constructivism:

- Learning is characterized by cognitively active learners.
- Learning should happen in context and be structured around related themes or primary concepts.
- New knowledge constructs are built upon prior knowledge.
- New knowledge should be applied and feedback provided.
- Learner self-reflection on the learning process is a key learning activity. (as cited by Yoders, 2014, p. 12)

Learning in the traditional style where a student sits in a brick-and-mortar classroom is very different from a student who enrolls in a virtual school. In a virtual school students need to be active learners and reflect on their own learning. The move from a traditional to a virtual school will come with a learning curve. Scaffolding is a term that is associated with Vygotsky’s zone of proximal development (ZPD) in which
the student is introduced to material just outside of his or her comfort level. The teacher continues to introduce material that the student needs to grapple with in order to master (Gredler, 2012). Scaffolding takes complex tasks and breaks them into manageable chunks, which allow the student to “close the gap” (Yoders, 2014, p. 13). Similarly, as a student works through and experiences virtual courses, the student will move to a new ZPD.

Advancing Scientific Knowledge

Agentic engagement is a relatively new concept as a construct of overall student engagement. Prior research identified three constructs of engagement: behavioral, cognitive, and emotional engagement (Lam et al., 2014; Lester 2013). Reeve (2013) hypothesized agentic engagement and developed an Agentic Engagement Scale (AES) to measure the construct. Academic progress and achievement are educationally valuable outcomes that can be predicted by measuring student engagement (Gerber et al., 2013). Self-determination theory (SDT) is the basal theory of all constructs of engagement. SDT indicates the inherent ability of students to self-motivate.

Virtual education is the next iteration of distance education (Cavanaugh, Barbour, & Clark, 2009). Virtual education is separated from distance education as virtual education is considered primarily utilized over the internet (iNACOL, 2011). Cavanaugh et al. (2009) compiled a literature review of benefits of virtual schooling on K-12 students, which included “higher levels of motivation, expanding educational access, high quality learning opportunities, improving of student outcomes and skills, and educational choice” (p. 5). Virtual education is immersed in constructivist and learner centered theories.
Constructivism is based on the teacher as the facilitator, and the activities are centered on the student. The students are responsible to self-motivate, stay on task and stay in contact with their teachers (Tatli & Ayas, 2012). Sultan, Woods, and Koo (2011) studied digital learning with respect to constructivist attitudes. The researchers found four key outcomes that related to constructivism including personal relevance, uncertainty, critical voice, shared control and student negotiation.

Student experiences and how that affects improved student engagement need to be studied further (Burrows, 2010). Additionally, Li and Lerner (2013) stated that further research is needed on variables that promote student engagement. There was a gap in the literature with respect to agentic engagement and how students can contribute to their own academic motivations (Reeve & Lee, 2014). Additionally, there is a gap with respect to student experiences in virtual compared with brick-and-mortar (Pleau, 2012). This study extended prior research on agentic student engagement to students in the virtual setting, and contributed to the overall research on student engagement. In virtual education, students are tasked with motivating themselves and being stewards of their own education. This study determined if the attendance in virtual school increased a student’s self-motivation through the measure of agentic engagement.

**Significance of the Study**

This study was significant within the K-12 educational context. Its most apparent significance was the addition of agentic engagement to virtual K-12 education. This quantitative study utilized the Agentic Engagement Scale, a survey developed by Reeve (2013). The theory of agentic engagement and the AES was strengthened with added data points (Reeve, 2013). Li and Lerner (2013) stated that further research is needed on
variables identified as significant to student engagement. The study extended prior research on agentic student engagement to students in the virtual setting to address if agentic engagement increased with attendance in a virtual setting. Agentic engagement predicted student achievement and is important as a construct of total student engagement (Reeve & Tseng, 2011).

In virtual education, students are tasked with motivating themselves and being stewards of their own education. This study determined if the attendance in virtual school increased a student’s self-motivation through the measure of agentic engagement. The AES tool could be used to identify at-risk behaviors prior to the end of the school year (Hamane, 2014). Administrators and teachers could use the tool to monitor agentic engagement in students. It could prevent students from failing courses for which they are not prepared or allow teachers to be proactive in addressing academic issues. The present study will also have significance to virtual schools in Florida, especially the Lee Virtual School located in the Lee County School District (LCSD).

Rationale for Methodology

The population of Lee Virtual School in Lee County, Florida is 168 full time 6th-12th-grade virtual students. The researcher recruited a convenience sample of 82 full time Lee Virtual School students (Appendix D). Given the size of the sample of participants and the fact that the validated AES instrument used in this study collects quantitative data for agentic engagement, the researcher used the quantitative research method, which is also appropriate for statistical testing of relationships among numerically expressed variables. The statistical procedure that is appropriate for assessing the impact of interval independent variables on interval dependent variables is multiple linear regression. The
predictors (independent variables) in this study were the student’s experience in the virtual learning environment, age and grade level. The criteria (dependent variables) was the student’s current agentic engagement in the virtual school and the change in student’s agentic engagement from the previously attended brick-and-mortar schools to the current virtual school. The level of statistical significance was alpha = 0.05. Qualitative studies collect data about a single or small group of subjects. Xiao (2014) utilized qualitative design and profiled a single case study on virtual engagement.

In quantitative research, there is a large group of subjects that is used to make connections and determine trends. Veiga and Robu (2014) conducted a quantitative study comparing a student engagement survey between 742 Romanian and Portuguese students. The research in the current study included 82 students. Quantitative methodology is the most appropriate due to the amount of expected responses.

In their original research and development on the AES, Reeve and Tseng (2011) utilized a Likert Scale and a linear regression as part of the data analysis. Their study used many statistical tests to test five hypotheses including zero-order correlations, multiple regression and exploratory confirmatory factor analysis. The linear regression was used to assess the impact of student engagement on academic achievement. In that study, the researchers used a 21-item engagement scale (including AES). For need satisfaction, those researchers used the 14-item Activity Feeling States (AFS). Each assessment used a 7-item Likert scale.

**Nature of the Research Design for the Study**

This researcher used a correlational design to investigate whether students’ experience in the virtual learning environment, age and grade level were significant
predictors of students’ current agentic engagement in the virtual school. In addition, a
causal-comparative design was used to determine if there was a change in students’
agentic engagement from the previously attended brick-and-mortar schools to the current
virtual school. The study population was 168 full time virtual students enrolled in grades
6 through 12 at Lee Virtual School in Lee County, Florida. The researcher recruited a
convenience sample of 82 participants, eliminated three respondents, and performed the
analysis on a sample of 79 cases. The a priori minimum sample size was 77 cases, and
was computed on G*Power to capture an effect size of 0.15, with 0.80 power, at alpha =
0.05 (Appendix D).

The researcher collected the necessary data via online survey using a validated
instrument. The AES instrument is a questionnaire that includes five statements (Reeves,
2013). Respondents are requested to score their degree of agreement to each of these
statements using five-point Likert scales.

The AES showed strong internal consistency, produced a normal distribution of
scores, was associated positively with autonomous motivation, was associated
negatively with controlled motivation, and explained independent variance in
student achievement that the other three aspects of engagement were unable to
explain. (Reeve, 2013, p. 586)

The researcher asked the respondents to score two versions of the exact same instrument,
one with regard to their experience in the virtual school they are currently enrolled in and
the second time with regard to their past experience in the previously attended brick-and-
mortar schools.
The researcher analyzed the survey data using multiple linear regression to test the first three hypotheses stated for the three potential predictors of student agentic engagement: student experience in the virtual learning environment, age, and grade level. The statistical procedure was hierarchal linear regression, with experience in the virtual learning environment as the main predictor, and age and grade level as controls. The criterion (dependent variable) was student agentic engagement in the current virtual environment. For testing the fourth hypothesis, the researcher used a paired-samples $t$ test to compare the means of current agentic engagement in the virtual school and past agentic engagement in the previously attended brick-and-mortar schools.

Reeve and Tseng (2011), in their original study that developed agentic engagement as a measurement, used a correlational design to test five hypotheses. Their analysis included zero-order correlations, multiple regression, and exploratory confirmatory factor analysis. In other agentic engagement studies, Reeve and his colleagues used hierarchal linear modeling (Jang, Kim, & Reeve, 2012; Reeve & Lee, 2014). Jamaludin and Osman (2014) used Pearson correlations to assess the relationship between the four constructs of engagement. In the current study, one of the researcher’s goals was to determine if age, grade level, and years of experience in the virtual learning environment were significant predictors of agentic engagement. For that, the researcher used a correlational design and hierarchical linear regression analysis. The other goal in this study was to compare the respondents’ agentic engagement in the current virtual school experience and in their earlier brick-and-mortar school experience. For that, the researcher used a causal-comparative design and a paired-samples $t$ test for the analysis.
Definition of Terms

The following terms and concepts are defined for the purpose of identification with the study. The definitions below are derived from each variable in the study and from the theoretical framework:

**Agentic engagement.** It is defined as the “student’s constructive contribution into the flow of the instruction they receive” (Reeve & Tseng, 2011, p. 258).

**Behavioral engagement.** Behavioral engagement is the “student’s involvement in academic and social activities” (Lester, 2013, p. 3). It can include: attention, persistence, effort, following class rules and asking questions (Lester, 2013).

**Brick-and-mortar schools.** “Refers to traditional school or traditional school building, as contrasted with an online school” (iNACOL, 2011, p. 3).

**Cognitive engagement.** “Cognitive engagement refers to strategies that students adopt and employ during the learning process” (Lam et al., 2014, p. 216).

**Construct.** “A construct is a variable that cannot be observed directly but is assumed on the basis of other evidence” (Fredricks, et al., 2011, p. 5). Behavioral, cognitive, emotional and agentic engagement cannot be measured directly but can be measured through other indicators (Fredricks et al, 2011).

**Distance education.** Distance education activities are where students are separated by space from the instructor and each other. The separation may or may not be time (iNACOL, 2011).

**Emotional engagement.** Emotional engagement is a student’s attitudes, interests and values and how those are affected by positive or negative interactions in school (Lester, 2013). Examples of emotional engagement are: affective reactions, emotional
reactions and school identification (Lester, 2013). Affective engagement is a synonymous term (Appleton et al., 2008)

*Self-determination theory (SDT).* “Self-determination theory asserts that every person across cultures requires the fulfillment of fundamental needs of autonomy, competence and relatedness” (Appleton, Christensen, & Furlong, 2008, p. 378)

*Virtual education.* Virtual education is an iteration of distance education. Virtual education’s separating factor is that it is administered primarily on the internet (iNACOL, 2011). Synonyms are “online learning”, “e-learning”, “cyberlearning” (iNACOL, 2011, p. 7).

**Assumptions, Limitations, Delimitations**

**Assumptions.** The researcher made the following assumptions with respect to the study of experience in a virtual program and agentic engagement:

1. The survey participants were assumed to be honest on the survey assessment. Student participation in this study did not count for a grade and in no way penalized or rewarded a student for answering honestly.
2. The researcher assumed that the students participated in the survey on their own, without help from their parents.
3. The AES was assumed to collect valid and reliable measures of students’ agentic engagement.
4. The researcher assumed that each student participated in the survey once.

**Limitations.** This study had the following limitations:

1. The survey was administered online with no method to verify actual participant completing survey.
2. The data collected with the AES survey were technically ordinal in nature. However, the researcher approximated the data to interval measures.
3. The data set for the t test were not normally distributed.

**Delimitations.** The researcher made certain decisions that delimited this study in the following ways:
1. The study population was delimited to students in Lee Virtual School. Consequently, the research findings cannot be generalized to other virtual populations.
2. The sample of virtual students was delimited to 6th-12th graders.
3. The researcher used a cross-sectional online survey for convenient and expeditious data collection. Given this choice of data collection method, participation was on a voluntary basis. The resulting convenience sample of participants was nonrandom, which posed a validity problem and violated the sample randomness assumption for parametric statistics.

**Summary and Organization of the Remainder of the Study**

Agentic engagement is a new construct within the framework of overall student engagement (Reeve & Tseng, 2011). Agentic engagement is a measure of how much the students monitor and are agents in their own education (Reeve, 2013). In a virtual setting, students are not located in the same time or space as their teachers (iNACOL, 2011). Agentic engagement can be an indicator to administrators if students are succeeding in a virtual environment. Virtual school relies on the student being self-disciplined and self-motivated. Students who are new to virtual school have a different experience in a physical brick-and-mortar school. In the virtual setting students were expected to improve overall agentic engagement each year of attendance in a virtual school.

This purpose of this study was to investigate to what extent student years of experience with virtual learning, age, and grade could predict their agentic engagement, and determined if agentic engagement differed between the respondents’ current virtual school environment and their earlier brick-and-mortar school environment. The researcher used a quantitative research method. Students at a virtual school in Lee County, Florida were administered a survey to determine their overall agentic engagement and to collect demographic data regarding their years of experience in virtual school, age, and grade. The researcher analyzed data from a convenience sample of 79
students. The quantitative (interval) nature of the data and purpose of the study called for two types of designs. For the first three research questions regarding student years of experience with virtual learning, age, and grade as potential predictors of agentic engagement, the researcher used a correlational design and a hierarchical linear regression analysis. For the fourth research question regarding the difference in the respondents’ agentic engagement between their current virtual school environment and their earlier brick-and-mortar school environment, the researcher used a causal-comparative design and a paired-samples $t$ test.

Chapter 2 of this research contained the literature review. Constructivism and self-determination theory (SDT) are the foundational theories for virtual education and agentic engagement, respectively. The researcher discussed the historical framework of virtual school and student engagement. The review continued with a presentation of the current literature on the topic of engagement and virtual instruction. The researcher focused on the studies that were most closely related with this research and discussed both their methodology and their findings. This provided a basis for the justification of the research methodology that was selected for the study.

Chapter 3 presented in detail the methodology used in this research and provided justifications for the chosen method and design, data collection method and instruments, and data analysis procedures. Chapter 4 described the data analysis and presents the results using appropriate tables and figures. Chapter 5 included a summary of the study, presented implications and conclusions, and provided recommendations for further research and for practice.
Chapter 2: Literature Review

Introduction to the Chapter and Background to the Problem

The literature review will begin with the development of the study through historical context and theoretical foundations of constructivism, K-12 virtual education, and self-determination theory (SDT). These theoretical foundations will establish the years of experience in virtual education (independent variable) as a predictor of agentic engagement (dependent variable). The first section will establish constructivism as a theoretical foundation of the virtual education model. The second section will cover the historical context of virtual education by establishing a timeline of the growth of virtual education and synthesizing research on the effectiveness of K-12 virtual education. The third section will describe SDT as a foundation for student engagement.

The review of current literature will establish agentic engagement as a fourth construct of student engagement. The review will cover research published after 2010 to ensure accuracy of findings. The databases utilized were Education Research Complete, Google Scholar, Dissertations and Theses: The Humanities and Social Sciences Collection, ERIC, PsychINFO, Omnifile Full Text Select (H.W. Wilson), Social Sciences Citation Index, Psych Articles, SPORTDiscus with full text, MAS Ultra – School Edition and PsychARTICLES. In the review of the literature the researcher reviewed over 200 peer review journal articles, over 50 dissertations and two books. The search terms utilized for general purposes were student engagement and virtual education. To filter the journal articles more thoroughly the researcher added K-12 to attain the most relevant information. In addition, the terms of constructivism, self-determination theory (SDT), and agentic engagement were used for background information to develop the literature
review. To ascertain that all appropriate articles for virtual education were reviewed, the researcher also used the terms online learning, distance learning and eLearning. There will be a selection of articles, books and journals published prior to 2010 that establish key points and topics for discussion. This will also establish the gap in the literature of agentic engagement and attendance in a virtual school. The research will provide a complete review of current research in student engagement. The fourth section will introduce the constructs of student engagement. The fifth section will establish agentic engagement as a new construct to the student engagement literature. The sixth section will determine the justification of virtual education as a tangible measure of agentic engagement.

