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STUDENT MOTIVATION AND ITS RELATIONSHIP WITH ENGAGEMENT AND ACADEMIC ACHIEVEMENT AMONG FULL-TIME VIRTUAL SCHOOL STUDENTS

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A DISSERTATION APPROVED FOR THE
DEPARTMENT OF EDUCATIONAL LEADERSHIP AND POLICY STUDIES

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Dedication

To Madison and Chris—my best friends – your love, patience, and curiosity are the reason this work matters. Every step of this journey was for you and because of you.

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Abstract

Virtual school enrollments in the United States have been steadily increasing over the past 25 years. Yet, studies have routinely shown that the academic performance of full-time virtual school students is considerably below that of their brick-and-mortar peers. To understand these results, theoretical reasoning suggests that motivation may be an important factor as students may need to be highly self-motivated to engage with online learning programs effectively. However, very little empirical work has tested the relationship among student motivation, engagement with learning platforms, and outcomes among full-time K-12 virtual school students. The purpose of this study was to examine these relationships by analyzing administrative data and surveys given to 6-12 grade students (n=212) in a full-time virtual school in an urban school district. Results indicated no statistical association between measures of self-reported motivation and engagement with learning platforms. However, self-reported internalized motivation was associated with student outcomes (i.e., course completion and grades). This study contributes to a growing body of literature on full-time virtual school students' motivation, achievement, and participation in online learning activities.

Keywords: virtual schools, online learning, student motivation, self-determination theory, engagement, academic outcomes, internalized motivation, full-time virtual students

Chapter 1. Introduction

Full-time virtual school enrollments in the United States have been increasing over the past 25 years (Hamlin et al., 2023). During the 2013-2014 school year, nearly 200,000 US students were enrolled in full-time virtual schools with the vast majority attending virtual charter schools (Common Core of Data, n.d.1). By the 2019-2020 school year, that number had risen to approximately 330,000 students (Common Core of Data, n.d.2). During the pandemic, that number skyrocketed to 643,930 students, nearly doubling the number of enrolled students in just one year (Molnar et al., 2023). Only 10% of these students returned to brick-and-mortar during the 2021-2022 school year in response to declining pandemic rates (Molnar et al., 2023). The number of students enrolled in the 2022-2023 school year was still over 500,000 students (Molnar et al., 2023). Prior to the Covid-19 pandemic, a growing number of school districts opened their own full-time virtual schools (Molnar et al., 2023). The number of district-operated virtual academies post pandemic now account for 66% of all full-time virtual schools in the United States and they enroll 41% of all full-time virtual school students so the sector is no longer limited to charter schools (Molnar et al., 2023). The share of full-time virtual school enrollments in each grade level rises as the student grade levels increase (Molnar et al., 2023). Approximately 4% of kindergarten students and approximately 11% of high school seniors were enrolled in full-time virtual schools in the 2021-2022 school years (Molnar et al., 2023).

Given the growth of enrollments in full-time virtual schools over the past few decades, researchers have sought to develop an understanding of the role that online learning plays in student achievement (Hamlin et al., 2023). A number of studies find that even when controlling for prior student achievement levels and standard sociodemographic characteristics, students who transition into virtual schools perform well below their brick-and-mortar peers in academic

growth as well as overall academic achievement (Ahn & McEachin, 2017; Bueno, 2020; CREDO, 2015; Fitzpatrick et al., 2020). For example, a longitudinal study conducted in the state of Oklahoma used fixed effects analysis to compare a student's academic performance in virtual school to their own performance when enrolled in a brick-and-mortar school and found significant negative associations with academic achievement when enrolled in virtual schools (Hamlin et al., 2023). Another study that analyzed data from nearly 1.7 million students found that Ohio students enrolled in full-time virtual schools performed significantly below their charter and traditional brick-and-mortar peers on all standardized assessments (Ahn & McEachin, 2017).

The mechanisms underlying poor outcomes in full-time virtual schools remain unclear. Despite showing consistent results, existing empirical research on academic achievement does not fully account for negative selection into full-time virtual schools, so there may be unobserved student background factors driving poor outcomes in full-time virtual schools (Greene & Paul, 2022; Hamlin, 2018). Alternatively, learning processes in full-time virtual schools may be driving low outcomes, but very little is known about these processes. One factor may be related to the differences in instructional design and to what extent online curricular materials differ from that of brick-and-mortar. From instructional design, student-teacher interactions, social and collaborative learning, support structures and resources, full-time virtual schools may have fundamental differences from traditional schools that can ultimately hinder student achievement.

Current empirical research suggests that in full-time online learning environments, higher motivation is linked to higher participation events, higher overall engagement, and higher academic outcomes, but most work in this area focuses on online courses at the college level and single course enrollments for high school students (Alemayehu & Chen, 2023; Chen & Jang,

2010, Hartnett, 2012; Kim et al., 2014). Increased motivation among adult learners is linked with higher active participation in online discussions and study hours (Chen & Jang, 2010; Hartnett, 2012). In addition, adult learners who report higher motivation also report higher levels of three forms of engagement: cognitive, behavioral, and emotional (Alemayehu & Chen, 2023). For high school students who are enrolled in a single online course, increased motivation accounted for thirteen percent of the variation in student performance in their online math courses (Kim et al., 2014). However, these studies focus on adults or single-course high school enrollments, leaving open questions about whether similar patterns hold for full-time virtual school students in grades 6-12. Little empirical research has addressed the relationship between student motivation and engagement in learning platforms or academic outcomes among full-time virtual school students in the 6-12 grade setting. Addressing this gap in the literature could help researchers understand the mechanisms that contribute to the poor outcomes for full-time virtual school students.

Study Purpose and Research Questions

The purpose of this study is to determine if student motivation has a relationship with engagement in learning platforms and academic outcomes among full-time virtual school students in 6-12 grades. It examines the quantity and type of student participation in online learning platforms as well as average course grades and average course completion among full-time virtual students of a district-run public school. Given this study's purpose, the following research questions are specified:

> **Research Questions:** *R1: Is there a relationship between student motivation and engagement in online learning platforms (i.e., asynchronous time on task and synchronous participation) among full-time virtual school students?*

R2: Is there a relationship between student motivation and academic outcomes (i.e. student grades and course completion) among full-time virtual school students?

Study Setting & Methods

Virtual school enrollments across the country have been on the rise for more than a decade (Molnar et al., 2023). Enrollments in full-time virtual schools in Oklahoma have mimicked that of national trends. In 2014, there were just over 8,000 students enrolled in virtual charter schools across the state, but in 2022, that number rose to over 34,000 students (*State Public Enrollment Totals | Oklahoma State Department of Education*, n.d.). The state of Oklahoma is not yet tracking enrollments in virtual schools associated with traditional public-school districts, which indicates that the number of virtual enrollments in the state is higher than that report implies. Not only are enrollments in virtual charter schools on the rise, but nearly half of all urban school districts indicated their intention to maintain a virtual academy during the 2020-2021 school year (Diliberti & Schwartz, 2021). Despite the increasing enrollments into virtual schools, a longitudinal study conducted in Oklahoma found that virtual school student achievement is significantly lower than their brick-and-mortar peers in both Math and Language Arts, (Hamlin et al., 2023). One urban school district in Oklahoma launched a virtual academy in the 2020-2021 school year and has found demand for continuation of that school in the years that have followed. This study will refer to that school as The Virtual Academy (TVA). At TVA, courses are provided primarily through an asynchronous platform. Students can complete their coursework entirely in this asynchronous format or participate in optional video conference classes with their peers and teachers. Students in the model can also opt to attend a single blended learning day offered at their school site each week. During these in-person sessions, they

can receive tutoring, attend an advisory period with their peers, and participate in coursework-related activities. However, most students do not choose to attend these on-campus experiences.

During the 2023-2024 school year, school leaders at TVA administered a Likert scale survey to their students through each student's advisory course. Teachers administered the survey following required in person assessments that occurred in January. For students who missed the first survey window, advisory teachers continued to reach out via email, the learning management system, and a computer monitoring software to get the rest of the students to complete the survey. Advisory teachers who got 100% survey completion received a "remote work coupon" for one day which allowed them to work from home on a day approved by the principal. This survey was administered by the school to better understand their student's motivation and intent to engage in virtual learning. The results of this survey will be able to be used in the analysis for the current study.

Demographic data was collected through the school's enrollment management system regarding student free and reduced lunch status, special education status, and English language learner status, race, gender, and grade level. Additional data was collected at the end of the school year from the school's learning management systems. Platform engagement data, pacing and time on task, was captured weekly throughout the school year. In addition, teachers administered a "Zoom Attendance" survey during each of their class zoom sessions. This data was collected from October through the end of the school year and analyzed for participation in both asynchronous and synchronous online learning experiences.

Theoretical Framework

This study draws on Self-Determination Theory to inform the analysis. This theory attempts to understand human motivation through the process of internalizing and integrating

external regulations into autonomous motivation (Ryan & Deci, 2000). Internalization occurs most effectively when individuals experience conditions that support autonomy, competence, and relatedness (Ryan & Deci, 2017). When students internalize motivation, they become more engaged and self-regulated in their learning (Ryan & Deci, 2000; Ryan & Deci, 2017). The application of this theory to online learning is appropriate given that empirical research has found that online learning environments could be less motivational than their face-to-face counterparts (Wang et al., 2019). Online learning environments often employ asynchronous learning models that are designed to foster autonomy and competence but may not provide the social dynamics necessary to support the internalization of motivation through relatedness (Ismailov & Chiu, 2022).

Theoretical reasoning suggests that online learning may not engage students as effectively as face-to-face learning (Wang et al., 2019). These asynchronous models allow students to learn at their own pace but often limit teacher-student and peer group interactions, which are thought to foster deep learning and relational connectedness (Ismailov & Chiu, 2022). Nonetheless, empirical research testing these ideas in full-time virtual schools is practically non-existent. Many of the studies that can be found are related to distance learning during the Covid-19 global pandemic (Youth Truth National Non-Profit, 2020). Although the findings of these studies cannot be generalized to full-time virtual school programs and students, these studies are often the first of their kind in addressing student experiences with online learning in the K-12 setting and give possible insights for future research for full-time virtual school students. One large-scale survey of 20,000 Covid-19-era online students found that half of 5th-12th grade students cited depression, stress and anxiety as obstacles to virtual learning, and 41%reported a lack of motivation (Youth Truth National Non-Profit, 2020). Students struggled with

distractions, motivation, stress at home, and social connection (Youth Truth National Non-Profit, 2020). The challenges with motivation and belonging align to the findings of another comparative study conducted with adult learners that found that students reported the online learning environment to be less motivational than face-to-face learning (Wang et al., 2019). The application of Self-Determination Theory to the 6-12 full-time virtual school setting could provide helpful insights into student engagement, motivation, and achievement.

Despite being limited to adult learners and single-course enrollments in high school, the current body of empirical research on motivation, engagement in online learning platforms, and academic achievement still provides useful insights for studying full-time virtual school students. Additional study is needed to determine which factors may influence student academic achievement in full-time virtual school programs. Additionally, theoretical reasoning and empirical research from post-secondary context suggests a relationship between motivation, engagement in learning platforms, and academic outcomes. These insights may help address some of these questions. However, very little empirical work has tested this relationship among full-time 6-12 virtual school students.

Contributions and Limitations

This study has several limitations that should be considered when interpreting the findings. The sample size (N=216) reduces statistical power and limits broader generalizability. Additional this study was conducted in a single urban-full-time virtual school, which may not capture the experiences of students in other contexts. Methodologically, the survey's length and readability could have posed challenges for students who are multilingual, special education, or have low reading proficiency. In addition to the challenges with the sample and survey, the study is unable to account for variables that may influence engagement in online learning platforms

and academic achievement because the controls are limited to sociodemographic characteristics that may not account for home life differences that influence the outcome variables. The quantitative approach to this study limits insights into qualitative components regarding student perceptions of their own motivation, engagement and achievement that may help to explain some of the factors influencing the engagement and performance in the full-time virtual school context. These constraints highlight the need for further research with more diverse samples, qualitative measures, and additional controls.