There is a gap in the literature dealing with student experiences and how that effects improved student engagement (Burrows, 2010, p. 74). Additionally, there is a gap with respect to student experiences in virtual compared with brick-and-mortar (Pleau, 2012). Virtual education is a fairly new pathway in education. It has seen great success in growth in its short existence. Synonyms for virtual education include: “online learning”, “e-learning”, and “cyber learning” (iNACOL, 2011, p. 7). Hamane (2014) included the following synonyms to virtual education: distance education, distributed learning and distance learning. Allen and Seaman (2013) described online learning as most or all of the instruction is online. They established that 80% or more constitutes online learning. Learning can be completely online or blended. Blended learning involves most of the learning online with some face-to-face meetings (Allen & Seaman, 2013). In Kansas, the number of virtual schools increased from five in 2000 to 25 in 2006 (Hawkins, Graham, & Barbour, 2012). Florida was one of the early adopters of virtual education; and the rest
of the states are now working to incorporate virtual education within their education systems (Millet, 2012).

Student engagement is one of the key ingredients to academic success in school. There is a positive correlation between student engagement and academic achievement (Lam et al., 2014). Student experiences and how that effects improved student engagement need to be studied further (Burrows, 2010). Additionally, Li and Lerner (2013) state that further research is needed on variables that promote student engagement. There is a gap in the literature with respect to agentic engagement and how students can contribute to their own academic engagement (Reeve & Lee, 2014). Additionally, there is a gap with respect to student experiences in virtual compared with brick-and-mortar (Pleau, 2012). This study will extend prior research on agentic student engagement to students in the virtual setting, and contribute to the overall research on student engagement.

**Theoretical Foundations**

Virtual education experience as the independent variable as increasing self-reliance has been studied through dissertations, peer-reviewed journal articles and books. Virtual education is heavily steeped in constructivist theories (Shih-Chyueh et al, 2008). Virtual school success depends on the student being able to self-monitor and self-regulate. “Self-monitoring and self-regulating provide valuable insights to students’ learning and enhance their perceived level of engagement” (Hamane, 2014, p. 164). Virtual education and learning management systems can help students understand their own methods for learning (Hamane, 2014). Students’ experiences with virtual education can help them become aware of their own needs in learning. Shih-Chyueh et al. (2008)
found that virtual education promotes “metacognitive reflective thinking” and “epistemological development” through “multiple information sources” and decontextualized interactions” (p. 155).

Clayton Christensen, Michael Horn and Curtis Johnson (2008) delineated the evolution of virtual education and modularity of learning. The authors explained that students will be able to individually customize their learning and choose courses that interest them or meet their learning needs (2008). Agentic engagement, in line with this view, is the ability for students to monitor and direct their own learning (Reeve & Lee, 2014). Agentic engagement is a new construct of overall engagement and is found to increase with “agentic-rich motivation” and was negatively associated with “agentic impoverished motivation” (Reeve, 2013). Reeve and Lee (2013), using the AES as one of the engagement indicators, found that students’ initial engagement predicted mid semester and end of semester motivations. This finding leads credence to the theory that agentic engagement can be an indicator of student success in a virtual environment.

Constructivism is the foundational theory for virtual education experience as the independent variable. Self-determination theory is the foundational theory for agentic engagement. Both theories intersect with each other in making students grapple with their work. Agentic engagement is a measure of the students’ “constructive contribution” to the education they receive (Reeve, 2013, p. 579).

**Constructivism.** Virtual education is based on the theory of constructivism (Shih-Chyueh et al., 2008). Constructivism is one of the foundational theories for both variables. Baviskar et al. (2009) and Brooks and Brooks (1999) discussed essential features of constructivism:
• Learning is characterized by cognitively active learners.
• Learning should happen in context and be structured around related themes or primary concepts.
• New knowledge constructs are built upon prior knowledge.
• New knowledge should be applied and feedback provided.
• Learner self-reflection on the learning process is a key learning activity. (as cited in Yoders, 2014, p. 12)

Sultan et al. (2011) studied digital learning with respect to constructivist attitudes. The researchers found four key outcomes that related to constructivism including: personal relevance, uncertainty, critical voice, shared control and student negotiation. The students are responsible to self-motivate, stay on task and stay in contact with their teachers.

Constructivism is a student-centered learning environment, which emphasizes student participation as a core element (Ültanir, 2012). Constructivism is the backbone of virtual education. Virtual and web based applications and lessons lend themselves toward constructivist tendencies (Tatli & Ayas, 2012).

Lev Vygotsky researched how students learn best. He stated that students needed to grapple with knowledge while utilizing their own experiences and through social interaction. Lev Vygotsky theorized about the zone of proximal development (ZPD), which incorporates scaffolding into student learning (Gredler, 2012). From Vygotsky’s work, Gredler (2012) summarized how the ZPD can be determined by teachers:

• Demonstrate the solution to see if the child can imitate the steps.
• Begin to solve the problem to see if the child can finish it.
• Have the child “cooperate” with another more fully developed child.
• Explain the principles of solving the problem, ask leading questions, analyze the problem for the child and so on. (p. 118)

In Vygotsky’s theory, the teacher and students have a role in development. Scaffolding is a term that is associated with Vygotsky’s ZPD in which the student is introduced to material just outside of his or her comfort level. The teacher continues to
introduce material that the student needs to grapple with in order to master (Gredler, 2012). Scaffolding takes complex tasks and breaks them into manageable chunks, which allows the student to “close the gap” (Yoders, 2014, p. 13).

John Dewey a progressive education theorist continued the theory of constructivism in his writing (Ültanir, 2012). Dewey believed that students should be actively participating in their own self-directed learning (Ültanir, 2012). This view combined with Vygotsky’s ZPD creates a pathway for virtual education to create “self-realization” of the learner (Ültanir, 2012, p. 201). Christensen, Horn and Johnson’s (2008) view of the future of virtual education align with Dewey’s progressive educational views.

**Self-determination theory (SDT).** Student academic success and student engagement are dependent on conditions that give the student a chance to succeed. SDT is a framework that delineates how people internalize resources and self-regulate. SDT accounts for how people learn and grow and what conditions account for positive or negative growth (Ryan & Deci, 2000). This approach conceptualizes the effects teachers and students have on each other in the confines of the student-teacher dialectical framework (Reeve & Tseng, 2011).

Research on SDT compares the positive and negative effects classroom conditions can have on students’ motivation (Reeve, 2006). SDT assumes:

- All students, irrespective of their backgrounds, possess inherent growth tendencies and psychological needs that provide a motivational foundation for their optimal functioning, academic engagement, constructive social development, and personal well-being.
- Students are always in active exchange with their classroom environment and therefore need supportive resources from their environment to nurture and involve these inner motivational resources. (Reeve, 2006, p. 226)
Student engagement can be positively or negatively affected by fostering or neglecting these inner motivational resources (Reeve, 2006). Figure 1, developed by Reeve (2006), showed the dialectical framework within SDT between classroom conditions and the students’ internal motivational resources. There is a relationship between the classroom conditions and students’ internal motivations. The dialectical framework, in general, diagrams opposing forces. In this framework the dialectical shows visually how internal motivation and external classroom conditions are “dynamically interactive” (Reeve, 2006, p. 226). Certain approaches to instruction can activate motivation in students.

Offering students choices and incorporating student interest in instruction can foster and increase overall student inner motivation resources. In situations where the teacher cannot increase this inner motivation with an activity, the instructor redesigns and redeploy the lesson to better include students’ preferences, interests and sense of enjoyment. Increasing a student’s inner motivation comes from internal factors and not external rewards (Reeve, 2006).
Figure 1. The dialectical framework within self-determination theory (Reeve, 2012, p. 158).

One way to discourage motivation is for teachers to utilize “controlling language” in which the students are discouraged by coercion or pressure (Reeve, 2006, p. 229). “Non-controlling language” is flexible and allows a student who is underachieving to foster inner motivational resources to complete activities (Reeve, 2006, p. 229). SDT provides autonomy support to students to self-correct and improve throughout the classroom activity. Reeve (2006) delineated what autonomy supportive teachers do in the classroom:

1. Listen carefully.
2. Create opportunities for students to work in their own way.
3. Provide opportunities for students to talk.
4. Arrange learning materials and seating patterns so students manipulate objects and conversations rather than passively watch and listen.
5. Encourage effort and persistence.
6. Praise signs of improvement and mastery.
7. Offer progress enabling hints when students seem stuck.
8. Are responsive to students’ questions and comments.
9. Communicate a clear acknowledgement of students’ perspectives. (p. 231)
Agentic engagement is the product of positive interactions within the dialectic framework proposed by Reeve (2006) of internal motivations and classroom resources. Agentic engagement is the students’ contribution to their own engagement. The classroom and teacher provide the basal support for students to express opinions and ask questions that are the criteria for an agentically engaged student (Reeve & Tseng, 2011).

**Review of the Literature**

The section on virtual education is important to the study establishing virtual education as a successful pathway for student success. Virtual instruction has many benefits such as modularity and individualized learning and can disrupt traditional education (Christensen et al., 2008). Virtual education is steeped in constructivist theory. The variable of agentic engagement is only worth measuring if virtual education is a heavily researched and sound educational methodology. The section begins with the definitions of various online learning and criteria for virtual education. The section then uses current literature to establish the effectiveness of virtual education with multiple variables and demographic populations such as students with IEPs, low and high socioeconomic status, free and reduced lunch, gender and race. The final part of the section brings out the issues within virtual education to create a complete picture of the field.

**K-12 virtual education.** Virtual schools have experienced rapid growth in student population and quantity of virtual options such as: virtual charter schools, private virtual schools, district run virtual schools, full time virtual schools and part time virtual options (iNACOL, 2013). K-12 virtual education has increased from 40,000 in the beginning of the decade to over two million (Barbour, Grzebyk, & Eye, 2014). The broad
definition of virtual education is learning that takes place primarily over the internet (iNACOL, 2011). Synonyms for virtual education include: “online learning”, “e-learning”, and “cyber learning” (iNACOL, 2011, p. 7). Hamane (2014) included the following synonyms to virtual education: distance education, distributed learning and distance learning. Allen and Seaman (2013) described online learning as most or all of the instruction is online. They establish that 80% or more constitutes online learning. Learning can be completely online or blended. Blended learning involves most of the learning online with some face-to-face meetings (Allen & Seaman, 2013). Allen and Seamen (2013) described hybrid learning as 20%-79% online curriculum.

**Virtual K-12 effectiveness.** A report on virtual school productivity cited that online learning has many aspects that can increase productivity by:

1. Broadening access to resources and experiences.
2. Engaging students in active learning.
3. Individualizing and differentiating curriculum. (Bakia, Shear, Toyama, & Lasseter, 2012, pp. 19-21)

Corry and Stella (2012) developed a framework for researching K-12 distance education. The researchers’ framework encompassed nine areas: learners, teachers, materials, delivery, methodology, evaluation, administration, international and history. From a student’s perspective, online learning provided “a greater level of independence and control over their own learning” (Barbour, McLaren, & Zhang, 2012, p. 235). In the same study the students cited lack of on-task behavior due to uninteresting curriculum. Barbour (2011) highlighted benefits of online learning:

- Higher levels of motivation.
- Expanding educational access.
- Providing high-quality learning opportunities.
- Improving student outcomes and skills
Allowing for educational choice
Administrative efficiency. (p. 5)

Similarly, a qualitative study that surveyed parents of children in virtual school found comparable challenges with keeping their children on task (Sorenson, 2012). In addition, the parents cited lack of socialization as another challenge to virtual school. The researchers concluded that parents have an overall favorable view of virtual school including: pace, teacher interaction, increased student learning, positive student growth, environment and flexibility. Hawkins, Graham, Sudweeks, and Barbour (2013) utilized a quantitative study that surveyed students’ perceptions and compared them with completion rate and academic performance. The study found that quantity and quality of interactions had an impact on completion rate but not on grades awarded.

The effectiveness of students in virtual school has been studied in aggregate and within each subject and student population. Student engagement in an online math course was measured using synchronous and asynchronous platforms (Petty & Farinde, 2013). The researchers found that students who had more time to reflect in the asynchronous platform displayed higher levels of engagement. Liu and Cavanaugh (2011) conducted a study on an online biology course. The researchers sought to determine if learner and learning environment characteristics effected academic performance in a biology course. Learners in the second semester of biology, who participated in online activities more frequently, had more of a chance for success in the online class. However, learning in the first semester of biology did not have a significant increase in achievement. The researchers noted that virtual learning has a learning curve and students in the first semester may be adapting to the environment while the second semester counterparts have more experience in a virtual course.
Corry and Carlson-Bancroft (2014) researched methods in which virtual learning was used to assist schools with their turnaround model. Access to schools via the virtual model can broaden access to populations in remote locations or can access highly qualified teachers. The virtual model can help students who need to recover credit either at their own pace or as an additional class beyond the school day. Finally, the ability to work at the student’s own pace and receive individual learning can benefit students across the spectrum of at-risk, students with disabilities and even gifted students (Corry & Carlson-Bancroft, 2014). Cavanaugh, Repetto, Wayer, and Spitler (2013) discussed ways to prevent dropouts, incorporate students with disabilities and at risk students in virtual education. The authors referred to the five C’s of the student engagement framework: control, curriculum, climate, caring community and connection. Using the five C’s in the virtual framework can help to provide services for these students.

Studies in virtual education effectiveness have to be separated into various demographic variables, for helping underserved populations. Liu and Cavanaugh (2011) included free and reduced lunch status, individual education plan (IEP), grade level, and race. The students of low socioeconomic status (SES) trailed in academic achievement compared to medium to high SES students. The students of low SES still performed better in the second half of biology like the high SES counterparts. The researchers found that IEP status, grade level and race were not of significance. One note was that students in higher grade levels performed better in the second half of biology courses. The author indicates that this could be due to students utilizing virtual credit retrieval, which helped students who were not successful in biology in a traditional setting. These students have taken the course prior and have seen the material.
Some areas of concern have been noted in various studies on virtual education. Cyber-truancy is one area that can hinder the effectiveness of virtual instruction. Attendance and record keeping in a brick-and-mortar school is concisely defined and easily implemented. In the virtual environment there are barriers to monitoring and enforcing online attendance (Archambault, Kennedy, & Bender, 2013). Petty and Farinde (2013) in their research noted that it is hard to tell if quality engagement is occurring. If students are not fully engaged in the learning environment, then mastery of the content will not take place.

Liu and Cavanaugh (2011) highlighted that low SES students may need assistance with gaps in resources that could affect academic achievement in virtual school. Barbour and Siko (2012) mirrored this in a case study of an at risk student. The student struggled due to lack of proper technology at home. Barbour (2011) in a literature review highlighted some of the historical challenges to virtual instruction including:

- Access issues surrounding the digital divide.
- Student readiness issues and retention issues. (p. 5)

**Student engagement.** Student engagement has been researched over three decades (Appleton et al., 2008). The research shows the evolution of engagement as an idea to a multi-dimensional construct. This section first defines engagement and provides a historical framework. The section provides research on how student engagement produces student outcomes such as improved student achievement. Engagement is related to SDT and agentic engagement is added as a fourth construct of engagement. The final section discusses how student engagement can be improved.

**Student engagement definition and construct.** Self-determination (SDT) theory is the underlying theory on student engagement. SDT is a continuum of how much
autonomy a student is afforded in classes combined with the students’ internal resources (Jang, Reeve, & Deci, 2010). Most theorists who study student engagement agree that engagement is a multi-dimensional construct and encompasses school involvement and a commitment to learning (Appleton et al., 2008; Fredricks, et al., 2011; Lam et al., 2014). Despite the near consensus on constructs, the overall definition used to describe engagement includes a broad range of elements: student engagement, school engagement, academic engagement, engaged time, student engaged learning, academic responding, engagement in class and engagement in school work (Fredricks, et al., 2011).

In early student engagement research there were two constructs of student engagement, emotional or affective and behavioral engagement (Appleton, Christensen, & Furlong, 2008; Lam et al., 2014). Affective engagement relates to how the student feels about his or her learning and school attachment (Appleton et al., 2008; Lam et al., 2014). Lester (2013) added that emotional engagement is “related to the positive or negative interactions with faculty, staff and students” (p. 3). Skinner and Belmont (1993) in their description of behavioral and emotional engagement discussed how effort and involvement played a role in engagement and had an effect on many student outcomes.

Examples of emotional engagement are student interest, boredom, anxiety, sadness, happiness, belonging and importance (Appleton et al., 2008; Lester, 2013). Behavioral engagement relates to effort and participation in schoolwork (Appleton et al., 2008; Lam et al., 2014; Lester, 2013). Lester (2013) specified that participation includes following class rules. Involvement includes concentration, persistence, and effort. Lester (2013) and Lam et al. (2014) indicated that effort and participation in school related activities is included in behavioral engagement.
Cognitive engagement was added as a third construct of engagement (Appleton et al., 2008; Lam et al., 2014). Appleton et al. (2008) and Lester (2013) stated that cognitive engagement included self-regulation, learning goals, and investment in learning. Lam et al. (2014) defined cognitive engagement as the “strategies students adopt and employ during the learning process” (p. 216). Lam et al. (2014) did not include self-regulation as the skill was not entirely cognitive.

Appleton et al. (2008) conducted a meta-analysis of student engagement definitions in an attempt to establish academic engagement as a fourth construct of student engagement. Lam et al. (2014) examined academic engagement and found that it was redundant and included many aspects of behavioral engagement. Reeve and Tseng (2011) developed another construct of student engagement called agentic engagement. Unlike academic engagement, the AES measured agentic engagement as a student initiated pathway different from other constructs of student engagement.

Li and Lerner (2013) developed a study to determine the interrelatedness of the three constructs of student engagement (behavioral, emotional, and cognitive). The researchers completed a 2-year longitudinal study on 9th-11th grade students. One of the significant findings was that there is a path from emotional engagement to both behavioral and cognitive engagement. There was not a significant pathway from cognitive back to behavioral engagement. Cognitive engagement and emotional engagement have a reciprocal relationship. The researchers made strides in linking the three constructs of engagement, but note that unless this was started at the time students were at school age, these pathways cannot be definitive (Li & Lerner, 2013).
Student engagement and student outcomes. Engagement is related to student outcomes such as understanding dropouts, encouraging school completion and preparing students for postsecondary options and the workplace (Appleton et al., 2008). Lam et al. (2014) included academic outcomes from student engagement, but also included non-academic outcomes such as higher self-esteem, peer acceptance, and life satisfaction. The author completed an international collaborative project on student engagement. The study measured the three constructs of student engagement (emotional, behavioral, and cognitive) with contextual factors (teacher support and practices, peer support, and parent support) and outcomes (emotions, academic performance, and conduct). The study included 3,420 middle school students in 12 countries. The study found that students who perceived the teacher supporting the students emotionally and motivationally had higher engagement. Parent, peer and teacher support also was positively associated with engagement. The author did note that parental involvement dissipates as the students get older but the foundational support remains. The author found moderate to low correlations with emotions and engagement. The author also found low correlations with engagement and academic performance. The author attributed this point to engagement being only one factor of student outcomes (Lam et al., 2014).

Dotterer and Lowe (2011) developed a study that utilized multi-methodological approach to behavioral, affective and cognitive engagement. This study utilized self-reports and observational assessments to determine if the classroom context can predict engagement that will then predict academic achievement in fifth grade students. The multi-method approach eliminated reporter bias (Dotterer & Lowe, 2011). The researchers found that classroom context (instructional quality, socioemotional climate,
and student-teacher relationships) is a predictor of school engagement. The researchers also found that students with lower previous engagement, when exposed to a high quality classroom, had their engagement level increase. Most importantly, the researchers found that school engagement is a predictor of academic achievement. Behavioral engagement was not related to academic achievement. The researchers noted that other behavioral aspects may be at work that were not observed (Dotterer & Lowe, 2011).

Both the Dotterer and Lowe (2011) and Lam et al. (2014) studies found that student engagement was not the only factor that contributed to academic achievement. Lee and Shute (2010) developed a framework that encompasses all factors that affect academic achievement. The authors developed personal and social-contextual factors. Personal factors included student engagement and learning strategies. Social contextual factors included school climate and social-familial influences. The two groups work in tandem and are bidirectional and reciprocal. The authors state that to have complete academic achievement the students must have high levels of each factor and within social-contextual and personal factors (Lee & Shute, 2010).

Researchers have noted that self-report measures can have positive reporter bias (Dotterer & Lowe, 2011; Gerber et al., 2013). To curb this bias in their study, Gerber et al. (2013) utilized attendance and homework grades to measure student engagement. The researchers found that attendance and homework submission predicted final examination success.

**Engagement and self-determination theory.** Lam et al. (2014) defined behavioral engagement as diligence in school work and extracurricular activities. In a study on SDT within sports, behavioral engagement was used to develop a model of behavioral
dissaffection (Curran, Hill, & Niemiec, 2013). The authors hypothesized that structure would positively affect behavioral engagement and negatively affect disaffection. The authors found that structure with autonomy support positively effects behavioral engagement while negatively effects disaffection. Curran et al. (2013) findings on the surface were related to sports but can be transferred to the classroom providing structure by offering clear instructions, guidance and assistance. Autonomy is provided by incorporating ideas, perspective and interests of the athletes.

Park, Holloway, Arendtsz, Bempechat, and Li (2012) isolated emotional engagement in a study on low performing high schools. The researcher sought to answer what extent the three psychological need variables account for differences in emotional engagement. The researchers found that when the psychological needs are fulfilled was related to their emotional engagement. The psychological need fulfillment was more important than gender, race, and achievement level in effecting emotional engagement. This study shows that students who are emotionally disengaged can be responsive to need fulfilment and can increase emotional engagement (Park et al., 2012).

Emotional engagement is a “dynamic and malleable construct” where low performing or high performing student emotional engagement can change with changing classroom conditions (Park et al., 2012, p. 400). SDT is a framework that encourages the use of inner resources and in the classroom various conditions can inhibit or allow for personal growth (Ryan & Deci, 2000). Jang, Kim, and Reeve (2012) used the three constructs of agentic engagement to develop a motivation mediation model. The model revealed that perceived autonomy support and classroom engagement both function as antecedents to consequences of students’ autonomy need satisfaction” (p. 1185).
Improving student engagement. Jang, Reeve and Deci (2010) studied engagement related to autonomy support and classroom structure. The researchers found that autonomy support and structure provided by teachers in the classroom predicted students’ classroom engagement. This is related to the inner resources and classroom conditions of the SDT dialectical framework (Jang et al., 2010).

Although the definition and aspects of student engagement are murky with the literature, there are common best practices to improve and encourage student engagement. Taylor and Parsons (2011) developed a list of best practices from prior research:

- Positive teacher-student relationships and interactions both personally and virtually.
- Exploratory and problem-based lessons.
- Personal relevancy.
- Constructivist pedagogy.
- Use of modern and relevant technology
- Using assessment to guide and improve teaching and learning.

Flipping the classroom is an example of the best practices that increase student engagement. In a flipped classroom, lectures are delivered to students prior to class as homework or a preactivity (Mok, 2014). In class activities are collaborative and interactive that reinforce the lecture pre activity. Additionally, Jamaludin and Osman, (2014) showed that in the “flipped classroom, the students’ behavioral, emotional, cognitive and agentic engagement enhanced active learning” (p. 129).

Using constructivist pedagogy in garden-based learning, student engagement in science and overall school engagement increased. There was a pathway connection between the use of the garden and overall school GPA (Skinner, Chi, & The Learning-Gardens Educational Assessment Group 1, 2012). Personal relevancy is evident in a
study of career relevant instruction (Orthner, Jones-Sanpei, Akos, & Rose, 2013). The researchers found that personal relevance in a CRI curriculum increases student engagement.

**Summary of the reviewed literature on student engagement.** Student engagement as a definition is a murky area. There is a consensus that student engagement is a multidimensional construct consisting of behavioral, emotional, cognitive and now agentic engagement. SDT is the basal theory from which all of the constructs of student engagement begin. Student engagement is established as one of the many factors that increase academic achievement. This section also researched best practices that can increase overall student engagement within the school context.

**Agentic engagement.** Agentic engagement is a new construct of overall student engagement. It is important to establish agentic engagement as a fully functioning aspect of student engagement. In this section, the AES is evaluated and established through the current literature. In addition, agentic engagement is developed as a measure that is inextricably linked to SDT and can be utilized within the virtual construct. Cognitive, behavioral and emotional engagement does not have the interactive dialogue between student and teacher that agentic engagement provides.

**Agentic engagement and self-determination theory.** Self-determination theory is based on self-regulation and internalization of available resources. In self-determination theory, students can experience negative or positive growth (Ryan & Deci, 2000). There is a relationship between the students' inner motivations and the conditions of the classroom (Reeve, 2006). Additionally, students’ autonomy, competence and relatedness within the classroom context determine the students’ overall engagement (Reeve & Lee,
2014). In a longitudinal research study, Jang et al. (2012) hypothesized a motivation mediation model that sought to determine if perceived autonomy support, autonomy need satisfaction, classroom engagement and perceived achievement have an interrelated relationship. Each measure was administered at three intervals during a 17 week semester. The researchers tested temporal causality, reciprocal causation and stationary effects in an effort to develop a model that predicts classroom engagement.

The data analysis showed that the model developed was valid but incomplete and needed further qualification. With respect to agentic engagement the study showed that gains in “contribution to the flow of instruction” created more autonomous experiences in the classroom (Jang et al., 2012, p. 1183). Contrarily, previous research found little empirical evidence that improved general engagement increases in motivation (Jang et al., 2012). The researchers note that the previous research was on general engagement while the present study is specifically studying autonomy need satisfaction.

SDT is framework that encourages the use of inner resources and in the classroom various conditions can inhibit or allow for personal growth (Ryan & Deci, 2000). In the study that used student-centered pedagogy of flipping the classroom, the researchers found that active learning supported student engagement (Jamaludin & Osman, 2014). This is an example of positive growth due to the changing classroom conditions to support students’ inner motivations (Ryan & Deci, 2000). According to SDT, giving personal relevance to an activity can increase students’ motivation to give full and high quality effort (Jang, 2008).

Jang (2008) administered an uninteresting activity but allowed for perceived personal autonomy and personal utility by explaining the importance of the activity. In
this example, the students proactively transformed the information and uninteresting
lesson into something more interesting, given the inner motivations of the student and the
autonomous classroom conditions (Reeve, 2012). Similarly, a study using gardens in
science education found that student engagement in the garden was linked to engagement
in science class and overall engagement in school (Skinner et al., 2012). The authors
relate SDT and the garden-based education to autonomous classroom conditions that
foster inner motivational resources of the student.

**Agentic engagement as a construct of student engagement.** Agentic engagement
is a measure of students’ contribution to their own overall engagement (Reeve & Tseng,
2011; Reeve, 2013; Reeve & Lee, 2014). Human agency is the ability to “intentionally
influence” aspects of life that contribute to overall happiness (Bandura, 2006, p. 164).
The four core properties of human agency are intentionality, forethought, self-
reactiveness, and self-reflectiveness (Bandura, 2006).

Reeve and Lee (2014) studied how changes in engagement can predict changes in
motivation. In this longitudinal study, the authors sought to add to an already existing
model that added psychological need satisfaction, self-efficacy and mastery goals.
Korean high school students were administered a survey three times during the semester.
The first two administrations included the four aspects of engagement (behavioral,
cognitive, emotional, and agentic) and the three aspects of motivation. The final survey
only asked questions about motivations. The researchers tested if: trial one engagement
changes trial two motivation, trial one motivation changes trial two engagement, trial one
and trial two engagement effects changes in trial two and trial three need satisfaction
(Reeve & Lee, 2014). The results showed that initial engagement in the classroom
predicts mid and late semester motivation. The authors noted that using the four constructs of engagement including agentic engagement highlighted a pathway from engagement to motivation.

In a qualitative case study on distance learning and human agency, the author studied how human agency relates to success in online learning. They concluded that “agentic engagement is the core of motivation” due to choice persistence and effort in online learning (Xiao, 2014, p. 13). Additionally, in another case study about higher education, the author noted that agentic engagement within higher learning is critical for preparing students for career ready jobs (Peach & Matthews, 2011). Within the virtual realm, Petty and Farinde (2013) noted that virtual engagement aligns but moves beyond cognitive, behavioral and emotional engagement. The researchers sought to determine engagement with meaningful contributions to a discussion board in an online math class.

**Agentic Engagement Scale (AES) as an instrument.** In previous models of education, students were relegated to confined classroom situations and mostly controlled learning through the classroom and school quality. The Internet and virtual education have disrupted the brick-and-mortar model and allowed students to self-direct learning (Bandura, 2006). The modularity of learning gives students the choice of learning and allows students to be an agent of their own education (Christensen et al., 2008).

Based on Bandura’s human agency, Reeve and Tseng (2011) developed the construct of agentic engagement. In a study of 365 high school students in Korea, agentic engagement was measured in aggregate with the other constructs of student engagement (behavioral, emotional, and cognitive). This study was initiated to validate agentic engagement, determine if agentic engagement was associated with motivation, and
determine if agentic engagement predicted academic achievement. The students were surveyed eight weeks into the semester and achievement data were collected at the end of the semester. The researchers found that agentic engagement was a construct of student engagement. They used a confirmatory factor analysis and all questions on the AES scale loaded and did not cross-load. No other construct of engagement cross-loaded into the agentic engagement factor. The other finding from this study respective to agentic engagement as a predictor of academic achievement was positively and significantly correlated to perceived autonomy, perceived competence and perceived relatedness.

Reeve (2013) conducted a study utilizing agentic engagement as a “student initiated pathway to academic success” (p. 581). The researcher used the refined AES as an assessment. The AES in all studies showed strong internal consistency and produced normal distribution scores. More importantly, the AES measured agentic engagement as a student initiated pathway different from other constructs of student engagement. Lester (2013) noted that self-regulated learning was included in cognitive engagement in previous research. The author believed it was not purely cognitive.

Jamaludin and Osman (2014) utilized the agentic engagement scale as part of the complete measure of student engagement to determine if active learning is taking place in a flipped classroom. The researchers found that each of the four constructs of engagement promote active learning. In the study, it was found that emotional engagement was the highest in a flipped classroom while agentic engagement was the lowest. In addition, a Pearson’s engagement correlation coefficient was utilized to determine if there was a relationship between the four constructs of engagement. Each of the four constructs of engagement was found to have a positive correlation. The author noted that agentic
engagement was low because the students were now introduced to the flipped classroom. The students did agentically engage when they ask questions and ask the teacher for help when needed.

**Research on agentic engagement: Methodologies and findings.** Reeve and Tseng (2011) in the original study of 365 high school students in Korea, measured agentic engagement in aggregate with the other constructs of student engagement (behavioral, emotional, and cognitive). This study was initiated to validate agentic engagement, determine if agentic engagement was associated with motivation, and determine if agentic engagement predicted academic achievement. The students were surveyed eight weeks into the semester and achievement data were collected at the end of the semester. The study used many statistical tests to test five hypotheses including zero-order correlations, multiple regression and exploratory confirmatory factor analysis. The linear regression was used to correlate academic achievement and student engagement. In this study, the researchers used a 21-item engagement scale (including AES). For need satisfaction the researchers used the 14-item Activity Feeling States (AFS). Each assessment used a 7-item Likert scale. Achievement was measured by school grade at the end of the semester.

The researchers found that agentic engagement was a construct of student engagement. They used a confirmatory factor analysis and all questions on the AES scale loaded and did not cross-load. No other construct of engagement cross-loaded into the agentic engagement factor. The other finding from this study respective to agentic engagement as a predictor of academic achievement was positively and significantly correlated to perceived autonomy, perceived competence and perceived relatedness.
Reeve (2013) performed three trials to establish reliability of the AES as a measure of agentic engagement. Trial 1 was designed to define the construct of agentic engagement and refine the AES as a measurement instrument. The population of Trial 1 included 271 college of engineering students. Using surveys, this trial compared the correlations to already established constructs of engagement (behavioral, emotional and, cognitive). A correlational analysis and exploratory factor analysis (EFA) were utilized to address the candidate items. The trial included a revised scale and the researcher found that the revised scale is psychometrically sound and internally consistent. Ten candidate questions were tested in this trial and five items that showed strong internal consistency and had normal distribution were retained.

Trial 2 validated the AES as a complete construct by confirming construct validity, discriminant validity, and predictive validity. The population for Trial 2 was 248 college of education students. The students took a survey that included questions on engagement (agentic, behavioral, emotional, and cognitive), motivation, and achievement. The trial utilized hierarchal linear modeling to test the survey results. The researcher first correlated participants’ scores on the AES with autonomous and controlled motivation. Then using the first trials EFA, the researcher utilized a confirmatory factor analysis (CFA). The trial results showed that the “AES was internally consistent, produced a normal distribution, was associated positively with autonomous motivation, was associated negatively with controlled motivation and explained independent variance in student achievement that the other three aspects of engagement were unable to explain” (Reeve, 2013, p. 586).
Jamaludin and Osman (2014) utilized the agentic engagement scale as part of the complete measure of student engagement to determine if active learning is taking place in a flipped classroom. The researchers found that each of the four constructs of engagement promote active learning. In the study, it was found that emotional engagement was the highest in a flipped classroom while agentic engagement was the lowest. In addition, a Pearson’s engagement correlation coefficient was utilized to determine if there was a relationship between the four constructs of engagement. Each of the four constructs of engagement was found to have a positive correlation. The author noted that agentic engagement was low because the students were now introduced to the flipped classroom. The students did agentially engage when they ask questions and ask the teacher for help when needed.