Despite these limitations, this study advances knowledge in several ways. First, it focuses specifically on full-time virtual school students in grades 6-12 – an understudied population in a field where most prior work has addressed adult learners or single-course enrollments. This contributes to the limited body of research on full-time virtual school students' motivation, engagement in online learning platforms, and academic achievement. Beyond self-reported measures of engagement, this study examines actual time spent in learning platforms, which could provide a more objective measure of how motivation translates into online participation. Finally, by incorporating academic outcomes, this study highlights how motivation might connect to broader school performance, offering practical insights for designing full-time virtual programs that support motivation, enhance student engagement, and ultimately foster higher levels of academic achievement.

Chapter 2. Theoretical Framework

Self-Determination Theory posits that the fulfillment of the basic psychological needs of autonomy, competence, and relatedness are necessary for individuals to access their innate resources necessary for the internalization of motivation (Niemiec & Ryan, 2009; Ryan & Deci, 2000; Ryan & Deci, 2002; Ryan & Deci, 2017). In education contexts, motivation internalization is associated with improved academic outcomes, increased learner engagement, and lower anxiety, reduced need frustration, and fewer negative emotions (Reeve & Cheon, 2021; Ryan & Deci, 2000). Among adult learners, online learning fosters autonomous and self-directed learning, as students navigate their own study schedules, learning styles, and paces (Serdyukova & Serdyukov, 2012). While some learners may thrive in this autonomous environment, others may struggle with reduced motivation due to the absence of interpersonal connections and collaborative learning opportunities. Research suggests that online learning environments could be less motivational than face to face learning, due to the lack of relatedness necessary to foster internalized motivation among students (Günes & Alagözlü, 2021; Ismailov & Chiu, 2022; Wang et al., 2019).

Self-Determination Theory

Self-Determination Theory is a social science theory that seeks to understand the ways that human beings and their social contexts foster environments where motivation, well-being, and growth can occur (Ryan & Deci, 2000; Ryan & Deci, 2002; Ryan & Deci, 2017). It posits that the psychological needs of autonomy, competence, and relatedness are necessary for humans to self-actualize (Ryan & Deci, 2000; Ryan & Deci, 2002; Ryan & Deci, 2017). The overarching theory attempts to explain human motivation and well-being through four mini-theories that come together to form a macro-theory of human growth and development (Ryan & Deci, 2002).

Each of the four mini-theories contribute to the social science understanding of human motivation and well-being:

- Cognitive Evaluation Theory deals with social contexts and their influence on intrinsic motivation.
- Organismic Integration Theory gives insight into goal internalization.
- Causality Orientations Theory explains the ways in which individuals orient themselves toward self-determination.
- Basic Needs Theory describes the role that the fulfillment of basic psychological needs plays on human behaviors related to motivation, growth, and well-being (Ryan & Deci, 2002).

Cognitive Evaluation Theory

Cognitive evaluation theory (CET) was developed to explain intrinsic motivation and factors that enhance or inhibit intrinsic motivation, and in particular CET seeks to understand the way that tangible and verbal rewards influence intrinsic motivation to engage in activities through autonomy and competence and how those rewards can undermine or enhance intrinsic motivation (Ryan & Deci, 2002). This mini theory posits that tangible rewards often decrease intrinsic motivation, but that verbal praise or positive feedback increases intrinsic motivation (Rummel & Feinberg, 1988; Ryan & Deci, 2002). These changes in intrinsic motivation can be brought about because of a change in perceived locus of causality, from internal to external due to the tangible reward, and a perceived change in competence based upon the positive praise received (Ryan & Deci, 2002). However, competence alone is not enough to increase intrinsic motivation, but instead, people must have a sense of perceived autonomy associated with their competence (self-efficacy) to develop intrinsic motivation (Ryan & Deci, 2000).

Social contexts can influence the perception of both tangible and verbal rewards and negatively impact intrinsic motivation, which typically depends on whether the environment leans toward controlling rather than informational rewards or praise (Ryan & Deci, 2002; Ryan et al., 1983). Much of the research regarding CET focuses on the fulfillment of autonomy and competence, but the inclusion of relatedness into this theory comes through empirical research that finds that relatedness supports the development of intrinsic motivation (Ryan & Deci, 2002). However helpful CET is in understanding intrinsic motivation, it does little to support the understanding of most tasks that people engage in, because to be intrinsically motivated the person must have an interest in the task itself (Ryan & Deci, 2000). This is where the other mini theories are able to support a better understanding of the ways in which humans are motivated to complete activities that are not self-initiated (Ryan & Deci, 2000).

Organismic Integration Theory

Organismic integration theory (OIT) is the theory that helps explain types of motivation that are not intrinsic through a continuum of motivation that is based upon how internalized the regulation for that action has become (Ryan & Deci, 2002). There are behaviors that individuals must engage in that are externally regulated, but how well those external regulations are Identified into a person's sense of self has much to do with the social contexts through which those activities are introduced (Ryan & Deci, 2002). The far left of the continuum is amotivation which is non-regulated, meaning that the person does not intend to act or they will act passively throughout the activity and stems from lacking perceived competence, contingency, or internalized value of the activity and its outcome (Ryan & Deci, 2002; Wang et al., 2017).

Between amotivation and intrinsic motivation are four categories of motivation regulation, all falling under extrinsic motivation. The degree to which these types of regulation

are identified into a person's sense of self determines how self-determined a behavior is within the realm of extrinsic motivation (Ryan & Deci, 2002). These four categories, listed from least to most self-determined, are External Regulation, Introjected Regulation, Identification Regulation, and Integrated Regulation (Ryan & Deci, 2002). See the table below for a detailed explanation of each type of regulation (Ryan & Deci, 2000; Ryan & Deci, 2002).

Table 1. Extrinsic Motivation Descriptors

Regulation	Description
External Regulation	Least autonomous, motivation by rewards or punishments, satisfies external or socially constructed demands, external perceived locus of causality, show lower interest and effort, blame others for negative outcomes. (Ryan & Deci, 2000; Ryan & Deci, 2002).
Introjected Regulation	Internalized but not adopted as part of the sense of self, controlling, guilt and shame avoidance, ego boosts, increased effort, higher anxiety, difficulty coping with failures (Ryan & Deci, 2000; Ryan & Deci, 2002).
Identification Regulation	More self-determined, consciously value the behavior and see it as important, marks the transition between external regulation and self-regulation, more enjoyment, better coping (Ryan & Deci, 2000; Ryan & Deci, 2002).
Integrated Regulation	Most self-determined extrinsic motivation, shares qualities with intrinsic motivation, often developed through relational contexts because the behaviors are associated with a "significant other" or important group, higher engagement, better performance (Ryan & Deci, 2000; Ryan & Deci, 2002).

Within OIT, it is important to understand that the more internalized a regulation is, the more autonomous the motivation and the more likely the behavior can be sustained over time (Ryan & Deci, 2002, Wang et al., 2017). What else must be noted that although the continuum seeks to explain the types of internalization of regulation, social contexts can influence changes to the internalization of specific regulations and often behavior initiation is associated with

groups to which the person is connected (Ryan & Deci, 2000). Relatedness becomes an integral part in developing autonomous extrinsic motivation but alone is not enough to build upon the internalization necessary (Ryan & Deci, 2000; Ryan & Deci, 2002). In order for internalization of regulation to happen, a person has to feel like they have the skills necessary to be successful and they must feel like they have the autonomy to act, and the most self-determined motivation is only possible when all three components of autonomy, competence, and relatedness are present (Ryan & Deci, 2000).

Causality Orientations Theory

To date, Self-Determination Theory has presumed that there are two primary components that are functioning to support a person's motivation and behavior; their current social environment and their internal resources that have been formed through their previous social environments and contexts (Ryan & Deci, 2002). Causality orientations theory focuses on this second component and categorizes aspects of a person's personality into three orientations that determine how students respond to failure and persist in challenges: autonomy orientation, controlled orientation, and impersonal orientation (Koestner & Zuckerman, 1994; Ryan & Deci, 2002).

Basic Needs Theory

Basic needs theory posits that the satisfying or thwarting an individual's basic needs influences their mental health and well-being (Ryan & Deci, 2002). In this context, well-being is not defined merely as happiness, but rather as being fully functioning, emphasizing a person's perception of their own internal wellness (Ryan & Deci, 2002). Environments that support the development of the basic psychological needs of autonomy, competence, and relatedness foster well-being and the positive outcomes associated with it (King et al., 2024; Ryan & Deci, 2002).

Self Determination Theory and Education

According to Self-Determination Theory, humans tend toward a love of learning and growth (Niemiec & Ryan, 2009). In education contexts, the theory contends that all students theoretically have the innate resources that support the internalization of motivation and drive them to engage, but it also acknowledges that there are times when students experience amotivation and are not able to tap into their inner resources (Reeve, 2012). Self-Determination Theory would posit that it is the role of the educational environment, classroom climate, and teachers to set up conditions that help students tap into their innate resources to foster intrinsic motivation and facilitate motivation internalization (Reeve et al., 2004; Reeve, 2012; Ryan & Deci, 2000). If these conditions are not established, the theory posits that students would tend toward lower levels of motivation internalization, relying more on external regulation or even experiencing amotivation, which in turn leads to lower engagement and outcomes (Niemiec & Ryan, 2009; Reeve 2012).

Self-Determination Theory suggests that when autonomy, competence, and relatedness are fulfilled, individuals experience a greater internalization of motivation (Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Ryan & Deci, 2000). This shift from external regulation toward internalized motivation and intrinsic motivation is linked to positive associations of basic psychological need fulfillment: higher performance, greater curiosity, interest, self-regulation and engagement, as well as lower anxiety, need frustration, problematic relations, and negative emotions (Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Ryan & Deci, 2000). To support this process, school environments should provide for conditions that fulfill the basic psychological needs of autonomy, competence, and relatedness (Reeve, 2012; Reeve & Cheon, 2021; Niemiec & Ryan, 2009; Ryan & Deci, 2000). Theoretically,

fostering autonomy through giving students a voice and a choice, along with providing a rationale for learning, supports the internalization of motivation, helping students align learning with personal values and goals (Niemiec & Ryan, 2009). This would suggest that, according to the theory, when teachers introduce challenges that are appropriately difficult and give useful feedback that improves effectiveness rather than focusing on evaluation, they theoretically foster the basic psychological need of competence, which strengthens motivation internalization and supports sustained engagement (Niemiec & Ryan, 2009). In addition, Self-Determination Theory would suggest that when students feel a sense of connectedness and belonging, they are hypothetically more likely to internalize the motivation necessary to engage in difficult learning tasks than when they feel rejected or disconnected from their teachers (Niemiec & Ryan, 2009).

Theoretically, fulfilling basic psychological needs creates a context that allows students to build upon their innate motivational resources, leading to deeper internalization of motivation and a shift from external regulation to internalized motivation and intrinsic motivation. This process is expected to foster higher behavioral, cognitive, emotional, and agentic engagement, ultimately improving academic outcomes for students (Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Ryan & Deci, 2000). Several studies have highlighted the relationship between psychological need fulfillment and engagement showing that when teachers implement autonomy supportive practices, student participation and engagement tend to increase as motivation becomes more internalized and self-regulated (Chatzisarantis & Hagger, 2009; Cheon & Reeve, 2015; Cheon et al., 2019; Reeve et al., 2004). From a theoretical perspective, learner engagement is a crucial factor in the relationship between motivation and achievement, mediating the relationship between learner motivation and academic achievement (Reeve, 2012).

Self-Determination Theory and Online Learning

The application of Self-Determination Theory to educational contexts, along with evidence that motivation internalization through autonomy, competence, and relatedness predicts student achievement and engagement, supports extending the theory to online learning environments (Behzadnia et al., 2023; Hsu et al., 2019; Ismailov & Chiu, 2022; Reeve, 2012; Reeve & Cheon, 2021). Researchers have applied Self-Determination Theory to online learning contexts in a variety of ways and with a wide range of findings (Alemayehu & Chen, 2023; Behzadnia et al., 2023; Chen & Jang, 2010; Günes & Alagözlü, 2021; Hartnett, 2012; Ismailov & Chiu, 2022; Kim et al., 2014; Salikhova et al., 2021; Wang et al., 2019).

Studies drawing on Self-Determination Theory have attempted to understand course design and its relationship with student motivation, engagement, and academic outcomes (Günes & Alagözlü, 2021; Ismailov & Chiu, 2022; Salikhova et al., 2021). One study examined asynchronous online coursework that used Universal Design for Learning – emphasizing diversity and inclusion – and investigated its impact on students' psychological need fulfillment and related outcomes (Ismailov & Chiu, 2022). That study found that the student-centered course design had a positive association with competence and autonomy support, which are critical in fostering motivation internalization, but not relatedness in the online learning environment but found that students self-reported lower levels of behavioral engagement due to a lack of relatedness in the online learning environment (Ismailov & Chiu, 2022). This study highlights the potential challenges of fostering the relatedness necessary for the internalization of motivation in fully virtual learning environments, despite otherwise well-designed course structures (Ismailov & Chiu, 2022). This finding is consistent with a qualitative study that did analysis of essays regarding adult learner perceptions of their asynchronous online courses

(Salikhova et al., 2021). The study found that asynchronous learning was able to fulfill the adult learners' needs for autonomy and competence, but that they experienced a lack of relatedness fulfillment in their asynchronous online coursework (Salikhova et al., 2021).

Applying the notion to the full-time virtual 6-12 setting may present a unique challenge, because although adult learners were able to satisfy their needs for autonomy and competence through asynchronous coursework, 6-12 students may not experience that same need fulfillment for a variety of reasons including the requirement of compulsory education, which may hinder their sense of autonomy and lead to more externally regulated forms of motivation rather than internalized motivation. Asynchronous course design could also present challenges for competence support since students in the 6-12 setting may have academic gaps that prevent them from readily accessing and learning the material presented in the asynchronous learning environment. If autonomy and competence support are insufficient, students may struggle with motivation internalization, relying instead on external rewards or compliance-based engagement rather than intrinsic motivation. In the 6-12 full-time virtual setting, it is possible that asynchronous coursework will not have the same ability to fulfill the psychological needs of competence for special education or multilingual learner students. The possible lack of psychological need fulfillment for autonomy and competence could be compounded by the relational environment created by virtual learning environments (Ismailov & Chiu, 2022; Salikhova et al., 2021).

While the methodology of these empirical studies range from theoretical articles to rigorous quantitative comparative analyses, a theme emerges in the findings that the basic psychological need of relatedness often goes unmet in online learning environments and could explain why one study found that online learning environments are less motivational than their

face to face counterparts, as students may struggle to fully internalize motivation in the absence of strong teacher and peer relationships (Ismailov & Chiu, 2022; Salikhova et al., 2021; Wang et al., 2019). The proposition that online learning environments are less motivational comes from a two phase study that sought to determine if Basic Psychological Need Satisfaction was a good fit for online learning contexts through the administration of a 21-item Likert scale survey administered to over 600 college students enrolled in an online course at their university (Wang et al., 2019). A confirmatory factor analysis showed that the model fit was adequate for online learning environments but identified one autonomy measure and two relatedness measures that might need to be adjusted for the online learning environment (Wang et al., 2019). They also found a correlation between need satisfaction and need dissatisfaction, suggesting that the measures for these were not direct opposites in the online learning environment. This finding implies that online students might simultaneously experience both need satisfaction and need dissatisfaction; however, the researchers recommended continued research in this area to better explain the findings (Wang et al., 2019).

Building upon these findings, phase two of the study compared students enrolled in online contexts and those in face-to-face classes in the same university (Wang et al., 2019). The study examined approximately 500 students from each context based on three different questionnaires administered via a single online survey (Wang et al., 2019). Measures of learning climate, basic psychological needs, motivation, and perceived knowledge transfer were analyzed using structural equation modeling (SEM), which revealed that need satisfaction and motivation mediated the relationship between learning climate and student outcomes (Wang et al., 2019). Independent t-tests further showed that online students report lower values in learning climate, need satisfaction, motivation, perceived knowledge transfer, and course grade, while exhibiting

higher levels of need dissatisfaction (Wang et al., 2019). These results suggest that the online learning environment provides a less motivational setting than in-person courses (Wang et al., 2019).

This study was limited by its focus on a single large university, and caution should be exercised when applying its findings to broader educational contexts (Wang et al., 2019). However, this study contributes valuable insights into Self-Determination Theory and motivation within the context of online learning. The study employed rigorous methods to compare face-to-face and online learning settings, implying the need for future researchers to delve deeper into motivational factors in online environments (Wang et al., 2019).

When applying this study and its Self-Determination Theory framework to full-time virtual schools in the 6-12 setting, key questions emerge regarding whether online learning environments can fulfill the basic psychological needs that foster internalized motivation in students. On one hand, the flexibility and autonomy of online learning could empower some students to take control of their learning, fostering more internalized motivation (Serdyukova & Serdyukov, 2013). On the other hand, the lack of in-person interaction could lower their relatedness satisfaction and lead to lower motivation internalization (Wang et al., 2019). The mediating relationship of motivation internalization and need satisfaction between learning climate and student engagement and academic outcomes is an important consideration for those in the full-time virtual 6-12 setting (Wang et al., 2019).

Chapter 3. Literature Review

Current research on motivation and engagement in online learning has primarily centered around adult learners in online university courses and single course enrollments in high school (Alemayehu & Chen, 2023; Chen & Jang, 2010, Hartnett, 2012; Kim et al., 2014). Studies have found a relationship between student motivation and basic psychological need fulfillment and participation, self-reported engagement (behavioral, cognitive, and emotional), self-monitoring in their online courses, and improved academic outcomes (Alemayehu & Chen, 2023; Chen & Jang, 2010; Hartnett, 2012; Kim et al., 2014). Little empirical research has addressed student motivation and the relationship with engagement in learning platforms and academic outcomes among full-time virtual school students in the 6-12 grade setting. Addressing this gap in the literature could help researchers understand the mechanisms that contribute to the poor outcomes for full-time virtual school students.

The Evolution and Spectrum of Virtual Schooling in the United States

Virtual schools offer distance education through computer mediated courses to students that are separated by time or location from their teachers (Molnar et al., 2023). Virtual education offerings exist on a spectrum from single online courses offered to students enrolled in traditional brick-and-mortar schools to students enrolled in schools where the entirety of their schooling is conducted asynchronously through computer mediated coursework (Molnar et al., 2023). Somewhere in between those ends of the spectrum are hybrid schools and blended learning models where students take some portion of their school work online and some in traditional classrooms (Molnar et. al., 2023, Stalker, 2011). In blended and hybrid learning, some in-person learning experiences are required as part of the educational experience (Stalker, 2011).

While the spectrum of virtual education spans from one online course offering to entirely asynchronous schooling, the definition of what constitutes a full-time virtual school varies among researchers as well (Molnar et al., 2023; Barbour & Reeves, 2009). Under the strictest definition, full-time virtual schools are those that offer all coursework exclusively through online asynchronous classes (Molnar et al., 2023). While other researchers have opened the definition to include schools where the majority of the coursework is offered in online only environments and can include independent, synchronous, or asynchronous course delivery (Barbour & Reeves, 2009). For this study, the Barbour and Reeves (2009) definition of full-time virtual schools is used, which does not require all coursework to be asynchronous or prohibit in-person experiences but specifies that the majority of schooling occurs online.

The history of virtual schooling in the United States spans more than two decades when the first two virtual schools were established in 1997 in Florida (Barbour & Reeves, 2009). By the year 2001 upwards of 50,000 students were being served in over 50 virtual schools operating in 30 states (Barbour & Reeves, 2009). Over the past two decades, the number of enrollments in full-time virtual schools in the United States has steadily increased, peaking at over 600,000 students during the 2020-2021 school year due to the Covid-19 global pandemic (Molnar et al., 2023). Although pandemic rates declined the following year, only 10% of these students returned to brick-and-mortar schools during the 2021-2022 school year, and enrollments in full-time virtual schools have not returned to the pre-pandemic levels (Molnar et al., 2023).

Because of the surge in interest in full-time virtual school enrollments during the Covid-19 pandemic, the number of public-school districts operating their own full-time virtual schools increased ninefold compared to pre-pandemic levels (Diliberti & Schwartz, 2021). The number of district-operated virtual academies post pandemic now account for 66% of all full-time virtual

schools in the United States and enroll 41% of all full-time virtual school students (Molnar et al., 2023). Half of all urban school districts planned to operate their own full-time virtual academies following the Covid-19 pandemic (Diliberti & Schwartz, 2021). Along with single district-run virtual schools, there are several other organizing bodies that operate full-time virtual schools including for profit and non-profit education management organizations, state operated virtual programs and multi-district programs (Clark & Berge, 2005; Diliberti & Schwartz, 2021; Molnar et al., 2023). Table 2 shows the different organizational types of virtual schools.

Table 2. *Organizational Types of Virtual Schools*

Type of School	Description
University-based	Virtual schools that are linked to universities and often serve gifted or independent study students. Some offer accredited diplomas.
State-sanctioned, state-level	Official state virtual schools that often offer AP courses. Most virtual charter schools lack statewide recognition.
Consortium or collaborative	Partnerships between schools, universities, government agencies and private groups.
Local education agency	Public school districts run virtual programs mainly for local students.
Charter school	State-approved virtual charter schools operate with fewer regulations, with funding and rules varying by state.
Private school	Independently operated virtual schools with their own curricula and accreditation.

(Clark & Berge, 2005)

The wide range of managing organizations for full-time virtual schools results in a variety of program models, which typically fall into three primary categories: independent, synchronous, and asynchronous learning (Diliberti & Schwartz, 2021). The independent model is like the traditional correspondence course model that has students work through the curriculum

with little to no contact with their instructors (Diliberti & Schwartz, 2021). The asynchronous model allows students to work through online discussion posts, video lessons, assignments, and quizzes on their own time under the supervision of a certified teacher but on their own schedule and at their own pace (Diliberti & Schwartz, 2021; Watson, 2007). Although an asynchronous course has the student work through at their own pace, it often includes student-teacher interaction that happens through a variety of means including email, chat, or phone (Watson, 2007). Some asynchronous courses offer student-student interaction using discussion boards and posts, but the primary interaction in asynchronous courses is between student and teacher (Watson, 2007).

This is distinctly different from a synchronous virtual classroom where students meet live via web conferencing software and work through their online courses together with a teacher with the learning happening at the same time in the same virtual space as their teacher and peers (Watson, 2007). It is unclear what percentage of online coursework is offered synchronously vs asynchronously, but some initial research suggests that online charter schools are more likely to offer asynchronous coursework and district-run virtual schools are more likely to offer synchronous offerings (Molnar et al., 2023).

Virtual School Achievement

Studies have compared full-time virtual school students to their brick-and-mortar charter and traditional public school peers and have found that students attending virtual schools perform lower in all tested areas on standardized assessments across multiple tested grade levels

than their brick-and-mortar peers even when controlling for prior performance (CREDO, 2015; Ahn & McEachin, 2017, Hamlin et al., 2023).

One rigorous national study compared students in traditional public schools, brick-and-mortar charter schools, and online charter schools (CREDO, 2015). Students were matched based on grade level, gender, free and reduced lunch status, English language learner status, special education status, and prior achievement results and found that even after rigorous matching and controlling for demographic characteristics and selection into charter programs, those in the virtual environment fared worse in both Language Arts and Mathematics than their traditional public school and brick-and-mortar charter peers (CREDO, 2015). This result held true across demographics including poverty and race/ethnicity (CREDO, 2015). However, this study did find that students in two states had better growth in English language arts in their virtual schools than in the brick-and-mortar programs, but it is unclear whether state policies or other factors led to the improvements in scores and that result is uncommon as the other 15 states all showed worse results among the virtual students (CREDO, 2015).