**Summary of the reviewed literature on agentic engagement.** Agentic engagement and the AES were fully developed through the review of the literature. The AES is a valid and reliable measure. Agentic engagement is directly related to SDT and constructivism. Virtual education requires students be self-motivated and self-regulate their own learning. Agentic engagement as a construct of overall engagement can show that students in the virtual environment are stewards of their own education. In this manner they let the teacher know what they need to be successful. This is an important skill for any student especially a virtual student.

**Summary**

There is a gap in the literature with respect to agentic engagement and how students can contribute to their own academic engagement (Reeve & Lee, 2014). Additionally, there is a gap with respect to student experiences in virtual compared with
brick-and-mortar (Pleau, 2012). This study extended prior research on agentic student engagement to students in the virtual setting, and contribute to the overall research on student engagement. Student experiences and how that effects improved student engagement need to be studied further (Burrows, 2010). Additionally, Li and Lerner (2013) state that further research is needed on variables that promoted student engagement.

Constructivism is the foundational theory for virtual education experience as the independent variable. Self-determination theory is the foundational theory for agentic engagement. Both theories intersect with each other in making students grapple with their work and by providing the platform for autonomous support. Agentic engagement is a measure of the students’ “constructive contribution” to the education they receive (Reeve, 2013, p. 579).

Virtual education experience as the independent variable as increasing self-reliance has been studied through dissertations, peer-reviewed journal articles and books. Virtual education is heavily steeped in constructivist theories (Shih-Chyueh et al., 2008). Virtual school success depends on the student being able to self-monitor and self-regulate. “Self-monitoring and self-regulating provide valuable insights to students’ learning and enhance their perceived level of engagement” (Hamane, 2014, p. 164). Virtual education and learning management systems can help students understand their own methods for learning (Hamane, 2014). Students’ experiences with virtual education can help them become aware of their own needs in learning. Shih-Chyueh et al. (2008) found that virtual education promotes “metacognitive reflective thinking” and
“epistemological development” through “multiple information sources” and decontextualized interactions” (p. 155).

Christensen et al. (2008) delineated the evolution of virtual education and modularity of learning. The authors explained that students will be able to individually customize their learning and choose courses that interest them or meet their learning needs.

Virtual education has been thoroughly researched through many variables such as quality, perceptions of students (Barbour et al., 2012), perceptions of parents (Sorenson, 2012), students with IEPs (Liu & Cavanaugh, 2011), students of varying SES (Liu & Cavanaugh, 2011), students in rural areas and between various subjects (Liu & Cavanaugh, 2011; Petty & Farinde, 2013). In addition, issues such as cyber truancy and the digital divide are issues that still surround virtual education.

Student engagement is a multi-dimensional construct consisting of cognitive, emotional and behavioral engagement (Lam et al., 2014; Lester, 2013). In previous models of education, students were relegated to confined classroom situations and mostly controlled learning through the classroom and school quality. The Internet and virtual education have disrupted the brick-and-mortar model and allowed students to self-direct learning (Bandura, 2006). The modularity of learning gives students the choice of learning and allows students to be an agent of their own education (Christensen et al., 2008). Based on Bandura’s human agency, Reeve and Tseng (2011) developed the construct of agentic engagement. Agentic engagement is the students’ constructive contribution to the classroom (Reeve 2013; Reeve & Tseng 2011).
SDT is framework that encourages the use of inner resources and in the classroom various conditions can inhibit or allow for personal growth (Ryan & Deci, 2000). Self-determination theory is based on self-regulation and internalization of available resources. In self-determination theory, students can experience negative or positive growth (Ryan & Deci, 2000). There is a relationship between the students’ inner motivations and the conditions of the classroom (Reeve, 2006). Additionally, students’ autonomy, competence and relatedness within the classroom context determine the students’ overall engagement (Reeve, 2013).

Agentic engagement is a relatively new concept as a construct of overall student engagement. Prior research identified three constructs of engagement: behavioral, cognitive, and emotional engagement (Lester 2013; Lam et al., 2014). Reeve (2013) hypothesized agentic engagement and developed an Agentic Engagement Scale (AES) to measure the construct. Academic progress and achievement are educationally valuable outcomes that can be predicted by measuring student engagement (Gerber et al., 2013). Self-determination theory (SDT) is the basal theory of all constructs of engagement. SDT indicates the inherent ability of students to self-motivate.

The research question and hypothesis will determine if agentic engagement increases each year of enrollment in a virtual school and compared with previous brick-and-mortar experiences. The research questions and hypothesis relate directly to the problem statement of how agentic engagement is increased by experience in virtual instruction. The design proposed by the author is meant to determine the support for this inquiry. The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience in the Lee Virtual
School virtual learning environment, age and grade level were significant predictors of agentic engagement, and if overall agentic engagement changed from the previous brick-and-mortar school environment to the current virtual school environment. Chapter 3 describes in detail the research methodology and the data collection and analysis.
Chapter 3: Methodology

Introduction

The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience in the Lee Virtual School virtual learning environment, age and grade level were significant predictors of agentic engagement, and if overall agentic engagement changed from the earlier brick-and-mortar school environment to the current virtual school environment. There was a gap in the literature with respect to agentic engagement and how students can contribute to their own academic engagement (Reeve & Lee, 2014). Additionally, there was a gap with respect to student experiences in the virtual school environment compared with the brick-and-mortar school environment (Pleau, 2012). This study extended prior research on agentic student engagement to students in the virtual setting and contributed to the overall research on student engagement.

This study attempted to help address the research gap by creating new knowledge about the relationship between students’ experience in virtual education and their agentic engagement. Prior studies solely utilized Korean secondary and post-secondary students (Reeve, 2013; Reeve & Lee, 2014; Reeve & Tseng, 2011). This researcher collected data using the Agentic Engagement Survey (AES) developed by those prior researchers (Reeve, 2013; Reeve & Lee, 2014; Reeve & Tseng, 2011). This researcher extended prior research on student engagement by introducing two control measures, grade level and student age, as possible co-predictors of agentic engagement.

The study population was comprised of 168 full time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida. Lee Virtual School is the only
public virtual school in Lee County Florida. The students of Lee Virtual School follow the Lee County school district calendar. The population included full-time K-12 students and part-time 8th-12th grade students. Part-time students are enrolled at a brick-and-mortar school and take a class with Lee Virtual School. Students are required to visit a physical location for statewide and district testing. There is not a requirement for in person classes. Teachers at Lee Virtual offer office hours and host optional, but recommended academic days each week. Academic days are opportunities for students to receive help from all of their instructors at the physical location. Out-of-county students can enroll with Lee Virtual School during a current semester but they are encouraged to enroll at the beginning of the next semester. In-county students cannot enroll in Lee Virtual School during an in-progress semester.

**Statement of the Problem**

It was not known if and to what extent student experience in the Lee Virtual School virtual learning environment, age and grade level were significant predictors of agentic engagement of secondary students and if overall agentic engagement significantly changed from previous brick-and-mortar school experience to current virtual school experience. There was a gap in the literature with respect to agentic engagement and how students can contribute to their own academic engagement (Reeve & Lee, 2014). Additionally, there was a gap with respect to student experiences in the virtual school environment compared with the brick-and-mortar school environment (Pleau, 2012). Virtual education is a fairly new pathway in education. Virtual education is learning that takes place primarily over the Internet (iNACOL, 2011). It has seen great success in growth in its short existence. In Kansas, the number of virtual schools increased from five
in 2000 to 25 in 2006 (Hawkins et al., 2012). Florida was one of the early adopters of virtual education; and the rest of the states are now working to incorporate virtual education within their education systems (Millet, 2012). In 2013, there were 428,315 high school students enrolled in a virtual course (iNACOL, 2013).

Prior researchers found a positive correlation between student engagement and academic achievement (Lam et al., 2014). Reeve and Tseng (2011) postulated an additional type of engagement called agentic engagement. Agentic engagement is the “constructive contribution into the flow of the instruction they receive” (Reeve & Tseng, 2011, p. 258). Students who are engaged in this manner are agents of their own education and seek out learning that best fits their needs (Reeve & Tseng, 2011).

This study was important because it examined the role of agentic engagement as a construct of engagement and investigated agentic engagement in the virtual environment. In virtual education, students are tasked with motivating themselves and being stewards of their own education. This study determined if the experience in Lee Virtual School increased students’ self-motivation through the measure of agentic engagement.

**Research Questions and Hypotheses**

The central research question related to the ability for students to be stewards of their own education and if the experience in virtual school enhances that ability. The central research question addressed in this study was: Does experience at Lee Virtual School foster agentic engagement, and does agentic engagement increase in each subsequent year of attendance in virtual school? There were four research questions and corresponding pairs of hypotheses that framed this study:
R1: Is student experience in the virtual learning environment a significant predictor of agentic engagement?
H1a: Student experience in a virtual learning environment is a significant predictor of agentic engagement.
H10: Student experience in a virtual learning environment is not a significant predictor of agentic engagement.

The researcher used two control variables as possible co-predictors of agentic engagement, student age and student grade. The corresponding research questions and pairs of hypotheses were the following:

R2: Is the age of virtual students a significant predictor of agentic engagement?
H2a: The age of virtual students is a significant predictor of agentic engagement.
H20: The age of virtual students is not a significant predictor of agentic engagement.

R3: Is the grade level of virtual students a significant predictor of agentic engagement?
H3a: The grade level of virtual students is a significant predictor of agentic engagement.
H30: The grade level of virtual students is not a significant predictor of agentic engagement.

The fourth research question regarded the change in students’ agentic engagement from their earlier brick-and-mortar school environment to their current virtual school environment:
R4: Is there a difference in agentic engagement with previous experience in a brick-and-mortar school and current virtual experience?

H4a: There is a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.

H4b: There is not a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.

The four research questions and hypotheses aligned with the purpose of this study, which was to determine whether student experience in the virtual learning environment, age and grade level were significant predictors of agentic engagement, and if agentic engagement changed from previous brick-and-mortar to current virtual experience. The research questions were further aligned with the research design and statistical analysis. For testing the hypotheses associated with the first three research questions, the researcher used a correlational design and a hierarchical linear regression analysis. The potential predictors in the hierarchal linear regression were defined as student years of experience in the virtual learning environment, age and grade level. The information regarding student experience in the virtual learning environment, age and grade level were collected by three demographic questions on the survey administered to students. The criterion variable in the hierarchical linear regression was defined as agentic engagement as reported by students on the AES instrument, which was the main component of the online survey.

For testing the hypotheses associated with the fourth research question, the researcher used a correlational design and a paired-samples \( t \) test to compare student engagement in the earlier brick-and-mortar school environment and the current virtual
school environment. To collect the necessary data, the researcher asked students the AES questions both in reference to their current experience and their past experience in brick-and-mortar schools, before attending virtual school.

**Research Methodology**

The study population was comprised of 168 full time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida. The researcher used G*Power to compute the a priori minimum sample size, which was 77 participants (Appendix E). The researcher recruited a volunteer sample of 82 students who completed an anonymous online survey. This quantitative study utilized for data collection the Agentic Engagement Scale, a survey developed by Reeve (2013), supplemented with three demographic questions regarding student experience with virtual learning (measured as number of years spent as an online student), student age, and the grade in which the student was enrolled. The quantitative nature of the survey data justified the selection of a quantitative method for this study. The AES data were technically ordinal, but the researcher approximated those data to interval measures. All other measures were ratio.

The quantitative method was also appropriate considering the purpose of this study, which was to determine through statistical analysis to what extent experience in a virtual learning environment, grade level, and age could predict students’ agentic engagement, and whether there was a significant difference in agentic engagement between the respondents’ current experience in the virtual school experience and their earlier experience in brick-and-mortar schools. In addition, a quantitative methodology was appropriate for this study due to the relatively large sample size. Moreover, all but one study on agentic engagement using the AES had been quantitative in nature.
(Jamaludin & Osman, 2014; Reeve, 2013; Reeve & Lee, 2014; Reeve & Tseng, 2011),
which was one more reason for the choice of the quantitative methodology. A qualitative
method was not considered appropriate for this study whose purpose was to test
hypotheses using statistical analysis of quantitative data.

**Research Design**

There are different design options for quantitative studies. Reeve and Tseng
(2011), in their original study that developed agentic engagement as a measurement, used
a correlational design to test five hypotheses. In other agentic engagement studies, Reeve
and his colleagues used hierarchal linear modeling (Jang et al., 2012; Reeve & Lee,
between the four constructs of engagement. This study used a similar correlational
research design to test the hypotheses associated with the first three research questions
that asked to what extent students’ experience in the virtual learning environment, age
and grade level predicted agentic engagement in the virtual school. To answer the fourth
research question, the researcher used a causal-comparative design to assess the
difference in agentic engagement between the respondents’ current virtual school
environment and their earlier brick-and-mortar school environment.

This researcher considered other design options available for quantitative studies.
The experimental or quasi-experimental designs were not appropriate because this
research did not seek to assess the effects of any experimental treatment or intervention.
A post-hoc study based on secondary data was not appropriate because this researcher
had to collect primary data via online survey for all variables of interest.
Population and Sample Selection

The site of the investigation was the Lee County School District (LCSD) located in the southwest region of Florida. Site approval to conduct research has been granted by the LCSD IRB (Appendix F). The LCSD is the ninth largest school district in Florida and the 40th largest in the United States. The Lee Virtual School (LVS) is the only public virtual school in Lee County. LVS is the sixth largest public virtual school in Florida. LVS has around 240 full time K-12 students. The researcher chose LVS because it is his home school district. Gathering data was seamless for the researcher since LCSD is familiar with the researcher. LCSD has made student engagement a priority and monitors overall student engagement with a yearly student poll.

The target population for this study was comprised of 168 students who were enrolled full time at LVS in Grades 6 through 12. Students who participated in the research were required to have been enrolled in Lee Virtual School. The sample was delimited to middle and high school students. The questions on the AES were detailed and specific. It was important for the students who took the survey to understand the terminology. The G*Power a priori computation of the minimum sample was performed to capture an effect size of .15, with 0.80 power, at alpha = 0.05, and the result was N = 77 (Appendix D). The researcher recruited a convenience sample of 82 full-time students, out of which 79 cases were retained as the final sample for the data analysis. The final sample met the minimum sample size of 77. The ratio of subjects to predictors in this study, 79:3, is well above the 10:1 ratio required to run a multiple regression (Maxwell, 2000).
**Instrumentation**

This quantitative study utilized the AES (Appendix G) as the main data collection instrument for the survey. The AES is a five-item questionnaire that includes the following questions:

1. I let my teacher know what I need and want.
2. During this class, I express my preferences and opinions.
3. When I need something in this class, I’ll ask the teacher for it.
4. During class, I ask questions to help me learn.
5. I let my teacher know what I am interested in. (Reeve, 2013, p. 585)

Permission for the use of the survey was granted for research purposes. There is a statement on the Johnmarshall Reeve’s (2012) website (Appendix C) that states “all 3 questionnaires are free to use for research purposes, as they are not copyrighted” (AES, CTQ, and AFS Questionnaires, para 2).

Respondents were requested to score their degree of agreement to each of these statements using five-point Likert scale. The AES instrument collects technically ordinal data, but the researcher approximated those data to interval measures to be able to utilize parametric statistics. The researcher asked the respondents to score two versions of the exact same instrument, one with regard to their experience in the virtual school they are currently enrolled in, the second time with regard to their past experience in the previously attended brick-and-mortar schools.