Another study attempts to use a non-experimental matching approach to help mitigate the effects of selection bias to determine the effects of virtual enrollments on academic performance (Fitzpatrick et al., 2020). The study uses longitudinal data from the state of Indiana to evaluate student performance from the 2010-2016 school years and a rigorous matching protocol to find that students in virtual schools who had previously attended a traditional brick-and-mortar school perform far below their matched peers in all academic areas even when you control for teacher and student characteristics (Fitzpatrick et al., 2020)

One longitudinal study that uses both fixed effects estimates, and random effects estimates indicates that the pattern of low performance of virtual school students continues

among rural online charter school students in Oklahoma (Hamlin et al., 2023). This study used state test score data from a four-year period to analyze the performance of virtual school students in rural Oklahoma and accounted for a number of control variables as well as school mobility (Hamlin et al., 2023). The study found that students in all tested grade levels are performing below their peers across both the larger population and the rural subsection of the population in both ELA and Math, and only the 11th grade ELA test scores did not show statistical significance (Hamlin et al., 2023). The study author notes that although these results are consistent with prior literature on student achievement in virtual schools, it does not provide causal evidence and cannot rule out negative selection into virtual schools (Hamlin et al., 2023).

Overwhelmingly the literature around the academic performance of virtual school students highlights a significant area of concern for researchers and policy makers alike. Despite the rigorous methodological designs of these studies, they are not able to address the possible issues with selection into virtual schools that could contribute to academic performance and are unable to establish a causal link between mode of learning and academic achievement and have not been able to control for negative selection (CREDO, 2015; Fitzpatrick et al., 2020; Greene & Paul, 2022, Hamlin et al., 2023).

Negative Selection

Several empirical studies have found that full-time virtual school student achievement is below that of their brick-and-mortar peers on a wide range of academic outcomes (Ahn & McEachin, 2017; Bueno, 2020; CREDO, 2015; Fitzpatrick et al., 2020; Hubbard & Mitchell, 2011; Miron et al., 2002; Miron & Urschel, 2012; Zimmer et al, 2003). Although a growing body of literature points to the underperformance of full-time virtual schools in meeting the academic needs of their students, some research indicates that negative selection among those who choose

to attend these schools could account for some of the academic performance issues plaguing online programs (Greene & Paul, 2022; Scafidi, 2023). One study suggests that there is a difference in students who choose to attend full-time virtual schools and finds that negative selection – negative reasons associated with the transfer to virtual schools including depression, anxiety, bullying, and prior course failure – has a statistically significant negative relationship with academic achievement in English Language Arts (Greene & Paul, 2022). A survey was administered to parents who had selected virtual school options for their child, and the parents were asked to share their reasons for selecting virtual schools (Greene & Paul, 2023). Approximately 28% of parents cited at least one negative reason for choosing a virtual school, most commonly bullying and anxiety, and many parents listed multiple negative factors for enrolling their child in virtual education (Greene & Paul, 2023).

Another study analyzed the differences between movers and non-movers and their rationale for changing schools (Scafidi, 2023). The study compared movers and non-movers in public and charter schools, non-public schools, and a full-time virtual charter school using a survey of over 2,000 families (Scafidi, 2023). Results of the study showed that virtual schools were much more likely to enroll movers than the other school types and found that these movers were significantly more likely to report issues with their previous schools – including extreme anxiety, concerns about physical safety, and problems with teachers and administrators (Scafidi, 2023). However, this study was only able to obtain responses from 8 percent of the population of students and is not able to determine if issues with negative selection have an impact on observational data for student outcomes (Scafidi, 2023). Although neither the Scafidi nor the Greene and Paul study can determine the impact of negative selection on student achievement and other outcomes among full-time virtual school students, prior literature that addresses

academic achievement but does not control for negative selection may be more biased than originally thought (Greene & Paul, 2022; Scafidi, 2023).

Despite the growing body of literature addressing full-time virtual school student academic outcomes, there has been a failure of empirical literature to identify mechanisms that influence student performance in online schooling. One potential area of focus is the relationship between motivation, student engagement, and academic achievement among full time virtual school students (Ismailov & Chiu, 2022; Salikhova et al., 2021; Wang et al., 2019).

Motivation, Learning Engagement, and Achievement

Numerous studies have attempted to understand student motivation and its relationship with engagement and achievement in online courses, however, most of these studies have centered around adult learners or single course enrollments in hybrid high schools (Alemayehu & Chen, 2023; Chen & Jang, 2010; Hartnett, 2012; Kim et al., 2014). Studies have found that students who report higher levels of motivation and need satisfaction have improved outcomes in both engagement and academic achievement in their online courses (Alemayehu & Chen, 2023; Chen & Jang, 2010, Hartnett, 2012; Kim et al., 2014). Students participate more frequently in online learning and demonstrate greater overall engagement including self-reported behavioral engagement, cognitive engagement, emotional engagement, and self-monitoring in their online coursework (Alemayehu & Chen, 2023; Chen & Jang, 2010; Hartnett, 2012).

Hartnett (2012) conducted a small case study to explore how motivation influences participation in online courses, involving 21 participants from two higher education programs. The participants were divided into two case study groups. In both cases, they completed a survey to determine a composite motivational score, which was then analyzed against their participation levels in the online course. Correlational analysis examined the relationship between

motivational scores and participation measures, including messages posted, messages read, and total hits. In the first case study, a correlation was found between the motivational scores and the number of posted messages. However, no significant relationship was observed between motivation and passive engagement, such as reading messages or course hits (Hartnett, 2012). In contrast, no correlations were found between motivation and participation in the second case study. Following the correlational analysis, a content analysis of student posts revealed that in case study 1, higher motivational scores were associated with greater collaboration with peers. However, the second case study found no significant relationship between motivation and the quality of participation. Although the study examined achievement in the online course, it primarily tested the relationship between participation and achievement rather than motivation and achievement (Hartnett, 2012).

The findings of the Hartnett (2012) study are constrained by its small sample size, which reduces the statistical power needed to draw broader conclusions. Conducting statistical analysis with only 21 participants across two case studies is inherently challenging due to the limited sample size. The lack of findings in the second case study may be attributed to this small sample rather than an actual absence of a relationship between motivation and participation quantity or quality. Hartnett also suggests that highly motivated students may not necessarily participate more rather engage in different, which could explain the lack of a direct correlation between participation and motivation in Case Study 2 (2012). Additionally, the study lacks methodological rigor, as it does not clearly explain the type of content or document analysis used to assess the quality of online participation and the study relies solely on emergent themes for analysis (Hartnett, 2012). While this study's generalizability is limited, similar results regarding self-reported motivation and increased participation have been observed in other research.

Two additional studies conducted among college students used survey methodology to examine the relationship between student motivation and engagement (Alemayehu & Chen, 2023; Chen & Jang, 2010). The first of the two studies surveyed 354 adult learners enrolled in online higher education courses in a university in Taiwan, where the survey measured motivation, self-efficacy, self-monitoring, behavioral engagement, cognitive engagement, and emotional engagement (Alemayehu & Chen, 2023). They found that motivation had a significant positive relationship with self-efficacy as well as all three forms of engagement (Alemayehu & Chen, 2023). One primary limitation of this study is that it relies on self-reported measures of engagement, which are likely influenced by social desirability bias, meaning participants may report higher levels of engagement than they experience (Alemayehu & Chen, 2023). The study does not attempt to triangulate these self-reported data measures with actual time on task, participation, or quality of participation data (Alemayehu & Chen, 2023). The benefit of this study is that it provides insight into participants' perceptions of the relationship between motivation and engagement but would benefit from additional triangulation of data with actual participation.

While Alemayehu and Chen (2023) focused on the relationship between motivation and different forms of engagement, Chen and Jang (2010) extended this line of research by examining how motivation interacts with need satisfaction, participation and achievement in online learning environments. Chen and Jang (2010) took a quantitative approach, analyzing surveys on the connection between motivation, need satisfaction, and participation among 267 adult learners enrolled in online courses as part of a special-education teacher certification program (Chen & Jang, 2010). The surveys used measures for basic psychological need satisfaction and a composite score called the Self-Determination Index derived from the

Academic Motivation Scale, estimating the relationship between motivation, need satisfaction, number of hits, expected grade, final grade, perceived learning, and course satisfaction (Chen & Jang, 2010, Vallerand et al., 1992). The study was structured with the composite motivation score and need satisfaction as independent variables and found that need satisfaction positively predicted study hours and number of hits, but did not find a relationship with need satisfaction and expected grade, final grade, perceived learning, or course satisfaction. The Self-determination index, the composite motivation score, did not have a significant relationship with any of the outcome variables, which surprised the researchers (Chen & Jang, 2010). However, although this study did not find a relationship between the independent and outcome variables, some challenges were related to model fit, while others may have resulted from statistical power of a sample size as low as 267 (Chen & Jang, 2010). The limitations of these studies in relation to full-time virtual school students stem not only from challenges with statistical power, generalizability, and sample size, but also from differences in the population and samples themselves. Each of these studies was conducted with adult learners. Studies regarding student motivation among K-12 students enrolled in online courses remain extremely limited.

A study examining motivation and achievement among high school students offers insights but is constrained by its small sample size and limited generalizability to full-time virtual schooling, since these students were enrolled in only one online mathematics course (Kim et al., 2014). The study employed survey methodology with 72 students and used multivariate regression to examine if any of the tested measures - motivational factors, affective factors, and cognitive processes - could predict student achievement and whether any of these tested measures are related to one another (Kim et al., 2014). The study found that there was a positive relationship between motivation and achievement, positive affective factors, and cognitive

processes. Results showed a negative relationship between motivation and the negative affective factors (Kim et al., 2014). The results of this study are significant because they establish a clear positive relationship between motivation and achievement, along with positive affective associations like enjoyment and a reduction of negative affective associations like boredom and anxiety. However, this study is again limited by its small sample size and reduced power (Kim et al., 2014). The study's generalizability to the full-time virtual school context is further limited because these students were only enrolled in a single online course, while completing the rest of their coursework in face-to-face learning environments (Kim et al., 2014).

Given these limitations, there remains a significant gap in the empirical literature on motivation and its relationship with engagement in learning platforms and academic achievement among students enrolled in full-time virtual school in the 6-12 grade education sector. Each of these studies supports the assumption that motivation has a significant relationship with participation and achievement, but empirical research remains limited to adult learners high school students taking a single online course. With the rise in enrollments in full-time virtual K-12 schools across both charter and traditional school districts, further research is needed to understand the mechanisms that support learner engagement and achievement in this context (Molnar et al., 2023). Empirical research suggests that online learning environments may be less motivational than their brick-and-mortar counterparts, and the application of Self-Determination Theory to online learning indicates that students with higher motivation demonstrate greater engagement, achievement and well-being (Chatzisarantis & Hagger, 2009; Cheon & Reeve, 2015; Cheon et al., 2019; Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Reeve et al., 2004; Ryan & Deci, 2000; Wang et al., 2019)

Chapter 4: Methods

Current Study

Current empirical literature studying motivation and its relationship with engagement and achievement among students enrolled in online coursework suggests that students who are more highly motivated will spend more time in their online learning platforms, report higher levels of engagement, and have improved academic outcomes in their online coursework (Alemayehu & Chen, 2023; Chen & Jang, 2010; Hartnett, 2012; Kim et al., 2014). Some studies suggest that online learning environments may not be able to foster the social context necessary for students to experience relatedness satisfaction resulting in an inability to access the innate resources necessary for internalization of motivation to occur, while other studies suggest that there may be an element of negative selection influencing student achievement in among full-time virtual school students (Greene & Paul, 2022; Ismailov & Chiu, 2022; Salikhova et al., 2021; Scafidi, 2023; Wang et al., 2019). Self-Determination Theory predicts that students who have higher internalization of motivation are more likely to experience the positive effects of increased motivation including higher quantity and quality of engagement and improved academic outcomes (Chatzisarantis & Hagger, 2009; Cheon & Reeve, 2015; Cheon et al., 2019; Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Reeve et al., 2004; Ryan & Deci, 2000; Wang et al., 2019). However, this research is limited to adult learners and single online course enrollments in high school. There is a gap in current literature on motivation and its relationship to engagement and academic outcomes among full-time virtual school students in the 6-12 grade setting. The purpose of this study is to determine if motivation is related to student engagement in their online learning platforms and academic achievement in full-time virtual 6-12 grade

education. Given the purpose of this study, the following research questions have been identified:

Research Questions

R1: Is there a relationship between student motivation and engagement in online learning platforms (i.e., asynchronous time on task and synchronous participation) among full-time virtual school students?

R2: Is there a relationship between student motivation and academic outcomes (i.e. student grades and course completion) among full-time virtual school students?

Study Setting

Enrollments in full-time virtual schools have been on the rise for over a decade in this country, with just under 200,000 students enrolling in full-time virtual schools in the 2013-2014 school year, and that number rising to nearly 600,000 students during the 2021-2022 school year (Common Core of Data, n.d.1; Molnar et al., 2023). The state of Oklahoma has mimicked this national trend with just over 8,000 students enrolled in virtual charter schools in 2014 and over 32,000 students enrolled in virtual schools in the 2022 school year (*State Public Enrollment Totals | Oklahoma State Department of Education*, n.d.). Despite the increasing enrollments in virtual schools, a longitudinal study conducted in Oklahoma found that virtual school student achievement is significantly lower than that of their brick-and-mortar peers in both Math and Language Arts (Hamlin et al., 2023).

Oklahoma does not track enrollments in all full-time virtual schools on its state report. The state report only tracks enrollments in full-time virtual charter schools (*State Public Enrollment Totals | Oklahoma State Department of Education*, n.d.). However, national data indicates that virtual academies associated with traditional public-school districts are a growing

segment of the market for full-time virtual schools, with nearly 66% of all virtual schools and 41% of all students enrolled in virtual schools associated with traditional public-school districts (Molnar et al., 2023). One national study suggests that nearly half of all urban school districts indicated their intention to maintain a virtual academy during the 2020-2021 school year and suggests that the number of enrollments will not shrink back to pre-pandemic numbers even as Covid rates decline (Diliberti & Schwartz, 2021). Unfortunately, it is hard to determine exact numbers of enrollments in these district-run virtual academies due to issues with state and district reporting methods.

In Oklahoma, one virtual charter program, Epic Charter Schools, dominates the virtual landscape. The Charter school opened in 2011 and by 2014, the school had grown to almost 3,000 students (NCES, n.d.). By 2017, the school had more than 13,000 students with numbers peaking at about 40,000 students during the Covid-19 pandemic. Those enrollments shrank back to just over 27,000 students during the 2023-2024 school year. Epic Charter Schools was accused of mismanaging funds and setting up “ghost students” in 2014 and has continued to face several legal challenges, including a 2022 criminal case in which its founders were arrested for embezzling millions of dollars through fraudulent practices (Branham, 2019). Despite these scandals, Epic remains a major player in the Oklahoma education system (Burris & Cimarusti, 2023).

Beyond Epic Charter Schools, many other school districts in Oklahoma have also chosen to maintain their virtual school programs that were launched during the pandemic. One urban school district in Oklahoma, for example, established a virtual academy in the 2020-2021 school year and has found continued demand for the school in the years that have followed. During the 2021-2022 school year, a small semi-structured interview pilot study was conducted in this urban

virtual academy and found that students reported issues with anxiety and motivation to engage in their online learning platforms (Council, n.d.). The current study has developed out of the learnings resulting from the earlier pilot study.

Sample and Population

It is difficult to ascertain the total number of students enrolled in virtual academies associated with traditional public schools in Oklahoma. However, national data suggests that 41% of all virtual school enrollments are associated with traditional public-school districts and that full-time virtual school students now comprise 1.5 % of total enrollments nationwide (Molnar et al., 2023). In the study setting - one urban Oklahoma school district - there are just over 33,000 students enrolled, with approximately 1% of the total student population participating in a full-time virtual school program serving grades Pre-K through 12. This study sample (N=212) consists of full-time virtual school students enrolled in grades 6-12 within the district's virtual academy. Table 3 provides information on the demographic breakdowns of the students in the sample.

Table 3. *Summary Statistics* (N=212)

Variables	Mean/Prop	SD	Min	Max
Dependent Variables				
Asynchronous Time in Coursework	0:35:11	0:27:38	0:04:45	5:45:56
Asynchronous Time in Learning Path	0:04:28	0:05:56	0:00:00	0:31:42
Synchronous Participations in Zoom	0.36	0.48	0.00	2.57
Synchronous Participation in Blended	0.04	0.04	0.00	0.15
Average Course Completion	76.66	27.21	1.64	100.00
Average Course Grade	62.21	23.79	1.18	96.53
Independent Variables				
Internalized Motivation	3.02	0.79	1	4

External Regulation	2.56	0.88	1	4
Amotivation	1.89	0.87	1	4
Internalized Motivation (Standardized)	-0.002	0.81	-2.06	1.00
External Regulation (Standardized)	-0.003	0.81	-1.45	1.30
Amotivation (Standardized)	0.002	0.86	-0.87	2.07
Demographic Controls				
Middle School	.41	-	0	1
High School	.59	-	0	1
Gender		-		
Female	.58	-	0	1
Male	.42	-	0	1
Special Education		-		
Yes	.17	-	0	1
No	.83	-	0	1
Multilingual Learners		-		
Yes	.28	-	0	1
No	.72	-	0	1
Ethnicity		-		
White	.27	-	0	1
Black	.24	-	0	1
Hispanic	.30	-	0	1
Other	.19	-	0	1
Economically Disadvantaged		-		
Yes	.89	-	0	1
No	.11	-	0	1

Data Sources: Survey Instrument

To measure student motivation to participation in virtual learning, the Situational Motivation Scale was adapted for virtual learning contexts to create a self-report measure assessing internalized motivation, external regulation, and amotivation (Guay et al., 2000) These four measures were confirmed through both exploratory and confirmatory factor analysis. The 16-item scale in Table 4 was modified to fit the virtual context. For example, the introductory line was adapted to read, “Why do you engage in virtual learning?”, and item 1 stated, “Because I think that virtual learning is interesting”. Students responded to each statement based on how true they felt it was for them, using a four-point scale: not at all, a little, enough, and a lot.

A web-based survey containing the Situational Motivation Scale for virtual learning was administered to full-time virtual school students in grades 6-12 (Guay et al., 2000; Wang et al., 2019). Advisory teachers distributed the survey following mandatory in-person state assessments in January 2024. For students who did not complete the survey during the initial administration, advisory teachers sent weekly reminders through Canvas, the district’s learning management system (LMS), encouraging students to complete it. The survey remained open until early March to allow students additional time for participation. Advisory teachers who achieved a 100% completion rate among their students received a one-day remote work pass as an incentive from the school administration.

The survey administration method presented both challenges and opportunities. First, because the survey was not graded, students could easily choose not to complete it, leading to incomplete data. As a result, not all enrolled students participated. However, the lack of grading may have given students a greater sense of autonomy, potentially leading to more honest

responses, as they were not concerned about how their answers might impact their grades. Additionally, distributing the survey through advisory teachers rather than via an email from school administration may have increased participation rates as the students have a pre-existing relationship with their advisory teacher. However, this approach could have also introduced social desirability bias, with students possibly responding in ways they believed their teacher would prefer. To mitigate this, survey responses remained confidential, and the results were not shared with advisory teachers. Finally, a key concern was that the Situational Motivation Scale was originally developed for adults. Students with lower reading proficiency may have struggled to comprehend the survey items, potentially increasing the likelihood of response errors.

Table 4. *Description of Dataset for Composite Variables*

	Why are you currently engaged in virtual learning?	
Internalized Motivation	Because I am doing it for my own good	1. Not at all
	Because I think virtual learning is good for me	2. A little
	By personal decision	3. Enough
	Because I believe that virtual learning is important for me	4. A lot
External Regulation	Because I am supposed to do it	1. Not at all
	Because it is something that I have to do	2. A little
	Because I don't have any choice	3. Enough
	Because I feel that I have to do it	4. A lot
Amotivation	There may be good reasons to do it, but I personally don't see any	1. Not at all
	I do virtual learning, but I am not sure if it is worth it	2. A little
	I don't know why; I don't see what virtual learning brings me	3. Enough
	I do virtual learning, but I am not sure it is a good thing to pursue it	4. A lot

The Situational Motivation Scale (Guay, Vallerand, & Blanchard, 2000, p. 210)

Variables

Dependent Variables

The outcome variables for this study include asynchronous time in coursework, asynchronous time in an online learning path, synchronous participation in Zoom, synchronous participation in blended learning, average course completion, and average course grades. The

summary statistics in Table 3 show the mean and standard deviation for each of these measures. Table 5 provides a brief description of each of the measures for the dependent variables.

Table 5. *Dependent Variables and Measures*

Asynchronous Time in Coursework	Measure of active time reported by learning management system divided by the number of days the student is enrolled in full-time virtual school, divided by the number of courses the student is enrolled in.
Asynchronous Time in Learning Path	Measure of active time reported in learning management system divided by the number of days the student is enrolled in full-time virtual school.
Synchronous Participation in Zoom	Measure of total number of times a student participated in a synchronous learning opportunity through Zoom, divided by the number of days that the student was enrolled in full-time virtual school, divided by the number of opportunities the student had to participate in Zoom sessions.
Synchronous Participation in Blended Learning	Measure of total number of times a student participated in a synchronous learning opportunity through blended learning, divided by the number of days that the student was enrolled in full-time virtual school.
Average Course Completion	A measure taken by adding the percent of each course that the student completed, divided by the number of courses the student was enrolled in.
Average Course Grade	A measure taken by adding the final grade in each course, divided by the number of courses each student was enrolled in.

Asynchronous Time in Coursework. The asynchronous time in coursework variable is derived from the amount of time that students spend working in their primary learning platform

for their classes. The learning management system (LMS) is the main platform students use to complete schoolwork and spend most of their school hours. From this LMS, school staff compile a report at the end of each school year with summary statistics for each student enrolled in full-time virtual school. That report includes a measure of each student's total time on task in their online coursework. Rather than analyzing each student's total time on task, this study calculates an average time per day, per class using a formula to calculate an average time per day enrolled per class. This calculation allows for more accurate comparisons in statistical analysis and accounts for program-specific enrollment patterns.

This calculation was chosen to account for variations in student enrollment and course load. Not all students who completed the survey were enrolled for the entire academic year. To ensure a sufficiently large sample for statistical analysis, dividing total time on task by number of days enrolled accounts for students who were enrolled for shorter durations. This adjustment resulted in a measure referred to as "time by days". Additionally, not all students take the same number of courses due to program specific requirements. For example, middle school and high school students enrolled in a reading intervention course may take one fewer asynchronous course than their peers, as their intervention is provided in a separate LMS. Conversely, some high school students enroll in additional courses beyond the standard load to recover credits in a credit recovery program. To adjust for these differences, the "time by days" measure was further divided by the number of asynchronous courses a student was enrolled in. This final step ensures that asynchronous time in coursework accounts for variations in both enrollment duration and course load, allowing for more precise and meaningful comparisons in statistical analysis.

Asynchronous Time in Learning Path. The secondary asynchronous learning platform that students engage with is aligned to their independent skill level based on benchmark

assessment scores. Students in grades 6-10 are required to participate in this learning path as part of their advisory course requirements. At the end of each school year, data from this learning path are included in a summary report compiled by the school. This report provides each student's total time spent in the learning path throughout the school year. To calculate the dependent variable for asynchronous time in the leaning path, the total time spent in the platform was divided by the number of days the student was enrolled in full-time virtual school. This calculation method ensures the preservation of the sample size. Given the already limited sample (N=158), removing students who were not enrolled for the full academic year would reduce the sample size too, making statistical analysis infeasible.