The survey was administered through Survey Monkey. The researcher added to the AES instrument three demographic questions: “How many years have you attended Lee Virtual School?”, “What is your age?”, and “What is your grade level?” The demographic questions gave the information necessary for the predictor variables.
The AES showed strong internal consistency, produced a normal distribution of scores, was associated positively with autonomous motivation, was associated negatively with controlled motivation, and explained independent variance in student achievement that the other three aspects of engagement were unable to explain. (Reeve, 2013, p. 586)

Validity

Agentic engagement is a new construct and a component of overall student engagement. The AES questionnaire used to measure agentic engagement was developed to determine if agency could be used as a construct of engagement. Reeve and Tseng (2011), when first administering the AES, found that without agentic engagement as a construct there was still unexplained variance in overall student engagement that other constructs could not measure. The AES development research showed that agentic engagement:

1. Covaried with student motivation, with other indices of engagement and with achievement.
2. Was conceptually and statistically distinct from three other aspects of engagement.
3. Predicted student achievement even after taking out the variance in achievement that could otherwise be attributed to students’ behavioral, emotional, and cognitive engagement. (Reeve & Tseng, 2011, p. 263)

Reeve (2013) performed three trials to establish validity of the AES as a measure of agentic engagement. Trial 1 was designed to define the construct of agentic engagement and refine the AES as a measurement instrument. The population of Trial 1 included 271 College of Engineering students. Using surveys, this trial compared the correlations to already established constructs of engagement (behavioral, emotional, and cognitive). The trial included a revised scale and the researcher found that the revised
scale was psychometrically sound and internally consistent. Ten candidate questions were tested in this trial and five items that showed strong internal consistency and had normal distribution were retained.

Trial 2 validated the AES as a complete construct by confirming construct validity, discriminant validity, and predictive validity. The population for Trial 2 was 248 College of Education students. The students took a survey that included questions on engagement (agentic, behavioral, emotional, and cognitive), motivation, and achievement. The trial utilized hierarchal linear modeling. The trial results showed that the “AES was internally consistent, produced a normal distribution, was associated positively with autonomous motivation, was associated negatively with controlled motivation and explained independent variance in student achievement that the other three aspects of engagement were unable to explain” (Reeve, 2013, p. 586).

Trial 3 used the newly validated AES and administered it during three periods of time in a school year to measure if a student’s agentic engagement changes during the course of a semester. The population of Trial 3 was 315 middle school students. Agentic engagement showed normal distribution and proved to be individually significant in predicting academic achievement ($\beta = .25, t = 3.20, p = .01$) (Reeve, 2013).

Reeve and Lee (2014) conducted a longitudinal study that compared high school classroom engagement, including agentic engagement with classroom motivation. “All four engagement indicators were moderately intercorrelated at Time 1 (range of $r$ values: 0.39 to 0.71, $p = .01$), at Time 2 (range of $r$ values: 0.50 to 0.72, $p = .01$), and at Time 3 (range of $r$ values: 0.44 to 0.73, $p = .01$) (Reeve & Lee, 2014, p. 533).
Subsequent users of AES such as Jamaludi and Osman (2014) utilized the agentic engagement scale as part of the complete measure of student engagement to determine if active learning was taking place in a flipped classroom. Those researchers performed a Pearson correlation analysis to determine if there was a relationship between the four constructs of engagement. All four constructs of engagement were found to be positively correlated (agentic and behavioral: $r = 0.462$, $n = 23$, $p = 0.270$; agentic and cognitive: $r = 0.851$, $n = 23$, $p < 0.001$; agentic and emotional: $r = 0.653$, $n = 23$, $p = 0.001$).

Veiga and Robu (2014) used agentic engagement as a construct of student engagement to measure engagement across cultures. According to their findings, all five items hypothesized to operationalize agency as a distinct dimension of student engagement in school loaded above .40 on the first factor and did not cross-load onto any other factor (loadings were small or negligible). Moreover, no item from the other three factors cross-loaded onto the factor underlying agentic engagement. (p. 63)

**Reliability**

Agency is a new construct. The AES measure of agentic engagement was tested for reliability by the authors in various studies and trials. The Cronbach’s alpha reliability coefficients reported by Reeve (2013) for agentic engagement data collected in the three waves of their study were 0.90, 0.92 and 0.94, respectively. Reeve and Lee (2014) reported reliability coefficients between 0.80 and 0.84.

Jamaludi and Osman (2014) utilized the AES as part of the complete measure of student engagement to determine if active learning is taking place in a flipped classroom. Those authors reported that the inter-item consistency reliability value was “above the
criteria suggested by Nunnally (1978),” who had stated that a cut off value of 0.7 was acceptable (as cited in Jamaludin & Osman, 2014, p. 127). The same reported a 0.955 Chronbach’s alpha for the AES agentic engaegment measure. Veiga and Robu (2014) used agentic engagement as a construct of student engagement to measure engagement across cultures. They reported Chronbach’s alpha values of 0.84 for Portugal and 0.74 for Romania.

**Data Collection and Management**

After receiving IRB approval and school district approval, the researcher recruited participants on a volunteer basis and invited them to take an anonymous online survey. Participants were recruited through the county wide Parentlink system. Parentlink is a communication system in which all families in the Lee County School District are contacted for district announcements through a specific school. Parents received an email, call, and text message through Parentlink. All 6th – 12th grade Lee Virtual Students were invited to participate in the survey in order to provide equal opportunity for participation and to recruit as large a sample as possible. The Parentlink system allows an announcement to be recorded and sent out to parents.

The students were under the age of 18 and were considered a vulnerable population (Belmont Report, 1979). Each parent was emailed a written statement regarding the questions on the survey including the link to the survey (Appendix A). In addition a student letter appeared on the Survey Monkey website prior to the administration of the survey (Appendix B). The statement described how the data were used as well as how the student’s identity was protected. Prior to taking the survey on Survey Monkey, the parent and student were issued statements about the research. The
parent letter included the survey link and content of the survey and how the survey was utilized. The student letter did not include the survey link. It is assumed that students who participated in the survey received the link and permission from parents. The student letter included content of the survey and use of the survey. The survey included student consent through question two on the survey. The parent and student letter indicated that the student could have stopped the survey at any point and was not required to complete the survey (Belmont Report, 1979).

Both parent and student letter indicated the survey was anonymous. No personal identification information was collected from the participating students. The only information collected included the AES questions regarding prior experiences in brick-and-mortar schools, current experiences in the virtual school, number of years attending virtual school, grade, and student’s age. The data were collected on a secured website (using Survey Monkey) and then transferred to the researcher’s password protected computer, where the data file will be saved for 3 years after the completion of the study. The raw data will be kept for a minimum of 3 years and then data files will be definitively erased.

**Data Analysis Procedures**

The four research questions and corresponding pairs of hypotheses that framed this study were the following:

R1: Is student experience in the virtual learning environment a significant predictor of agentic engagement?

H1a: Student experience in a virtual learning environment is a significant predictor of agentic engagement.
H1₀: Student experience in a virtual learning environment is not a significant predictor of agentic engagement.

The researcher used two control variables as possible co-predictors of agentic engagement, student age, and student grade. The corresponding research questions and pairs of hypotheses are the following:

R2: Is the age of virtual students a significant predictor of agentic engagement?
H₂ₐ: The age of virtual students is a significant predictor of agentic engagement.
H₂₀: The age of virtual students is not a significant predictor of agentic engagement.

R3: Is the grade level of virtual students a significant predictor of agentic engagement?
H₃ₐ: The grade level of virtual students is a significant predictor of agentic engagement.
H₃₀: The grade level of virtual students is not a significant predictor of agentic engagement.

The Lee County School District manifested interest in assessing change in students’ agentic engagement from their earlier brick-and-mortar school environment to their current virtual school environment. To meet the district’s needs, the researcher asked a fourth research question:

R4: Is there a difference in agentic engagement with previous experience in a brick-and-mortar school and current virtual experience?
H₄ₐ: There is a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.
H40: There is not a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.

The data were collected using Survey Monkey. The raw data were exported to the researcher as an Excel data file, which was imported into SPSS for data inspection and analysis. Incomplete survey responses were discarded.

The researcher computed the participants’ agentic engagement scores for the earlier brick-and-mortar school environment and for their current virtual school environment. Those scores were sums of the scores on the AES items, reported separately by the students for the two environments.

First, the researcher computed descriptive statistics for all variables of interest in the study. Secondly, the researcher checked the assumptions for the inferential statistical procedures planned for the analysis. For the hierarchal linear regression the following assumptions were met: the variables were continuous; there were linear relationships between the independent variables and the dependent variables, as shown by the scatterplots; no significant outliers were present; the observations were independent, as indicated by the Durbin-Watson statistic; the data showed homoscedasticity; and the residuals (errors) of the regression line were approximately normally distributed, as shown by the Normal Q-Q plot. Third, the researcher performed a hierarchical linear regression to generate the information needed to answer the first three research questions. This statistical analysis was appropriate to assess the impact of multiple interval variables (student age, grade, and years of experience in the virtual school environment) on an interval criterion variable (agentic engagement in virtual school).
Fourth, the researcher performed a paired-samples t test needed to provide the information needed to answer the fourth research question. This statistical procedure was appropriate for comparing two sets (“samples”) of interval data collected from the same respondents regarding their agentic engagement in two environments, the prior brick-and-mortar schools and the current virtual school. For the paired-samples t test, the following assumptions were met: the variables were continuous, there were two related groups of variables, there were no significant outliers, and the differences in the dependent variable between the two related groups were not normally distributed, as shown by the Shapiro-Wilk test results. This was listed as a limitation of the study.

The statistical procedures used in previous studies varied. Reeve and Tseng (2011) developed agentic engagement as a measurement, used zero-order correlations, multiple regression, and exploratory confirmatory factor analysis. The linear regression was used to assess the impact of agentic engagement on student achievement. In other agentic engagement studies Reeve and his colleagues used hierarchal linear modeling (Jang et al., 2012; Reeve & Lee, 2014). Jamaludin and Osman (2014) used Pearsons correlation analysis. This researcher’s choice for hierarchal linear regression was consistent with earlier researchers’ approach. The use of a paired-samples t test in this study to assess differences in agentic engagement between two learning environments was dictated by the need to meet school district’s need for comparative information (reflected in the fourth research question). The level of statistical significance in this study was 0.05.
Ethical Considerations

The ethical considerations regarding respect for persons, beneficence, and justice were fully and wholly adhered to at all times during data collection. The principle of respect for persons requires that research participants make autonomous decisions, and people with limited autonomy receive special protection. Children under 18 are a protected class (Belmont Report, 1979). The participants in this study who were under 18 were protected using parental consent and child assent.

Beneficence refers to protecting people from harm and securing their well-being in research. This survey was anonymous, and no personal identification information was collected. The data collected were password-protected within Survey Monkey database as well as on the researcher’s computer for a period of 3 years. The only demographic questions were related to years of experience in virtual education, grade, and student’s age. In this study no individual student data were discussed, all data were analyzed in aggregate. Thus, this research caused no harm to the participants and did not involve any incentives or direct individual benefits. However, the study findings may be used to enhance virtual education for other students in the future.

Justice refers to treating each individual equally. In this study, the parents of all students in the target population had equal opportunity to allow their child to participate, and all students who received parental consent had an equal opportunity to volunteer as participants in the survey. Each parent was given a written statement regarding the questions on the survey and how the data would be used as well as how the student identity will be protected (Appendix A). The parent letter explained what the survey was for, what was being asked and how the student data were anonymous and protected. The
The student letter included the same information but was written in a more student-friendly language (Appendix B). The parent letter included survey link, content of the survey and how the survey was utilized. The student letter did not include the survey link. It is assumed that students who participated in the survey received the link and permission from parents. The student letter included content of the survey and use of the survey. The survey included student consent through question two on the survey. The parent and student letter indicated that the student could stop the survey at any point and was not required to complete the survey (Belmont Report, 1979).

**Limitations and Delimitations**

This study had several limitations. The survey was administered online, with no method to verify actual participant completing survey. The data collected with the AES survey were technically ordinal in nature. However, the researcher approximated the data to interval measures. Finally, the data set for the $t$ test were not normally distributed, posing a limitation to the study.

The researcher established several delimitations. The study population was delimited to students in Lee Virtual School. Consequently, the research findings cannot be generalized to other virtual populations. The sample of virtual students was delimited to 6th-12th graders. Finally, the researcher used a cross-sectional online survey for convenient and expeditious data collection. Given this choice of data collection method, participation was on a voluntary basis. The resulting convenience sample of participants was nonrandom. This sample posed a validity problem and violated the sample randomness assumption for parametric statistics.
Summary

The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience in the Lee Virtual School virtual learning environment, age, and grade level were significant predictors of agentic engagement, and if overall agentic engagement changed from the previous brick-and-mortar school environment to their current virtual school environment. Agentic engagement is the “constructive contribution into the flow of the instruction they receive” (Reeve & Tseng, 2011, p. 258). Reeve and Tseng (2011) postulated an additional type of engagement called agentic engagement. Students who are engaged in this manner are agents of their own education and seek out learning that best fits their needs (Reeve & Tseng, 2011).

This study was conducted with a convenience sample of 79 students recruited from a population of 168 6th-12th graders at the Lee Virtual School in Lee County Florida. The students were given an anonymous survey that asked them questions about their agentic engagement using AES. Reeve (2013) developed the AES to measure students’ agentic engagement. The validity and reliability of the measure have been documented in the literature.

The AES showed strong internal consistency, produced a normal distribution of scores, was associated positively with autonomous motivation, was associated negatively with controlled motivation, and explained independent variance in student achievement that the other three aspects of engagement were unable to explain. (Reeve, 2013, p. 586)

The data were analyzed using a hierarchal multiple linear regression analysis and a paired-samples t test.
The ethical considerations regarding beneficence, justice and respect were fully and wholly adhered to at all times during data collection. Student identity was protected in this study through the anonymity of data collection. Chapter 4 includes the description of the data analysis procedures and findings. Chapter 5 synthesizes the data from chapter 4 and contains the conclusions, implications, and recommendations for further research and for practice.
Chapter 4: Data Analysis and Results

Introduction

The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience in the Lee Virtual School virtual learning environment, age, and grade level were significant predictors of agentic engagement, and if overall agentic engagement changed from previous brick-and-mortar school to current virtual school environment. The study involved the collection of primary data using a cross-sectional online survey. The target population was comprised of 168 full-time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida. The researcher analyzed data from a convenience sample of 79 participants.

The survey instrument included the AES (Reeve 2013), which measured student agentic engagement, and three demographic questions regarding students’ experience with virtual learning (number of years in virtual school), age, and grade level. The researcher stated the following four research questions and corresponding pairs of hypotheses as a framework for this study:

R1: Is student experience in the virtual learning environment a significant predictor of agentic engagement?
H1a: Student experience in a virtual learning environment is a significant predictor of agentic engagement.
H10: Student experience in a virtual learning environment is not a significant predictor of agentic engagement.

R2: Is the age of virtual students a significant predictor of agentic engagement?
H2a: The age of virtual students is a significant predictor of agentic engagement.
H20: The age of virtual students is not a significant predictor of agentic engagement.

R3: Is the grade level of virtual students a significant predictor of agentic engagement?

H3a: The grade level of virtual students is a significant predictor of agentic engagement.

H30: The grade level of virtual students is not a significant predictor of agentic engagement.

R4: Is there a difference in agentic engagement with previous experience in a brick-and-mortar school and current virtual experience?

H4a: There is a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.

H40: There is not a difference in the means of agentic engagement with previous brick-and-mortar experience and current virtual experience.

The statistical analysis involved a hierarchical linear regression that generated the information needed to answer the first three research questions and a paired-samples t test that provided the information needed to answer the fourth question.

Chapter 4 is divided into three sections that summarize the data analysis and results. The first section presents the demographic characteristics of the sample population and the population of Lee Virtual School and the descriptive statistics for the variables of interest in this study. The second section describes the data analysis procedures used. Finally, the last section presents the assumption check for the statistical
procedures, displays the findings of the data analysis, and provides the answers to the research questions.

**Descriptive Data**

This study involved the collection of primary data from a convenience sample recruited from a population of 168 full-time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida. A total of 87 students responded to the online survey. Of the 87 student respondents, five were removed from data analysis for incomplete answers. The researcher decided to utilize complete case analysis method (Jinhui, Raina, Bayene, & Thabane, 2013). Complete case analysis only uses the data from survey respondents who fully and wholly completed the survey. All incomplete respondent surveys were not used in analysis. The retained sample included 82 respondents. The response rate was 49%. Three more respondents who were exceptional cases with five years of experience in the virtual school were subsequently eliminated. The analysis was conducted on 79 cases.