Synchronous Participation in Zoom. The synchronous participation in Zoom variable measures the number of times students attend optional synchronous video conferencing sessions. Students log their participation through a universal "Zoom Attendance Tracker," which is shared during each class session. Attendance data from this tracker is compiled into a single spreadsheet, and at the end of the school year, the total number of Zoom sessions attended is included in the annual summary report. Student opportunities for Zoom engagement vary, as some courses are offered more frequently than others. For example, 6th grade math is offered four days per week, while Algebra II is only available 2 days per week. As a result, a high school junior enrolled in Algebra II has half as many synchronous learning opportunities as a 6th-grade student in math. To preserve sample size, the number of days enrolled is used in the calculation to account for students not enrolled during the full academic year. Additionally, to ensure a more equitable comparison, the calculation adjusts for differences in both synchronous learning availability and enrollment duration.

Synchronous Participation in Blended Learning. The synchronous participation in blended learning variable measures how many times students attend optional blended learning days, which are offered once per week at the school site. Each student has one opportunity per week to participate in blended learning. Students are marked present for blended learning sessions, and their total participation is recorded in the end-of-year summary report compiled by school staff. The calculation for this variable is straightforward, as the only student-level difference that needs to be accounted for is enrollment duration. The variable is calculated by dividing the number of times a student participated by how many days they were enrolled.

Average Course Completion. The first student outcome variable is Average Course Completion. This variable is retrieved from reports in the learning management system. The end-of-year report captures the percentage of each course completed by the student for all enrolled classes. This variable is calculated by adding the sum of completion percentages divided by the number of enrolled courses.

Average Course Grade. The second student outcome variable is Average Course Grade. This variable is retrieved also from LMS reports, and the end-of-year report captures each student's final grade percentages across all enrolled classes. The calculation for this variable is the sum of all final grades divided by the number of enrolled courses.

Independent Variables

The independent variables for motivation were measured using the Situational Motivation Scale adapted for online learning (Deci et al., 2001; Guay et al., 2000; Ilardi et al., 1993; Kasser, et al., 1992; Wang et al., 2019). Table 6 shows the items from the survey that were combined to create composite variables. The subscales were standardized, and then a correlational analysis was run to determine how much the individual survey items correlate with one another.

Following the correlational analysis, factor loadings were run, and reliability was checked using Cronbach's alpha for each of the four item subscales (Table 6). The mean of the subscales was calculated to create the composite variables for Internalized Motivation, External Regulation, and Amotivation.

Control Variables

Given the modest sample size, parsimonious controls were used. Sociodemographic variables like ethnicity, gender, socio-economic status, English language learner status, special education status, and grade band will be introduced as controls for this study. The following controls were retrieved from the school's existing enrollment management system demographic data. The categories for ethnicity in this study include: Black, Hispanic, White, and Other. Gender is recorded as either male or female based upon academic records. Socioeconomic status is determined by students' qualification for free and reduced lunch. English language learner status is classified into two categories: "yes" for students who are current multilingual learners receiving language services, or former multilingual learners who have tested out of the program; and "no" for students who have never been designated as multilingual learners. Special education status is a binary variable covering any student with an IEP, including those with speech-only or behavioral-only IEPs. Grade level is categorizing students in grades 6-8 as middle school and 9-12 as high school.

Analysis

The sample for this study consists of students in grades 6-12 enrolled in an urban full-time virtual school in Oklahoma. First, summary statistics were calculated for each variable, including means, standard deviations, minimum and maximum values for the outcome variables and the independent motivation variables (Table 3). Additionally, factor loadings for each

composite variable were examined to assess model fit for the full-time virtual school context (Table 6).

After establishing the sample characteristics and assessing measurement validity, the next step was to examine relationships between variables through statistical analyses. This process began with bivariate correlations between each dependent variable and the key independent variables, followed by a series of linear regressions with two models each to further explain the relationships. Model 1 of the linear regression included the independent variables of Internalized Motivation, External Regulation, and Amotivation. Model 2 added demographic control variables including ethnicity, gender, special education status, multilingual learner status, economically disadvantaged status, and grade level. This process was repeated for each dependent variable found in Table 5, ensuring consistency across the analysis. Finally, bivariate correlations were conducted among all dependent variables to assess relationships between academic engagement and achievement measures.

Methodological Strengths and Limitations

This study builds upon the methodological strengths of prior research by examining the use of the Situational Motivation Scale in the context of 6-12th grade virtual learning. Additionally, this study is novel in design and benefits from access to secondary data sources that are not commonly available in published research. However, several limitations should be acknowledged. First, the study is limited in statistical power due to the small sample size. Surveys administered by advisory teachers may introduce social desirability bias, as students may feel inclined to respond in a manner they believe aligns with their teachers' expectations. Additionally, younger students and those with reading difficulties may struggle to comprehend and accurately respond to a survey that was originally designed for adults. There are also

limitations related to control variables. Given the small sample size, it is challenging to control for multiple factors that may influence motivation, engagement, and achievement. Furthermore, the study did not account for family-related factors, negative selection, or prior academic achievement, which could each play a significant role in shaping student motivation, engagement, and academic achievement among full-time virtual school students.

Chapter 5. Results

The purpose of this study is to examine whether a relationship exists between students' self-reported motivation and their engagement and academic outcomes in a full-time virtual school setting. Motivation for virtual learning is measured using the independent variables for Internalized Motivation, External Regulation, and Amotivation taken from the Situational Motivation Scale (Guay et al., 2000). The sample for this study consists of students in grades 6-12 who were surveyed while enrolled in a district-operated full-time virtual school in Oklahoma. Table 6 presents the survey items that were combined to create composite variables. The subscales were standardized, and a correlational analysis was conducted to assess the degree of correlation among individual survey items. Following the correlational analysis, factor loadings were examined, and reliability was assessed using Cronbach's alpha for each of the four-item subscales. The Cronbach's alpha values for each composite variable were above 0.80, indicating high internal consistency, and confirming that the measures assess distinct individual constructs.

Independent Variables

Table 6. *Factor Loadings for Composite Variables*

Composite Variable	Why are you currently engaged in virtual learning?	Factor Loading	Cronbach's Alpha
Internalized Motivation	Because I am doing it for my own good	0.784	0.83
	Because I think virtual learning is good for me	0.880	
	By personal decision	0.764	
	Because I believe that virtual learning is important for me	0.830	
External Regulation	Because I am supposed to do it	0.862	0.83
	Because it is something that I have to do	0.846	
	Because I don't have any choice	0.758	
	Because I feel that I have to do it	0.777	
Amotivation	There may be good reasons to do it, but I personally don't see any	0.779	0.88
	I do virtual learning, but I am not sure if it is worth it	0.895	
	I don't know why; I don't see what virtual learning brings me	0.887	
	I do virtual learning, but I am not sure it is a good thing to pursue it	0.857	

The Situational Motivation Scale (Guay et al., 2000).

Following the bivariate correlations and factor analysis for each survey subsection, composite variables were calculated using SPSS software. The standardized composites were created by calculating the mean of the subscales for the Situational Motivation Scale (Guay et al., 2000). Descriptive statistics for each composite variable were calculated and are presented in Table 3 in the Methods section of this study.

- Internalized Motivation has a mean of -0.0002 and a standard deviation of 0.81. The range is 3.06, with a minimum value of -2.06 and a maximum of 1.00.
- External Regulation has a mean of -.0003 and a standard deviation of 0.8, with a range of 2.75. The minimum value is -1.45, and the maximum is 1.30.
- Amotivation has a mean of 0.002 and a standard deviation of 0.86. The range is 2.94, with a minimum of -0.87 and a maximum of 2.07.

Dependent Variables

Asynchronous Time on Task in Coursework

Bivariate correlations were conducted to examine the relationship between Asynchronous Time on Task in Coursework and the independent variables (Table 7). Asynchronous Time on Task in Coursework showed a very weak positive association with Internalized Motivation, but this relationship was not statistically significant. Similarly, Amotivation and External Regulation exhibited a very weak negative association with Asynchronous Time on Task in Coursework, though these relationships were also not statistically significant.

To identify potential predictors Asynchronous Time on Task in Coursework, a regression analysis was conducted with two models.

- Model 1 examined the relationship between Asynchronous Time on Task in Coursework and Internalized Motivation, External Regulation, and Amotivation yielding an adjusted R^2 = -.01.
- Model 2 incorporated the demographic control variables-ethnicity, gender, special education status, multilingual learner status, economically disadvantaged status, and grade level-resulting in an adjusted R^2 = -.03.

The adjusted R^2 values indicate that the regression model does not include elements that explain the variability in the Asynchronous Time on Task in Coursework.

Table 7. *Correlations for Asynchronous Time on Task in Coursework*

Variables	Time in Coursework	Internalized Motivation	External Regulation	Amotivation
1. Time in Coursework	1	.07	-.02	-.04
2. Internalized Motivation		1	.14*	-.23**
3. External Regulation			1	.32**
4. Amotivation				1

*Correlation is significant at the 0.05 level (2 tailed). **Correlation is significant at the 0.01 level (two tailed).

Table 8 represents the regression model, which investigates the relationship between motivation, demographic characteristics, and Asynchronous Time on Task in Coursework among full-time virtual school students in grades 6-12 (N=212). Across both models, none of the independent variables or demographic factors show statistically significant relationships with time on task. The predictors used in this model do not explain the variability in Asynchronous Time on Task in Coursework.

- Internalized Motivation exhibits a small positive relationship with Asynchronous Time on Task in Coursework, but the standardized coefficient (β = .07) indicates a very weak association.
- External Regulation demonstrates a small negative relationship with Asynchronous Time on Task in Coursework (β = -.03) and Amotivation (β = -.02), though the effect sizes are very small and not statistically significant.
- When demographic controls are introduced, the strongest positive relationship with Asynchronous Time on Task in Coursework is observed among Black students, who spend an additional 292.86 seconds per course per day compared to the reference group (Hispanic Students). However, this relationship is not statistically significant.

Table 8. *Regression Models Predicting Asynchronous Time on Task in Coursework (N = 212)*

	Motivation		Demographic Controls	
Variable	*Model 1*		*Model 2*	
Time in Coursework	2105.32***	(114.32)	2060.60***	(552.46)
Internalized Motivation	134.12	(148.50)	158.08	(158.50)
External Regulation	-55.92	(153.28)	-83.20	(159.12)
Amotivation	-32.28	(147.56)	28.57	(155.64)
Demographics				
Ethnicity - White			-145.31	(431.61)
Ethnicity - Black			292.86	(449.46)
Ethnicity - Other			-42.39	(441.47)
Gender			42.08	(239.95)
Special Education			-202.93	(330.85)
Multilingual Learner			190.62	(404.78)
Economically Disadvantaged			61.14	(385.06)
Middle School			-168.94	(245.47)
Adjusted R^2	-.01		-.04	

Numbers in parentheses are standard errors. Ethnicity - Hispanic, and High School are reference groups.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed test).

Asynchronous Time on Task in Learning Path

Bivariate correlations were conducted to examine the relationship between Asynchronous Time on Task in the Learning Path and the independent variables (Table 9). Asynchronous Time on Task in the Learning Path demonstrated weak positive relationship with Internalized Motivation, but this relationship was not statistically significant. External Regulation also exhibited a very weak positive relationship with Asynchronous Time on Task in the Learning Path, though this relationship was not statistically significant. Interestingly, Amotivation was positively correlated with Asynchronous Time on Task in the Learning Path (R = 18), a statistically significant relationship at $p < .05$.

Table 9. *Correlations for Asynchronous Time on Task in the Learning Path (N=158)*

Variables	Time Learning Path	Internalized Motivation	External Regulation	Amotivation
1. Time Learning Path	1	.12	.06	.18*
2. Internalized Motivation		1	.14*	-.23**
3. External Regulation			1	.32**
4. Amotivation				1

*Correlation is significant at the 0.05 level (2 tailed). **Correlation is significant at the 0.01 level (two tailed).

To further investigate predictors Asynchronous Time on Task in the Learning Path, a regression analysis was conducted with two models.

- Model 1 examined the relationship between Asynchronous Time on Task in the Learning Path and Internalized Motivation, External Regulation, and Amotivation, yielding an adjusted R^2 = .04.

- Model 2 incorporated control variables-ethnicity, gender, special education status, multilingual learner status, economically disadvantaged status, and grade level-resulting in an adjusted $R^2 = .16$.

The increase in adjusted R^2 from Model 1 to Model 2 suggests that demographic factors contribute to the variability in Asynchronous Time on Task in the Learning Path.

Table 10 presents the regression models, examining the relationship between motivation, demographic characteristics, and Asynchronous Time on Task in the Learning Path among full-time virtual school students in grades 6-12 (N=158). In Model 1, Internalized Motivation exhibited a statistically significant positive relationship with Asynchronous Time on Task in the Learning Path ($\beta = .18$, $p = .031$). External Regulation showed a weak negative relationship ($\beta = -.04$, $p = .683$), though it was not statistically significant. Interestingly, Amotivation was positively correlated with Asynchronous Time on Task in the Learning Path ($\beta = .23$, $p = .008$), indicating that higher levels of Amotivation were associated with more time spent in the learning path. When demographic control variables were introduced in Model 2, the direction of the relationships for Internalized Motivation, External Regulation, and Amotivation remained the same, but none of these relationships remained statistically significant. However, Special Education status ($\beta = .24$, $p = .002$) and grade level ($\beta = .28$, $p < .001$) emerged as significant predictors. Specifically, students receiving special education services spent an average of 228.69 additional seconds per day in the learning path, while middle school students spent 196.94 more seconds per day compared to high school students.

Table 10. *Regression Models Predicting Asynchronous Time on Task in the Learning Path (N=158)*

	Motivation		Demographic Controls	
Variable	*Model 1*		*Model 2*	
Time in Learning Path	268.50***	(28.02)	-46.30	(136.39)
Internalized Motivation	76.09*	(34.89)	49.28	(34.54)
External Regulation	-15.59	(38.13)	-12.77	(37.23)
Amotivation	96.31**	(35.77)	55.35	(35.16)
Demographics				
Ethnicity - White			5.97	(96.89)
Ethnicity - Black			26.40	(102.97)
Ethnicity - Other			22.58	(102.86)
Gender			16.46	(55.13)
Special Education			228.69**	(73.65)
Multilingual Learner			-31.67	(93.03)
Economically Disadvantaged			172.22	(92.04)
Middle School			196.94***	(54.86)
Adjusted R^2	.04		.16	

Numbers in parentheses are standard errors. Ethnicity - Hispanic, and High School are reference groups.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed test).

Synchronous Participation in Zoom

Bivariate correlations were conducted to examine the relationship between Synchronous Participation in Zoom and the independent variables (Table 11). Synchronous Participation in Zoom demonstrated a very weak positive relationship with Internalized Motivation, External Regulation, and Amotivation. However, none of these relationships were statistically significant. Table 11 presents the correlations for Synchronous Participation in Zoom showing the relationship among motivation variables and Zoom participation.

Table 11. *Correlations for Synchronous Participation in Zoom (N=212)*

Variables	Zoom Participation	Internalized Motivation	External Regulation	Amotivation
1. Zoom Participation	1	.10	.05	.10
2. Internalized Motivation		1	.14*	-.23**
3. External Regulation			1	.32**
4. Amotivation				1

*Correlation is significant at the 0.05 level (2 tailed). **Correlation is significant at the 0.01 level (two tailed).

To further investigate predictors for Synchronous Participation in Zoom, a regression analysis was conducted using two models.

- Model 1 examined the relationship between Synchronous Participation in Zoom and Internalized Motivation, External Regulation, and Amotivation with an adjusted R^2 = .01.
- Model 2 incorporated demographic control variables-ethnicity, gender, special education status, multilingual learner status, economically disadvantaged status, and grade level-resulting in an adjusted R^2 = .30

The increase in adjusted R^2 from Model 1 to Model 2 suggests that demographic factors explain more of the variability in Synchronous Participation in.

Table 12 presents regression models, examining the relationship between motivation, demographic characteristics, and Synchronous Participation in Zoom among full-time virtual school students in grades 6-12 (N=212). In Model 1, Internalized Motivation exhibited a weak positive relationship with Synchronous Participation in Zoom, but the relationship was not statistically significant although it approaches significance (β = .14, p= .060). External

Regulation showed a very weak negative relationship Synchronous Participation in Zoom (β = -.01, p= .873), but the relationship is not significant. Amotivation demonstrated an insignificant weak positive relationship with Synchronous Participation in Zoom, although it approached significance (β = .13, p= .079). When demographic controls were included in Model 2, the correlations between Internalized Motivation and Amotivation remained positive, while the relationship with External Regulation became positive as well. However, all the relationships remained weak and not statistically significant.

Table 12. *Regression Models Predicting Synchronous Zoom Participation (N=212)*

	Motivation		Demographic Controls	
Variable	*Model 1*		*Model 2*	
Zooms	.36***	(.03)	.10	(.13)
Internalized Motivation	.08	(.04)	.07	(.04)
External Regulation	-.01	(.04)	.02	(.04)
Amotivation	.07	(.04)	.02	(.04)
Demographics				
Ethnicity - White			-.20*	(.10)
Ethnicity - Black			.07	(.11)
Ethnicity - Other			-.01	(.11)
Gender			-.01	(.06)
Special Education			.21**	(.08)
Multilingual Learner			-.01	(.10)
Economically Disadvantaged			.07	(.09)
Middle School			.51***	(.06)
Adjusted R^2	.01		.30	

Numbers in parentheses are standard errors. Ethnicity - Hispanic, and High School are reference groups.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed test).

Among the demographic factors, some significantly explained variance in Synchronous Participation in Zoom:

- White students attended .20 fewer Zoom sessions per day enrolled than their Hispanic peers (β = -.19 and p = .05).
- Special Education students participated in .21 more Zoom sessions per day enrolled (β = .16, p = .009).
- Middle school students participated in .51 more Zoom sessions per day enrolled compared to High School students (β = .52, p < .001).

Synchronous Participation in Blended Learning

Bivariate correlations were conducted to examine the relationship between Synchronous Participation in Blended Learning and the independent variables (Table 13). Synchronous Participation in Blended Learning showed a negative correlation with Internalized Motivation (R = -.16, p < .05), indicating that students with higher Internalized Motivation for Virtual Learning participated less in blended learning. Synchronous Participation in Blended Learning demonstrated a very weak negative correlation with External Regulation (R = -.01), but this relationship was not statistically significant. Amotivation showed a very weak positive relationship with Synchronous Participation in Blended Learning, though this relationship was also not significant (R = .02).

Table 13. *Correlations for Synchronous Participation in Blended Learning (N=212)*

Variables	Blended Learning	Internalized Motivation	External Regulation	Amotivation
1. Blended Learning	1	-.16*	-.01	.02
2. Internalized Motivation		1	.14*	-.23**
3. External Regulation			1	.32**
4. Amotivation				1

*Correlation is significant at the 0.05 level (2 tailed). **Correlation is significant at the 0.01 level (two tailed).

To further investigate predictors of Synchronous Participation in Blended Learning, a linear regression analysis was conducted using two models.

- Model 1 examined the relationship between Synchronous Participation in Blended Learning and Internalized Motivation, External Regulation, and Amotivation with an adjusted R^2 = .01.
- Model 2 incorporated demographic control variables - ethnicity, gender, special education status, multilingual learner status, economically disadvantaged status, and grade level - with an adjusted R^2 = .01.

The adjusted R^2 values indicate that the regression model explains very little of the variability in Synchronous Participation in Blended Learning, suggesting that these predictors are not strong explanatory factors.

Table 14 presents the regression models, examining the relationship between motivation, demographic characteristics, and Synchronous Participation in Blended Learning among full-time virtual school students in grades 6-12 (N=212). In Model 1, Internalized Motivation exhibited a statistically significant negative relationship with Synchronous Participation in Blended Learning (β = -.16, p = .025), meaning that students with higher Internalized Motivation for virtual learning attended fewer blended learning sessions. Amotivation showed a weak negative correlation with Synchronous Participation in Blended Learning, but this relationship was not significant. External Regulation had an extremely weak positive relationship, but it was not statistically significant.

In Model 2, when demographic control variables were included, the negative relationship between Internalized Motivation and Synchronous Participation in Blended Learning remained statistically significant (β = -.16, p = .037). The only other statistically significant relationship in

model two is the relationship between white students and blended learning participation. When a student is identified as white, they attend .02 fewer blended learning days per day they are enrolled (β = -.22, p = .050).

Table 14. *Regression Models Predicting Synchronous Blended Learning Participation (N=212)*

	Motivation		Demographic Controls	
Variable	*Model 1*		*Model 2*	
Blended Learning	.04***	(.00)	.06***	(.01)
Internalized Motivation	-.01**	(.00)	-.01**	(.00)
External Regulation	.00	(.00)	.00	(.00)
Amotivation	.00	(.00)	.00	(.00)
Demographics				
Ethnicity - White			-.02*	(.01)
Ethnicity - Black			-.01	(.01)
Ethnicity - Other			-.02	(.01)
Gender			.00	(.01)
Special Education			.00	(.01)
Multilingual Learner			-.01	(.01)
Economically Disadvantaged			-.01	(.01)
Middle School			.01	(.01)
Adjusted R^2	.01		.01	

Numbers in parentheses are standard errors. Ethnicity - Hispanic, and High School are reference groups.
*P < 0.05; **P < 0.01; ***P < 0.001 (two-tailed test).

Average Course Completion

Bivariate correlations were conducted with Average Course Completion to determine if a relationship existed between the dependent variable and key independent variables (Table 15). Average course completion had a statistically significant positive relationship with Internalized Motivation (R = .22, p < .001). External Regulation had a very weak positive relationship with course completion, although the relationship was not statistically significant (R = .03).

Amotivation had a very small negative relationship with course completion, but the relationship was also not significant (R= -.03)

Table 15. *Correlations for Average Course Completion*

Variables	Average Course Completion	Internalized Motivation	External Regulation	Amotivation
1. Average Course Completion	1	.22**	.03	-.03
2. Internalized Motivation		1	.14*	-.23**
3. External Regulation			1	.32**
4. Amotivation				1

*Correlation is significant at the 0.05 level (2 tailed). **Correlation is significant at the 0.01 level (two tailed).

When interpreting possible predictors of Average Course Completion, a regression analysis was conducted using two models. The first model analyzed the relationship between course completion and Internalized Motivation, External Regulation, and Amotivation, resulting in an adjusted R^2 = .04. The second model added the control variables of ethnicity, gender, special education status, multilingual learner status, economically disadvantaged status, and grade level, increasing the adjusted R^2 *to* .06. Although the adjusted R^2 values of .04 in Model 1 and .06 in Model 2 indicate that the model explains some of the variability in course completion, these values are relatively low. This suggests that while the independent variables included in the model contribute to understanding course completion, most of the variability in the outcome remains unexplained.

Table 16 presents the regression model used to investigate the relationship between motivation, demographic characteristics, and Average Course Completion among full-time virtual school students in grades 6-12 (N=212). The first model analyzed the relationship between Internalized Motivation, External Regulation, and Amotivation and found a statistically

significant positive relationship between Internalized Motivation and course completion (β = .23, p = .001). This indicates that for every one unit increase in Internalized Motivation, there was a 7.69 percentage point increase in Average Course Completion. In Model 2, Internalized Motivation continued to have a significant positive relationship with course completion (β = .20, p = .009), although the effect size was slightly reduced. None of the demographic characteristics were found to have a statistically significant relationship with Average Course Completion.