The survey provided descriptive and demographic information including age, grade level, and years of experience in virtual school, agentic engagement in the current virtual school environment, and agentic engagement in the previous brick-and-mortar school environment. Table 1 summarizes the responses to the three demographic questions. The survey was open to sixth to twelfth grade, full-time virtual students. The total middle school percentage of responses was 44%. The data were broken down by grade level. Grade 6 had 12.20% respond to the survey, Grade 7 had 14.63%, and Grade 8 had 17.07%. The total high school percentage of responses was 56%. The data were
broken down by grade level: Grade 9 had 14.63% respond to the survey, Grade 10 had 8.54%, Grade 11 had 13.41%, and Grade 12 had 19.51%.

Table 1

*Demographic Data for the Initial Sample of 82 Respondents*

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>10</td>
<td>12.20</td>
</tr>
<tr>
<td>7&lt;sup&gt;th&lt;/sup&gt;</td>
<td>12</td>
<td>14.63</td>
</tr>
<tr>
<td>8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>14</td>
<td>17.07</td>
</tr>
<tr>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
<td>12</td>
<td>14.63</td>
</tr>
<tr>
<td>10&lt;sup&gt;th&lt;/sup&gt;</td>
<td>7</td>
<td>8.54</td>
</tr>
<tr>
<td>11&lt;sup&gt;th&lt;/sup&gt;</td>
<td>11</td>
<td>13.41</td>
</tr>
<tr>
<td>12&lt;sup&gt;th&lt;/sup&gt;</td>
<td>16</td>
<td>19.52</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>6.10</td>
</tr>
<tr>
<td>12</td>
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<td>13</td>
<td>13</td>
<td>15.85</td>
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<td>14</td>
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<td>17.07</td>
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<td>15</td>
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<td>16</td>
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<td>10.98</td>
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<td>18</td>
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<td>17.07</td>
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<tr>
<td>Years of experience in virtual school</td>
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<td></td>
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<tr>
<td>First year</td>
<td>25</td>
<td>30.49</td>
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<tr>
<td>Second year</td>
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<td>Third year</td>
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<td>30.49</td>
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<tr>
<td>Fourth year</td>
<td>9</td>
<td>10.98</td>
</tr>
<tr>
<td>Fifth year</td>
<td>3</td>
<td>3.66</td>
</tr>
</tbody>
</table>

The survey was open to 6th-12<sup>th</sup> grade full time virtual students, which ranged in age from 11 to 18. The largest percentage was both 14 and 18 year old age groups with 17.07%. The third largest group responding was age 13 with 15.85%. The rest of the
respondents were as follows: age 16 with 14.63%, age 17 with 10.98%, age 12 with 9.75%, age 15 with 8.54% and age 11 had the least respondents with 6.10%.

The third and most important demographic variable was the number of years of experience in Lee Virtual School, which was the main independent variable considered in the analysis. At the time of this study, Lee Virtual School was in its 6th year of operation. The results showed that 30.49% of the students were in their first year of virtual school, 24.39% were in their second year of virtual school, 30.49% were in their third year of virtual school, and 10.98% and 3.66% were in their fourth and fifth years of virtual school, respectively. No respondents were in their sixth year of virtual school. Because of the low percentage of respondents with 5 years of experience (i.e., only three cases), the researcher considered those cases atypical and discarded them. The analysis was performed on a final sample comprised of 79 cases. Table 2 presents the frequencies for the demographic variables for the initial sample of 82 respondents with complete surveys and for the final sample of 79 cases considered in the analysis.

Table 2

Frequencies for the Demographic Variables, Age, Grade, and Experience

<table>
<thead>
<tr>
<th>N</th>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>Age</td>
<td>14.854</td>
<td>2.195</td>
<td>-0.024</td>
<td>-1.180</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Grade</td>
<td>9.110</td>
<td>2.067</td>
<td>0.047</td>
<td>-1.325</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Experience</td>
<td>2.329</td>
<td>1.134</td>
<td>0.410</td>
<td>-0.651</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>79</td>
<td>Age</td>
<td>14.810</td>
<td>2.219</td>
<td>0.022</td>
<td>-1.205</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Grade</td>
<td>9.051</td>
<td>2.081</td>
<td>0.115</td>
<td>-1.317</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Experience</td>
<td>2.228</td>
<td>1.025</td>
<td>0.184</td>
<td>-1.178</td>
<td>1</td>
<td>4</td>
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</tbody>
</table>
The skewness and kurtosis statistics (Table 2) indicate normal distribution of all three variables in both school environments, with a tendency of the distributions to be flat or platykurtic (negative kurtosis slightly exceeding -1).

**Dependent variable.** Agentic engagement was measured using the AES instrument (Reeve 2013, which includes five items that respondents score on 5-point Likert scales. The AES questions were asked twice, the first time about the respondents’ experience in their current virtual school, and then about their earlier experience in brick-and-mortar schools. The researcher computed two overall agentic engagement scores for the respondents’ current virtual school environment and for their previous brick-and-mortar school environment. Each one of the two overall scores was sums of the corresponding scores on the five AES items. Appendix I provides detailed information about the responses to all AES questions from the initial sample of 82 participants with complete surveys. Table 3 presents the frequencies for agentic engagement in the virtual and the brick-and-mortar school environments for the initial sample of 82 participants who completed the survey and for the final sample of 79 students considered in the analysis. The mean values indicate higher engagement in the virtual school environment, and the skewness and kurtosis statistics indicate normal distribution of the dependent variable in both school environments.

**Table 3**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Min</th>
<th>Max</th>
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</thead>
<tbody>
<tr>
<td>Brick&amp;Mortar AE</td>
<td>82</td>
<td>17.683</td>
<td>3.937</td>
<td>-0.453</td>
<td>0.292</td>
<td>7</td>
<td>25</td>
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<tr>
<td>Virtual AE</td>
<td></td>
<td>20.220</td>
<td>3.205</td>
<td>-0.359</td>
<td>-0.213</td>
<td>11</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Brick&amp;Mortar AE</td>
<td>79</td>
<td>17.684</td>
<td>3.934</td>
<td>-0.443</td>
<td>0.373</td>
<td>7</td>
<td>25</td>
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<tr>
<td>Virtual AE</td>
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<td>20.291</td>
<td>3.155</td>
<td>-0.305</td>
<td>-0.256</td>
<td>11</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>
Data Analysis Procedures

Preparation of the data file. The data for this study were collected using an electronic version of the AES, which was administered through Survey Monkey. The data were downloaded to Microsoft Excel. The total student respondents to the online survey were 87 from the total population of 168 Lee Virtual School students. Of the 87 student respondents, five were removed from data analysis for incomplete surveys.

The researcher utilized the complete-case analysis method (Jinhui, Raina, Bayene, & Thabane, 2013) and only use complete surveys for analysis. Complete case analysis only used the data from survey respondents who fully and wholly completed the survey. All incomplete respondent surveys were not used in analysis. Respondents with incomplete survey responses would not give a complete picture of agentic engagement. Due to the survey being anonymous, determining missing responses would have been difficult for the researcher. The final sample size was comprised of 82 respondents. The response rate was 49% of the total full-time Lee Virtual School population and 94% use of respondent data. The 82 respondents exceeded the minimum sample size of 77 cases needed for data analysis and statistical relevance (Appendix D).

The survey questions utilized a 5-item Likert scale from “strongly disagree” to “strongly agree”. Each of the five items was issued a point value. “Strongly disagree” was assigned one point, “disagree” was assigned two points, “neutral” was assigned three points, “agree” was assigned four points and “strongly agree” was assigned five points. The researcher approximated the technically ordinal data to interval measures. The five agentic engagement questions relating to current virtual school feelings were totaled to
give the current agentic engagement sum. In addition, the next five questions relating to past brick-and-mortar experiences were totaled to give the previous agentic sum.

**Descriptive procedures.** The researcher computed frequencies for all variables of interest in this study: mean, standard deviation, skewness, kurtosis, as well as minimum and maximum values. For the dependent variable, agentic engagement, the researcher computed separate overall measures for the respondents’ current virtual school environment and their earlier brick-and-mortar school environment. The statistics were displayed in tables.

**Linear regression assumption checks.** Prior to statistical analysis, all data passed assumptions for linear regression. The AE data collected from the survey was technically ordinal in nature. However, the researcher approximated the data to continuous measures. The assumption for linear relationships between predictors, and the criterion was met through inspection of scatterplots of each variable (Appendix J). Collinearity existed between grade level and age of students ($r = 0.971$, $p < 0.001$, VIF = 18.07). When age of students was removed from the regression as a predictor, the VIF was 1.072, which showed that the collinearity problem had been resolved. The assumption check for absence of significant outliers was met. No significant outliers more than ±3.29 standard deviations from the mean were present. There was independence of observations, as assessed by a Durbin-Watson statistic of 1.570. In addition, the residuals showed that variances along the line of best fit remained similar, which indicated that the homoscedasticity assumption was met (Figure 2). The residuals (errors) of the regression line were approximately normally distributed, as indicated by the Normal Q-Q plot (Figure 3).
Figure 2. Plot of residuals against the unstandardized predicted values.

Figure 3. Normal Q-Q plot of Virtual Agentic Engagement.

*t test assumption checks*. The data collected from the survey were technically ordinal in nature, but the researcher approximated the data to continuous measures. There were two related sets of variables, collected from the same respondents: their perceptions of their agentic engagement in the previous brick-and-mortar school environment and in
the current virtual school environment. Inspection of their values did not reveal them to be extreme, and they were kept in the analysis. A run without the outliers \((N = 79)\) did not significantly change the results (Table 3). The differences in the dependent variable between the two related groups were not normally distributed, as shown by the Shapiro-Wilk test results and added as a limitation to the study (Appendix K).

**Hierarchical linear regression analysis and findings.** For Research Questions 1 through 3, the researcher performed a hierarchical linear regression to assess the impact of three potential predictors of agentic engagement: students’ years of experience in virtual education (the main predictor), age, and grade level (controls). The regression model was computed using the final sample of 79 responses (Tables 4, 5, 6). The first run showed collinearity between age and grade (Table 6).

<table>
<thead>
<tr>
<th>Model</th>
<th>(R)</th>
<th>(R^2)</th>
<th>Adj (R^2)</th>
<th>Std. Error</th>
<th>(R^2) Change</th>
<th>(F) Change</th>
<th>(df) 1</th>
<th>(df) 2</th>
<th>Sig.</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.301*</td>
<td>0.091</td>
<td>0.054</td>
<td>3.078</td>
<td>0.091</td>
<td>2.461</td>
<td>3</td>
<td>74</td>
<td>0.069</td>
<td>1.581</td>
</tr>
</tbody>
</table>

*a Predictors: (Constant), Experience, Grade, Age  
*b Dependent Variable: Virtual AE
Table 5

*Hierarchical Linear Regression: Three Predictors: Coefficients*\(^a\)

<table>
<thead>
<tr>
<th>B</th>
<th>Std. Error</th>
<th>Std. Beta</th>
<th>t</th>
<th>Sig.</th>
<th>LB</th>
<th>UB</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>-0.039</td>
<td>0.709</td>
<td>-0.026</td>
<td>-0.055</td>
<td>0.956</td>
<td>-1.451</td>
<td>1.373</td>
<td>0.056</td>
</tr>
<tr>
<td>Age</td>
<td>0.139</td>
<td>0.668</td>
<td>0.098</td>
<td>0.208</td>
<td>0.836</td>
<td>-1.192</td>
<td>1.470</td>
<td>0.055</td>
</tr>
<tr>
<td>Experience</td>
<td>0.844</td>
<td>0.357</td>
<td>0.273</td>
<td>2.363</td>
<td>0.021</td>
<td>0.132</td>
<td>1.556</td>
<td>0.923</td>
</tr>
</tbody>
</table>

\(^a\) Dependent Variable: Virtual AE

Table 6

*Hierarchical Linear Regression: Three Predictors: Collinearity Diagnostics*\(^a\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
<th>Eigenvalue</th>
<th>Condition Index</th>
<th>(Constant)</th>
<th>Grade</th>
<th>Age</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>3.851</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0.122</td>
<td>5.625</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>0.026</td>
<td>12.149</td>
<td>0.18</td>
<td>0.04</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>0.001</td>
<td>69.929</td>
<td>0.82</td>
<td>0.96</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^a\) Dependent Variable: Virtual AE

To resolve the collinearity problem, the researcher retained grade as the only control variable and computed a new model (Tables 7, 8, 9).

Table 7

*Hierarchical Linear Regression: Two Predictors*\(^a\): Model Summary\(^b\)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>(R^2)</th>
<th>Adj (R^2)</th>
<th>Std. Error Estimate</th>
<th>(R^2) Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.300(^a)</td>
<td>0.090</td>
<td>0.066</td>
<td>3.058</td>
<td>0.090</td>
<td>3.717</td>
<td>2</td>
<td>75</td>
<td>0.029</td>
<td>1.575</td>
</tr>
</tbody>
</table>

\(^a\) Predictors: (Constant), Experience, Grade
\(^b\) Dependent Variable: Virtual AE
Table 8

**Hierarchical Linear Regression: Two Predictors: Coefficients**

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Std. Error</th>
<th>Std. Beta</th>
<th>t</th>
<th>Sig.</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>17.470</td>
<td>1.593</td>
<td></td>
<td>10.969</td>
<td>&lt;.001</td>
<td>14.297</td>
<td>20.643</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td>0.104</td>
<td>0.172</td>
<td>0.069</td>
<td>0.602</td>
<td>0.549</td>
<td>-0.24</td>
<td>0.447</td>
<td>0.932</td>
<td>1.073</td>
</tr>
<tr>
<td>Experience</td>
<td>0.852</td>
<td>0.353</td>
<td>0.275</td>
<td>2.41</td>
<td>0.018</td>
<td>0.148</td>
<td>1.556</td>
<td>0.932</td>
<td>1.073</td>
</tr>
</tbody>
</table>

a Dependent Variable: Virtual AE

Table 9

**Hierarchical Linear Regression: Two Predictors: Collinearity Diagnostics**

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
<th>Eigenvalue</th>
<th>Condition Index</th>
<th>(Constant)</th>
<th>Grade</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2.865</td>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.109</td>
<td>5.124</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.98</td>
</tr>
<tr>
<td>3</td>
<td>0.025</td>
<td>10.617</td>
<td>0.92</td>
<td>0.93</td>
<td>0.93</td>
<td>0</td>
</tr>
</tbody>
</table>

a Dependent Variable: Virtual AE

**Paired-samples t test and findings.** For Research Question 4, the researcher performed a paired-samples t test to determine whether there was a statistically significant difference in agentic engagement between the respondents’ earlier brick-and-mortar school environment and their current virtual school environment (Table 10).

Table 10

**Statistics of the Paired-Samples t Test (N=82)**

<table>
<thead>
<tr>
<th>Pair</th>
<th>Virtual AE – BandM AE</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
<th>95% CI of Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Virtual AE</td>
<td>2.537</td>
<td>4.445</td>
<td>.491</td>
<td>1.5599</td>
<td>3.513</td>
<td>5.168</td>
<td>81 .000</td>
</tr>
</tbody>
</table>
Results

The findings of the statistical analyses performed to test the stated hypotheses were used to answer the research questions. This section was broken down into two parts. Part 1 presents the results of the hierarchical linear regression performed to generate information needed to answer research questions one through three regarding three potential predictors of agentic engagement examined in this study: years of experience in virtual education (main predictor), age, and grade level (controls). Part 2 presents the results of the paired-samples $t$ test performed to compare the respondents’ agentic engagement in their current virtual school environment and in their previous brick-and-mortar school environment.

Research Questions 1 through 3 and corresponding results. A hierarchical linear regression was performed to predict agentic engagement from experience in the virtual learning environment, age and grade level. The assumptions of linearity, independence of errors, homoscedasticity, unusual points and normality of residuals were met. The regression revealed collinearity between age and grade level. Age was removed as a co-predictor. The final regression model with grade and experience considered as potential predictors was statistically significant, $F$ change (2, 75) = 3.717, $p = 0.029$, $R^2 = 0.09$ (Table 7). Experience was the only statistically significant predictor, standardized Beta = 0.275, $t = 2.41$, $p = 0.018$ (Table 8). Based on these findings, the researcher drew conclusions in response to the stated research questions.

Research Question 1 investigated if student experience in the virtual learning environment was a significant predictor of agentic engagement. The results provided empirical evidence in support of the alternative hypothesis stated for the first question:
Student experience in a virtual learning environment is a significant and positive predictor of agentic engagement. For each one-unit (one-year) change in experience, agentic engagement increased by 27.5% (Table 8).

The researcher used two control variables as possible co-predictors of agentic engagement: student age and student grade. Two corresponding research questions were developed to test these variables. Research Question 2 investigated if age of virtual students was a significant predictor of agentic engagement, and Research Question 3 investigated if grade level of virtual students was a significant predictor of agentic engagement. The results provided empirical evidence in support of the null hypotheses stated for these questions. The two control variables showed high collinearity (Tables 5, 6), with a Pearson correlation coefficient $r = 0.971$, $p < 0.001$. Therefore, student age and grade level were not statistically significant predictors of agentic engagement in the virtual school environment (Table 7).

**Research Question 4 and corresponding results.** A paired-samples $t$ test was performed to generate the information needed to answer the fourth research question which asked: Is there a difference in agentic engagement with previous experience in a brick-and-mortar school and current virtual experience? The test results provided empirical support for the alternative hypothesis stated for this question: There is a statistically significant difference in agentic engagement between the respondents’ current virtual school environment ($M = 20.220$) and their previous brick-and-mortar school environment ($M = 17.683$), $t(81) = 5.168$, $p < 0.001$ (Table 3 and 10).
Summary

The chapter presented the results generated from the multiple linear regression and \( t \) test for this study. The total student respondents to the online survey were 87. Of the 87 student responses, five were removed from data analysis for incomplete answers, and three cases were removed for having atypical values for the main predictor, student experience with virtual learning. The final sample size used in the analysis was comprised of 79, representing 47% of the total full time Lee Virtual School population enrolled in grades 6 through 12.

The hypotheses stated for Research Questions 1 through 3 regarding student experience with virtual learning, age and grade as possible predictors of agentic engagement in the virtual school were tested using hierarchical linear regression analysis. The regression model with grade and experience as predictors was statistically significant, \( F(2, 75) = 3.717, p < 0.001, R^2 = .09 \). The respondents’ years or experience with virtual learning was the only statistically significant predictor of agentic engagement, standardized Beta = 0.275, \( t = 2.41, p = 0.018 \). Based on these findings, the researcher accepted the alternative hypothesis stated for the first research question and the null hypotheses stated for the second and third research questions.

Hypothesis 4 regarding the difference in agentic engagement between the respondents’ current virtual school environment and their earlier brick-and-mortar school environment was tested using a paired-samples \( t \) test. The findings showed that the respondents’ agentic engagement in the current virtual school \( (M = 20.220) \) was significantly higher than their agentic engagement in the earlier brick-and-mortar schools \( (M = 17.683) \), \( t(81) = 5.168, p < .001 \). Based on these results, the researcher rejected the
null hypothesis and accepted the alternative hypothesis. Chapter 5 of the study includes a
discussion of the findings, conclusions, and examination of the implications of the results
including theoretical foundation, current practice and future research. The researcher
provides recommendations for future research and practice.
Chapter 5: Summary, Conclusions, and Recommendations

Introduction

The purpose, problem, and research questions have been developed and aligned throughout the study. The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience in the Lee Virtual School virtual learning environment, age and grade level were significant predictors of agentic engagement and if overall agentic engagement changed from previous brick-and-mortar to current virtual experience. It was not known if and to what extent student experience in the Lee Virtual School virtual learning environment, age and grade level were significant predictors of agentic engagement of secondary students and if overall agentic engagement significantly changed from previous brick-and-mortar experience to current virtual experience. The research questions are delineated as follows:

R1: Is student experience in the virtual learning environment a significant predictor of agentic engagement?

R2: Is the age of virtual students a significant predictor of agentic engagement?

R3: Is the grade level of virtual students a significant predictor of agentic engagement?

R4: Is there a difference in agentic engagement with previous experience in a brick-and-mortar school and current virtual experience?

The study addressed if agentic engagement was fostered by Lee Virtual School. The study involved the collection of primary data using a cross-sectional online survey. The population is 168 full time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida. The importance of this study sought to determine if the experience
in Lee Virtual School increases a secondary student’s self-motivation through the measure of agentic engagement. It is anticipated that the data on agentic engagement can help administrators predict success in virtual school. In virtual education, students are tasked with motivating themselves and being stewards of their own education.

Chapter 5 included a discussion of the findings, conclusions, and examination of the implications of the results including theoretical foundation. In addition, the current practice and future research were discussed. The researcher provided recommendations for future research and practice.

**Summary of the Study**

Chapter 1 of this dissertation introduced the purpose, problem and research questions that have been developed and aligned throughout the study. The purpose of this quantitative, correlational and causal-comparative study was to determine whether student experience in the Lee Virtual School virtual learning environment, age and grade level were significant predictors of agentic engagement and if overall agentic engagement changed from previous brick-and-mortar to current virtual experience. It was not known if and to what extent student experience in the Lee Virtual School virtual learning environment, age, and grade level were significant predictors of agentic engagement of secondary students, and if overall agentic engagement significantly changed from previous brick-and-mortar experience to current virtual experience. The research questions were delineated as follows:

R1: Is student experience in the virtual learning environment a significant predictor of agentic engagement?

R2: Is the age of virtual students a significant predictor of agentic engagement?
R3: Is the grade level of virtual students a significant predictor of agentic engagement?

R4: Is there a difference in agentic engagement with previous experience in a brick-and-mortar school and current virtual experience?

The study addressed if agentic engagement was fostered by Lee Virtual School. The study involved the collection of primary data using a cross-sectional online survey. The population is 168 full time 6th-12th grade virtual students in Lee Virtual School in Lee County, Florida. The importance of this study sought to determine if the experience in Lee Virtual School increases a secondary student’s self-motivation through the measure of agentic engagement. It is anticipated that the data on agentic engagement can help administrators predict success in virtual school. In virtual education, students are tasked with motivating themselves and being stewards of their own education.

Chapter 2 developed the study through the literature. The literature review began with the development of the study through historical context and theoretical foundations of constructivism and self-determination theory (SDT) as foundational theories. These theoretical foundations established the years of experience in virtual education (independent variable) as a predictor of agentic engagement (dependent variable). The next section of chapter 2 used current literature to establish the effectiveness of virtual education with multiple variables and demographic populations such as students with IEPs, low and high socioeconomic status, free and reduced lunch, gender and race. The final part of the section brought out the issues within virtual education to create a complete picture of the field.
Chapter 3 discussed the methodology and data collection process in depth and thoroughly. The researcher used the quantitative research method, a correlational design with hierarchical linear regression needed to answer the first three research questions, and a causal-comparative research design with a paired-samples \( t \) test analysis needed to answer the fourth research question. The researcher collected primary data via online survey from a convenience sample of 79 participants recruited from a target population of 168 6th-12th graders at the Lee Virtual School in Lee County Florida. The sample included 47% of the target population. The students were given an anonymous survey using the AES questionnaire (Reeve, 2013) developed to measure students’ agentic engagement. The researcher collected additional demographic data for three variables: years of experience in the virtual school, age, and grade level. The data were analyzed in SPSS.

Chapter 4 presented the data analysis and the findings. The researcher conducted a hierarchical linear regression to generate the information needed to answer the first three research questions regarding students’ years of experience in virtual school, age, and grade as possible predictors of agentic engagement in the virtual school environment. In addition, the researcher used a paired-samples \( t \) test to assess the difference in the respondents’ agentic engagement between the current virtual school environment and the earlier brick-and-mortar school environment. The results were used to answer the four research questions.

Chapter 5 included a summary of the findings, conclusions, and examination of the implications of the results including theoretical foundation. In addition, the researcher
elaborates on the current practice and future research. The chapter closes with recommendations for future research and practice.

**Summary of Findings and Conclusion**

This section included a summary of the research findings and conclusions based on Chapter 4. The following section was divided into three sections of conclusions on Research Questions 1 through 3 conclusions on Research Question 4 and overall conclusions based on current research of agentic engagement. Implications and recommendations for future research were discussed.

**Research Questions 1 through 3 and hypotheses.** The researcher conducted a hierarchical linear regression to generate the information needed to answer the first three research questions regarding students’ years of experience in virtual school, age, and grade as possible predictors of agentic engagement in the virtual school environment. Age and grade showed high collinearity ($r = 0.971$, $p < 0.001$), and age was eliminated from the analysis. The regression model with grade and experience as predictors was statistically significant, $F(2, 75) = 3.717$, $p = 0.029$, $R^2 = .09$. The respondents’ year of experience in the virtual school was the only statistically significant predictor of agentic engagement, standardized $\beta = 0.275$, $t = 2.41$, $p = 0.018$. Based on these results, the researcher accepted the alternative hypothesis stated for the first question and the null hypotheses stated for the second and third research questions.

Even though these factors were not identified as significant predictors of agentic engagement, the data points in this research can support the research on student engagement and most importantly, agentic engagement. Agentic engagement is a relatively new concept as a construct of overall student engagement. Reeve (2013)
hypothesized agentic engagement and developed an Agentic Engagement Scale (AES) to measure the construct. Li and Lerner (2013) stated that further research is needed on variables that promote student engagement. This research can add to the discussion with respect to agentic engagement and experience in the virtual environment. It adds to the research on how students can contribute to their own academic motivations (Reeve & Lee, 2014).

**Research Question 4 and hypotheses.** The researcher used a paired-samples $t$ test to assess the difference in the respondents’ agentic engagement between the current virtual school environment and the earlier brick-and-mortar school environment. The findings showed that the respondents’ agentic engagement in the current virtual school ($M = 20.220$) was significantly higher than their agentic engagement in the earlier brick-and-mortar schools ($M = 17.683$), $t(81) = 5.168$, $p < .001$. Based on these results, the researcher rejected the null hypothesis and accepted the alternative hypothesis.

The fourth research question was stated in response to the request of the Lee County School District. Agentic engagement is a relatively new concept as a construct of overall student engagement. Reeve (2013) hypothesized agentic engagement and developed an Agentic Engagement Scale (AES) to measure the construct. Li and Lerner (2013) stated that further research is needed on variables that promote student engagement. This research can add to the discussion with respect to agentic engagement between virtual and traditional brick-and-mortar schools. It adds to the research on how students can contribute to their own academic motivations (Reeve & Lee, 2014).

**Conclusions.** Students in the virtual environment express similar levels on engagement regardless of age and grade level. The rejection of the alternative hypotheses
still advances the research and contributes to the current body of knowledge on agentic engagement and overall student engagement. Age and grade level has no effect on agentic engagement. This means that each student regardless of age and grade level can be agentically engaged in the virtual environment. The results provided empirical evidence in support of the alternative hypothesis stated for the first question: Student experience in a virtual learning environment is a significant and positive predictor of agentic engagement. For each one-unit (one-year) change in experience, agentic engagement increased by 27.5% (Table 8).

In addition, evidence from the t test showed that students had a higher level of agentic engagement as compared to previous brick-and-mortar experiences. Evidence from Research Question 4 showed that there was an increase in agentic engagement moving from traditional to the virtual environment. There is a clear difference in brick-and-mortar agentic engagement and virtual student engagement. Agentic engagement along with overall student engagement can increase as experience in a classroom setting increased.

The results and conclusions of this study directly relate to previous studies on virtual education and agentic engagement. Reeve and Tseng (2011) sought to validate agentic engagement as a construct of overall student engagement. The authors surveyed 365 Korean high school students eight weeks into the semester for all four constructs of student engagement and collected achievement data at the end of the semester. The researchers found that agentic engagement was related to students’ productivity and motivation and explained part of the variance in student achievement. Agentic engagement is proactive and different from formative assessment, which is reactive.
Virtual education promotes active learning and proactive engagement of the student. From a student’s perspective, online learning can provide, “a greater level of independence and control over their own learning” (Barbour et al., 2012, p. 235). The findings of the researchers aligned with the findings in the current study that showed that the respondents’ agentic engagement in the current virtual school ($M = 20.220$) was significantly higher than their agentic engagement in the earlier brick-and-mortar schools ($M = 17.683$), $t(81) = 5.168$, $p < .001$.

Reeve (2013) used the newly validated AES and administered it during three periods of time in a school year to measure if a student’s agentic engagement changed during the course of a semester. The population of Trial 3 was 315 middle school students. Agentic engagement showed normal distribution and proved to be individually significant in predicting academic achievement ($\beta = .25$, $t = 3.20$, $p = .01$). Results showed that agentic engagement predicted changes in student’s levels of perceived autonomy and support at the early semester and mid-semester points. Reeve noted that students can be more motivated as interaction with the teacher unfolds during the semester. While the current study did not focus on agentic achievement as a predictor of student achievement, results showed that students’ years of experience with virtual learning was a predictor of agentic engagement. Therefore, virtual learning did improve student engagement over time, which supported Reeve’s findings.

Jang et al. (2014) completed a longitudinal study on SDT’s motivation mediation model. Agentic engagement was included as one of the constructs of overall student engagement. The researchers found that students initiated autonomous learning opportunities when they experienced need satisfaction during instruction. Virtual
instruction offers choices and pathways that are not available in a traditional brick-and-mortar-setting. The findings from the current study mirrored those of Jang et al. in that students experienced significantly higher levels of agentic engagement in virtual school as compared with brick-and-mortar school.

Jamaludin and Osman (2014) utilized the flipped classroom to measure four constructs of student engagement including agentic engagement. This study sought to determine if each of four constructs of engagement promoted active learning through the flipped classroom. These constructs included behavioral engagement, emotional engagement, cognitive engagement and agentic engagement, which was defined as student self-learning. The sample included 24 undergraduate students and results showed that emotional engagement received the highest score, followed by behavioral and cognitive engagement, respectively. Agentic engagement received the lowest score. In essence, the results of the study showed that students must be emotionally engaged for students to actively engage in learning. The flipped classroom and virtual education both focus on constructivist theory by engaging students in active learning and providing feedback to new knowledge (Yoders, 2014). In the Jamaludin and Osman (2014) study, overall active learning increased overall student engagement. Virtual education allows choice and freedom for students and promotes active learning (Bakia et al., 2012). The researchers noted that agentic engagement was low due to the flipped classroom being only first introduced during this study. This finding blends with the finding of the current study that experience in virtual education gradually increases agentic engagement.
Implications

This section will provide an overview of theoretical, practical and future implications. A critical analysis of the contributions of this research to the advancement of scientific knowledge with respect to agentic engagement and virtual education will be discussed. Lessons learned, strengths and weaknesses were discussed.

Theoretical implications. Student engagement is an ever changing and hard to define area of research. The common elements of multiple definitions from various authors define student engagement as the overall participation and success a student exhibits with respect to effort in class and schoolwork (Appleton et al., 2008; Lam et al., 2014; Lester, 2013). Although it is hard to define, it is still very important to student success. Student engagement is inextricably linked to student academic achievement. Lam et al. (2014) included academic outcomes from student engagement, but also included non-academic outcomes such as higher self-esteem, peer acceptance, and life satisfaction. Agentic engagement is a newer construct of overall student engagement. Agentic engagement is the “student’s constructive contribution into the flow of the instruction they receive” (Reeve & Tseng, 2011, p. 258). It is appropriate for this study and for more studies in the future to strengthen agentic engagement as a construct.

The previous research established agentic engagement as a construct of overall engagement (Reeve 2013). The AES is a valid and reliable instrument that measures agentic engagement. Agentic engagement is a relatively new construct that has limited administration outside of Korea (Reeve & Lee, 2014). The more data points that can be researched will strengthen agentic engagement as an overall construct of student engagement.
One main theoretical implication is that agentic engagement and virtual education have interrelated associations. Agentic engagement is a measure of the students’ ability to self-regulate and self-monitor with respect to their own education. Students who are engaged in this manner are agents of their own education and seek out learning that best fits their needs (Reeve & Tseng, 2011). The skills needed to be successful in virtual education are in line with agentic engagement. Barbour (2011) cited educational choice and higher levels of motivation as some of the many benefits of online learning.

**Practical implications.** One implication gleaned from this research is that students adapt to the virtual environment and exhibit the skills necessary to be agentically engaged. Years of experience in virtual school was the only statistically significant predictor of agentic engagement. This means that when faced with the challenge of virtual education, students can gradually adapt and grapple with the new challenge. Administrators can use the data from this to monitor agentic engagement. If agentic engagement should fall for an experienced virtual student, then there is a cause for concern.

Another implication from the results is that students feel that virtual instruction fosters their stronger agentic engagement compared with the traditional brick-and-mortar experience. This is an implication for brick-and-mortar schools to improve how they allow students to contribute to their own education. It also implies that virtual school allows students to make proactive choices in their own education.

A final implication from the results shows that virtual students exhibit a greater level of agentic engagement. Virtual school, as a model, shows that students learn best in a constructivist environment. Sultan, Woods and Koo (2013) cited four key outcomes of
constructivism: personal relevance, uncertainty, critical voice, shared control, and student negotiation. These are integrated into virtual school as students are in charge of their own learning pathway. Brick-and-mortar schools need to adopt a more constructivist model of education to allow students to take control of their own education as they have in the virtual environment.

The main strength of this study is the methodology and survey procedure. The fact that a multiple linear regression and Likert Scale were utilized for this study is significant. Reeve and Tseng (2011) utilized a Likert Scale and a linear regression as part of the data analysis on the original AES instrument. Quantitative data allows for the quick analysis of a high magnitude of data samples.

Another strength with this research was with the data collection process. The Parentlink system and online survey instrument helped expedite the data collection process. Parentlink allows for easy email, text and phone communication with parents and can be scheduled at intervals to remind parents of survey access. The combination of Parentlink and Survey Monkey made data collection effective and efficient.

An additional strength was the sample size. The researcher received 82 complete survey responses from a target population of 168 full-time students enrolled in Grades 6 through 12 at Lee Virtual School. The final sample on which the researcher performed the analysis was comprised of 79 respondents, which met the calculated sample size of n=77.

One weakness is associated with the survey administration. The survey was administered online to students to complete at their leisure. It is not conclusively known if the student completed the survey, or if a parent or another individual assisted or
completed the survey for the student. Parents and students were made aware through the informed consent letter that this survey is not for a grade and there is no reason to be dishonest.

The data set for the t test were not normally distributed. The Lee County School District expressed interest in the collection and analysis of this data. The t test was used to best display and aggregate the data for the school district. One final weakness was related to the data and how it was used in data analysis. The data collected from the survey was ordinal in nature. However, the researcher used approximation to utilize the data as interval.

**Future implications.** The current study did not find that experience in virtual education, age and grade level were significant predictors of agentic engagement. However, the administration of the survey occurred late in the school year. Students had a minimum of 6 months of experience in the virtual environment. That could be enough time for students to adapt. Greater attention should be given to students in their first 6 months of virtual education.

**Recommendations**

This study was a starting off point in linking agentic engagement and virtual instruction. The researcher has identified areas and recommendations for future research and future practice for researchers interested in agentic engagement and virtual instruction. This section is a summary of recommendations and their benefits to the topic and researchers. There are five recommendations presented by the researcher.

**Recommendations for future research.** First, this study used the AES on 6-12 graders in Lee Virtual School. Future quantitative research can encompass more virtual
students in other counties in Florida or include other states. Lee Virtual School is unique in some of the services offered to students. Future researchers can replicate this study and glean more information from the data collected. Expanding the research to a larger group could offer more generalized insights to all virtual students.

Second, this study included 6-12 grade students at Lee Virtual School. In future research, the researcher could include K-5 elementary virtual students in a quantitative study. Elementary students can offer different perspective of Lee Virtual School and agentic engagement. This research would give a more complete picture of Lee Virtual School agentic engagement.

Third, from the findings of this study, a qualitative study using agentic engagement and virtual instruction could be completed. In the literature there was only one qualitative study that utilized agentic engagement and covered high learning. A qualitative study at Lee Virtual School or another school would give some depth to virtual instruction and agentic engagement.

Fourth, taking a longitudinal approach to agentic engagement would give a researcher a different view on agentic engagement in virtual school. This current study was a snapshot in time comparing different students. Comparing the same students over a period of time could give more details on how agentic engagement changes in the virtual setting. All of the original research on the development of the AES were through longitudinal studies (Reeve & Tseng, 2011; Reeve, 2013; Reeve & Lee, 2014).

Finally, due to timing of the survey being at the end of the semester the students might already be acclimated to virtual instruction. A researcher could replicate the survey and survey students at the very beginning of the school year. There was a difference in
previous brick-and-mortar and current virtual agentic engagement. The increase in engagement must occur at a point before the end of the first semester. Liu and Cavanaugh (2011), in their research on an online biology class, found higher levels of engagement in the second semester due to familiarity of virtual learning.

**Recommendations for future practice.** Based on the findings from this research, the researcher recommends practices with regards to agentic engaging and virtual instruction. The information from this research could be of benefit to virtual school administrators, teachers, parents and students.

One recommendation is that the AES be implemented as a tool for monitoring students at Lee Virtual School quarterly, each semester or yearly. An administrator can use the AES to monitor how students are interacting with their own instruction. This research did not find any change in agentic engagement with years of experience. This means that if a student’s agentic engagement is monitored and it declines, it could be a cause for interventions. Hamane (2014) cited the need for a tool to monitor “at risk” behaviors in the virtual environment.

A second recommendation is that teachers could monitor students using the AES. Hawkins et al. (2013) utilized a quantitative study that surveyed students’ perceptions and compared them with completion rate and academic performance. The study found that quantity and quality of interactions had an impact on completion rate but not on grades awarded. Teachers can improve on the quality of the virtual instruction by engaging students in a conversation and by helping a student be a steward of his or her own education.
References


doi:10.1080/01587919.2014.891429

Appendix A

Informed Consent: Parent Letter

Dear Parents,

My name is Elijah Lefkowitz. I am a teacher at Lee Virtual School and working on my doctorate with Grand Canyon University. It is my honor to include your child in a study on agentic student engagement in virtual school. The purpose is to determine if experience in a virtual program increases a student’s agentic engagement or the student’s ability to direct how they learn in the classroom.

An anonymous survey will be available at the following link:
www.surveymonkey.com. No personal identification will be requested and collected. The survey will only ask the student 10 agentic engagement questions and the years the student has attended a virtual school, the student’s age and grade level. The student is allowed to discontinue the survey at any time and is not required to complete.

The results of this survey will help determine how students learn in virtual instruction. The study will be especially useful to Lee Virtual School by helping to prove overall virtual student learning. If you have any questions or concerns about the study, please contact me at:

Elijah Lefkowitz
239-470-6700
elefkowitz@my.gcu.edu

GCU IRB Contact:
Cynthia Bainbridge, Director of Academic Research and IRB Chair
602-639-7804
irb@gcu.edu

Sincerely,
Elijah Lefkowitz
Appendix B

Informed Consent: Student Letter

Dear Student,

My name is Elijah Lefkowitz. I am a teacher at Lee Virtual School. I am a student as well. I am currently earning a Doctorate of Education at Grand Canyon University. I would like to invite you to participate in a survey that will help me complete a research paper. I want to find out how students in virtual school engage and motivate themselves to do their work.

I need 6-12th grade students with parent permission to complete this anonymous survey. The survey asks 13 questions: years you have attended a virtual school, your age, grade level and 10 engagement and motivation questions. This is not for a grade, and you are not obligated to complete the survey, once you have started. There will be no consequence if you wish to discontinue, at any point. This survey is anonymous, so your answers cannot identify you in any way. I know you are very honest and will answer the questions to the best of your ability, but please help me out and be serious when you take the survey.

You can help me complete my school work by completing the survey by Next Friday 6/15/15. The results of this survey will help determine how students like you learn through virtual instruction. The study will especially benefit Lee Virtual School improve overall virtual student learning, and hey, you will know you were a part of it!

Thanks Again!
Elijah Lefkowitz
239-470-6700
elefkowitz@my.gcu.edu
Appendix C

AES Permission

AES, CTQ, and AFS Questionnaires

Click on the name of the questionnaire below for (a) the scale, (b) description of the scale, and (c) validating psychometric information and supportive reference citations.

All 3 questionnaires are free to use for research purposes, as they are not copyrighted.

**Agentic Engagement Scale (AES)**

The AES is a brief, 5-item, self-report measure with strong psychometric properties to assess one aspect of students' classroom engagement—namely, their agentic engagement.

*The 5 items:*

1. I let my teacher know what I need and want.
2. During this class, I express my preferences and opinions.
3. When I need something in this class, I'll ask the teacher for it.
4. During class, I ask questions to help me learn.
5. I let the teacher know what I am interested in.

For more information on the AES, click the name of the questionnaire above.

**Controlling Teaching Questionnaire (CTQ)**

The CTQ is a brief, 4-item self-report measure with strong psychometric properties to assess perceptions of a teacher's (or parent's, coach's, manager's, etc.) tendency to use controlling behavior during instruction.

*The 4 items:*

1. My teacher tries to control everything I do.
2. My teacher is inflexible.
3. My teacher uses forceful language.
4. My teacher puts a lot of pressure on me.

For more information about the CTQ, click on the name of the questionnaire above to view a Word
Appendix D

Sample Size Calculation: Multiple Linear Regression

**F tests** – Linear multiple regression: Fixed model, $R^2$ deviation from zero

**Analysis:** A priori: Compute required sample size

**Input:**
- Effect size $f^2$ = .15
- $\alpha$ err prob = 0.05
- Power (1–$\beta$ err prob) = .80
- Number of predictors = 3

**Output:**
- Noncentrality parameter $\lambda$ = 11.5500000
- Critical F = 2.7300187
- Numerator df = 3
- Denominator df = 73
- Total sample size = 77
- Actual power = 0.8017655
## Appendix E

**Sample Size Calculations: $t$ test**

$t$ tests - Means: Difference between two dependent means (matched pairs)

**Analysis:** A priori: Compute required sample size

**Input:**
- Tail(s) = Two
- Effect size $dz = 0.5$
- $\alpha$ err prob = 0.05
- Power $(1-\beta$ err prob) = 0.80

**Output:**
- Noncentrality parameter $\delta = 2.9154759$
- Critical t = 2.0345153
- Df = 33
- Total sample size = 34
- Actual power = 0.8077775
Appendix F
Site Approval

* Itzen, Dr. Richard

The District Research Committee has reviewed your study "Agentic Engagement In Virtual Instruction" and approved its implementation in Lee County. Please review the following conditions and recommendations:

- Work with principal Al Shilling on the timing and method of dissemination of the survey.
- Make it clear to the students that participation in the survey is voluntary.
- We're not sure that the 348 students would be all students in the LVP, but if not, we would encourage you to include all students in the program.
- Consider including other demographic variables such as age, grade-level, etc. in addition to years in the program.
- Consider adding a component to your study (survey) that would allow comparisons to students' experience in brick and mortar schools (i.e. ask them the same question in reference to what they were in a school other than LVP).
- Send us the results of your study (electronic please) when it is completed.

Thank you for your interest in conducting research in the School District.

Richard Itzen, Director
Dept. of Research and Assessment
[239] 325-1448

Harmony - Analytical - Intellective - Consistency - Holistic
Appendix G

Survey

Dear Students,

My name is Elijah Leifkowitz. I am a teacher at Lee Virtual School. I am a student as well. I am currently earning a Doctorate of Education at Grand Canyon University. I would like to invite you to participate in a research paper that all of you can help me complete. I want to find out how students in virtual school engage and motivate themselves to do their work.

I need 6-12th grade students with parent permission to complete this anonymous survey. The survey asks 13 questions: years you have attended a virtual school, age, grade level and 10 engagement and motivation questions. I know all of you are very honest and will answer the questions to the best of your ability. This is not for a grade and your answers cannot identify you in any way, but please help me out and be serious when you take the survey.

You can help me complete my school work by completing the survey by Friday 5/12/15. The results of this survey will help determine how students like you learn in through virtual instruction. The study will especially benefit Lee Virtual School improve overall virtual student learning, and hey, you will know you were a part of it!

Any questions about the study? Call or email me!

Thanks Again!
Elijah Leifkowitz
239-470-6700
eleifkowitz@my.gcu.edu

1. Do you agree to participating in the survey?
   - Yes
   - No

2. What grade are you in?
   - 6th
   - 7th
   - 8th
   - 9th
   - 10th
   - 11th
   - 12th
3. How old are you?
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

4. How many years experience do you have in virtual school?
- I am in my first year of virtual school
- I am in my second year of virtual school
- I am in my third year of virtual school
- I am in my fourth year of virtual school
- I am in my fifth year of virtual school
- I am in my sixth year of virtual school

5. I let my teacher know what I need and want.
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
-                  |          |         |       |               |

6. During this class, I express my preferences and opinions.
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
-                  |          |         |       |               |

7. When I need something in this class, I'll ask the teacher for it.
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
-                  |          |         |       |               |

8. During class, I ask questions to help me learn.
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
-                  |          |         |       |               |

9. I let my teacher know what I am interested in.
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
-                  |          |         |       |               |

10. Thinking back to your experience in your last brick and mortar school, answer the following: I let teacher know what I need and want.
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
-                  |          |         |       |               |
11. Thinking back to your experience in your last brick and mortar school, answer the following: During this class, I express my preferences and opinions.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

12. Thinking back to your experience in your last brick and mortar school, answer the following: When I need something in this class, I'll ask the teacher for it.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

13. Thinking back to your experience in your last brick and mortar school, answer the following: During class, I ask questions to help me learn.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

14. Thinking back to your experience in your last brick and mortar school, answer the following: I let my teacher know what I am interested in.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
Appendix H

IRB Approval

Thank you for your submission of New Project materials for this research study. Grand Canyon University Institutional Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Dr. Cynthia Bainbridge at (602) 639-7504 or cynthia.bainbridge@gcu.edu. Please include your study title and reference number in all correspondence with this office.

cc:
# Appendix I

## Descriptive Statistics

*Survey Response Summary (N=82)*

<table>
<thead>
<tr>
<th>AES Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Response Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I let my teacher know what I need and want.</td>
<td>0</td>
<td>1</td>
<td>13</td>
<td>41</td>
<td>27</td>
<td>4.15</td>
</tr>
<tr>
<td>During this class, I express my preferences and opinions.</td>
<td>1</td>
<td>2</td>
<td>23</td>
<td>33</td>
<td>23</td>
<td>3.91</td>
</tr>
<tr>
<td>When I need something in this class, I’ll ask the teacher for it.</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td>35</td>
<td>30</td>
<td>4.16</td>
</tr>
<tr>
<td>During class, I ask questions to help me learn.</td>
<td>0</td>
<td>2</td>
<td>18</td>
<td>34</td>
<td>28</td>
<td>4.07</td>
</tr>
<tr>
<td>I let my teacher know what I am interested in</td>
<td>0</td>
<td>3</td>
<td>21</td>
<td>37</td>
<td>21</td>
<td>3.93</td>
</tr>
<tr>
<td>Thinking back to your experience in your last brick-and-mortar school,</td>
<td>1</td>
<td>8</td>
<td>27</td>
<td>37</td>
<td>9</td>
<td>3.55</td>
</tr>
<tr>
<td>answer the following: I let teacher know what I need and want.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking back to your experience in your last brick-and-mortar school,</td>
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<td>15</td>
<td>26</td>
<td>30</td>
<td>10</td>
<td>3.40</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking back to your experience in your last brick-and-mortar school,</td>
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<td>10</td>
<td>18</td>
<td>37</td>
<td>16</td>
<td>3.70</td>
</tr>
<tr>
<td>answer the following: When I need something in this class, I’ll ask the teacher for it.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking back to your experience in your last brick-and-mortar school,</td>
<td>3</td>
<td>8</td>
<td>27</td>
<td>29</td>
<td>15</td>
<td>3.55</td>
</tr>
<tr>
<td>answer the following: During class, I ask questions to help me learn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking back to your experience in your last brick-and-mortar school,</td>
<td>2</td>
<td>11</td>
<td>25</td>
<td>33</td>
<td>11</td>
<td>3.49</td>
</tr>
<tr>
<td>answer the following: I let my teacher know what I am interested in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Questions from Agentic Engagement Survey (AES) (Reeve 2013).
Appendix J

Scatterplots For Hierarchal Linear Regression

Partial Regression Plot
Dependent Variable: VirtualAE

Partial Regression Plot
Dependent Variable: VirtualAE
Appendix K

t test Assumption Checks

<table>
<thead>
<tr>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>BandMAE</td>
<td>.107</td>
<td>82</td>
</tr>
<tr>
<td>VirtualAE</td>
<td>.095</td>
<td>82</td>
</tr>
</tbody>
</table>

<sup>a</sup> Lilliefors Significance Correction