Table 16. *Regression Models Predicting Course Completion (N=212)*

	Motivation		Demographic Controls	
Variable	*Model 1*		*Model 2*	
Average Course Completion	76.62***	(1.84)	84.87***	(8.67)
Internalized Motivation	7.69**	(2.39)	6.58**	(2.49)
External Regulation	-.34	(2.47)	-.58	(2.50)
Amotivation	.91	(2.37)	1.97	2.44
Demographics				
Ethnicity - White			-10.91	(6.77)
Ethnicity - Black			1.93	(7.05)
Ethnicity - Other			-.06	(6.92)
Gender			.57	(3.76)
Special Education			7.81	(5.19)
Multilingual Learner			3.03	(6.35)
Economically Disadvantaged			-6.85	(6.04)
Middle School			-5.12	(3.85)
Adjusted R^2	.04		.06	

Numbers in parentheses are standard errors. Ethnicity - Hispanic, and High School are reference groups.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed test).

Average Course Grade

Bivariate correlations were conducted with Average Course Grade to determine if a relationship existed between the dependent variable and key independent variables (Table 17). Average Course Grade had a statistically significant positive relationship with Internalized

Motivation (R = .24, p < .001). External Regulation showed a weak positive relationship, but it was not statistically significant (R= .01). Amotivation had a weak negative relationship with Average Course Grade, but the relationship was also not significant (R = -.06).

Table 17. *Correlations for Average Course Grade*

Variables	Average Course Grade	Internalized Motivation	External Regulation	Amotivation
1. Average Course Grade	1	.24**	.01	-.06
2. Internalized Motivation		1	.14*	-.23**
3. External Regulation			1	.32**
4. Amotivation				1

*Correlation is significant at the 0.05 level (2 tailed). **Correlation is significant at the 0.01 level (two tailed).

When interpreting possible predictors of Average Course Grade, a regression analysis was conducted using two models. The first model analyzed the relationship between Average Course Grade and Internalized Motivation, External Regulation, and Amotivation, resulting in an adjusted R^2 = .04. The second model added the control variables of ethnicity, gender, special education status, multilingual learner status, economically disadvantaged status, and grade level, increasing the adjusted R^2 to .07. These findings suggest that while the regression model accounts for some of the variability in Average Course Grade, its explanatory power is limited. Although the independent variable of Internalized Motivation provides some insight into Average Course Grade, much of the variation in outcomes remains unexplained.

Table 18 presents the regression model used to investigate the relationship between motivation, demographic characteristics, and Average Course Grade among full-time virtual school students in grades 6-12 (N=212). The first model analyzed the relationship between the Internalized Motivation, External Regulation, and Amotivation and found a statistically

significant positive relationship between Internalized Motivation and Average Course Grade (β = .24, p < .001). This indicates that for every one unit increase in Internalized Motivation, students show a 7.12 increase in Average Course Grade. External Regulation had a very weak negative relationship with Average Course Grade that was not statistically significant, and Amotivation had a very weak positive association that was also not statistically significant. In Model 2, Internalized Motivation continued to have a significant positive relationship with Average Course Grade (β = .22, p = .004). None of the demographic control variables showed a statistically significant relationship with Average Course Grade. However, White students (β = -.20, p = .070) and middle school students (β = -.12, p = .088) had a negative relationship with Average Course Grade that approach significance.

Table 18. *Regression Models Predicting Average Grade (N=212)*

	Motivation		Demographic Controls	
Variable	*Model 1*		*Model 2*	
Average Course Grade	62.17***	(1.60)	73.04***	(8.67)
Internalized Motivation	7.12***	(2.08)	6.39**	(2.17)
External Regulation	-.71	(2.15)	-1.10	(2.17)
Amotivation	.09	(2.07)	1.13	2.13
Demographics				
Ethnicity - White			-10.73	(5.90)
Ethnicity - Black			-.20	(6.14)
Ethnicity - Other			-1.55	(6.03)
Gender			.67	(3.28)
Special Education			4.17	(4.52)
Multilingual Learner			.21	(5.53)
Economically Disadvantaged			-7.15	(5.26)
Middle School			-5.75	(3.35)
Adjusted R^2	.04		.07	

Numbers in parentheses are standard errors. Ethnicity - Hispanic, and High School are reference groups.
*P < 0.05; **P < 0.01; ***P < 0.001 (two-tailed test).

Additional Statistical Tests

Bivariate correlations were conducted to examine the relationships among the dependent variables (Table 19). Asynchronous Time on Task in Coursework was positively correlated with Average Course Completion ($R = .25$, $p < .001$) and Average Course Grade ($R = .25$, $p < .001$) Asynchronous Time on Task in the Learning Path was significantly and positively correlated with Synchronous Participation in Zoom ($R = 34$, $p < .001$). Additionally, Average Course Completion was significantly correlated with Average Course Grade ($R = .97$, $p < .001$).

Table 19. *Correlations for All Dependent Variables*

Variables	TC	TLP	Zoom	BL	CC	AG
1. Time in Coursework	1	.07	.00	-.05	.25**	.25**
2. Time Learning Path		1	.34**	-.14	.10	.10
3. Zoom			1	.07	.04	.02
4. Blended Learning				1	-.09	-.10
5. Course Completion					1	.97**
6. Average Grade						1

*Correlation is significant at the 0.05 level (2 tailed). **Correlation is significant at the 0.01 level (2-tailed) TC is Time in Coursework, TLP is Time in Learning Path, BL is Blended Learning, CC is Course Completion, AG is Average Grade.

Chapter 6. Discussion

Summary of Main Findings

Virtual school enrollments in the United States have steadily increased over the past 25 years (Common Core of Data, n.d.1; Molnar et al., 2023). Yet, multiple studies have consistently shown that the academic performance of full-time virtual school students lags behind that of their brick-and-mortar peers (CREDO, 2015; Fitzpatrick et al., 2020; Greene & Paul, 2022, Hamlin et al., 2023). Theoretical reasoning suggests that student motivation may explain these disparities, as students likely need autonomous motivation to engage effectively with online learning platforms (Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Ryan & Deci, 2000). Although research in higher education has demonstrated a relationship between student motivation, engagement and achievement in online learning, limited empirical work has explored this relationship specifically among full-time virtual school students in grades 6-12 (Alemayehu & Chen, 2023; Chen & Jang, 2010, Hartnett, 2012; Kim et al., 2014). The purpose of this quantitative study is to investigate the relationship between student motivation for virtual learning, engagement, and academic outcomes among this population. This study uses secondary administrative and survey data analyzed through regression models.

This study found no relationship between student motivation and three of the four engagement variables examined among full-time virtual school students in grades 6-12. Specifically, Asynchronous Time on Task in Coursework, Asynchronous Time on Task in the Learning Path, and Synchronous Participation in Zoom showed no significant relationships with any motivation variables. However, two demographic controls helped explain some variability in synchronous Zoom participation. Special education and middle school students were more likely

to attend synchronous Zoom sessions than general education and high school students. Conversely, Synchronous Participation in Blended Learning showed a significant negative relationship with Internalized Motivation even after controlling for demographics. Additionally, one demographic control revealed differences in blended learning participation: White students were significantly less likely to attend blended learning than their Hispanic peers.

Both academic outcome variables, Average Course Completion and Average Course Grade, showed a significant positive relationship with Internalized Motivation in both regression models. None of the demographic controls statistically predicted these academic outcomes. Despite the statistically significant relationship between Internalized Motivation and academic outcomes, the adjusted R^2 values for both models were relatively low. Low R^2 values are common in social science research, likely indicating that multiple unmeasured factors contribute to academic outcomes in virtual environments. Thus, although Internalized Motivation appears influential for Average Course Completion and Average Course Grade, it remains just one factor among many affecting student success.

Comparison with Theoretical Framework

Self-Determination Theory posits that when conditions allow for the satisfaction of the basic psychological needs necessary to access students' internal motivational resources and motivation internalization, students will have increased well-being, higher performance, and greater engagement (Chatzisarantis & Hagger, 2009; Cheon & Reeve, 2015; Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Reeve et al., 2004; Ryan & Deci, 2000). At first glance, the results of this study may present a more complex picture, particularly focused on the surprising lack of findings related to engagement. Given that this study finds no relationship between Internalized Motivation and the dependent variables of Asynchronous Time on Task in

Coursework, Asynchronous Time on Task in the Learning Path, and Synchronous Participation in Zoom, one could hypothesize that full-time virtual students in grades 6-12 with higher internalization of motivation do not necessarily demonstrate greater engagement in online learning platforms. However, the problem may lie in how engagement was measured in this study. Time on task may be a limited or inadequate measure of student engagement. Students who experience higher Internalized Motivation may spend less time in their learning platforms because their work is more focused and less distracted. The measures used in this study capture only the quantity of engagement and do not reflect the quality or type of engagement.

Reeve (2012) measures engagement in three forms – cognitive, behavioral, and emotional – and finds that these forms of engagement fully mediate the relationship between motivation and achievement. Although this study aimed to measure engagement through Asynchronous Time on Task and Synchronous Participation, these measures may not adequately represent the three primary forms of engagement. Thus, these metrics may not sufficiently capture the mechanisms linking motivation and engagement among full-time virtual school students in grades 6-12. This limitation provides rationale for employing multiple measures – including quantitative metrics of participation, self-reported engagement surveys, and qualitative analysis of engagement quality – in future research to better understand this relationship.

The remaining engagement measure, Synchronous Participation in Blended Learning, revealed an interesting negative relationship with Internalized Motivation for online learning. This result may stem from the nature of the Situational Motivation Scale used to assess student motivation (Guay, et al., 2000). The Situational Motivation Scale does not measure a student's general motivational resources; instead, it assesses motivation within a specific context. It has been used in studies to measure a person's motivation toward physical activity, their job, and in

education contexts measure (Longsdale et al., 2007; Standage et al., 2003; Wasicek & McHugh, 2024; Wuryania et al., 2021). In this study, applying the Situational Motivation Scale for virtual learning may have influenced the finding concerning Synchronous Participation in Blended Learning. Specifically, students who reported higher internalized motivation toward online learning were less likely to participate in synchronous, in-person learning experiences. One plausible explanation is that students who are more motivated to learn online may not feel the need or desire to participate in optional in-person learning experiences.

Despite measurement challenges and somewhat mixed findings for motivation and engagement in online learning platforms, the relationship between motivation and academic achievement was much clearer. The dependent variables for achievement showed consistent relationships with motivation. Internalized Motivation had a statistically significant positive relationship with Average Course Completion and Average Course Grades, even when controlling for demographic variables**.** In fact, in this study, Internalized Motivation was the only variable – including the demographic controls – that significantly related to Average Course Completion and Average Course Grades. Specifically, an increase of one standard deviation in Internalized Motivation corresponded to a 6.58% higher average course completion rate and a 6.39% higher average course grade. These findings suggest that when student motivation is more internalized, they complete more of their coursework and achieve higher grades overall. This aligns closely with Self-Determination theory, which suggests that when educational contexts allow students to tap into innate motivational, a shift from external regulation to internalized motivation occurs. This internalization process is expected to foster higher behavioral, cognitive, emotional, and agentic engagement, ultimately improving academic outcomes for students (Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Ryan & Deci, 2000).

Comparison with Existing Literature

This section compares the findings from the current study to existing empirical literature, specifically organized around the key dependent variables: student engagement (asynchronous and synchronous participation) and academic achievement (course completion and course grades). This study corroborates several findings from prior empirical literature including improved academic outcomes for students with higher motivation, and a nuanced relationship between motivation and engagement in online coursework (Alemayehu & Chen, 2023; Chen & Jang, 2010; Hartnett, 2012; Kim et al., 2014).

Motivation and Engagement

In this study, engagement was measured using participation information available in administrative data for full-time virtual school students in grades 6-12. Engagement in learning platforms was categorized as Asynchronous Time on Task or Synchronous Participation. There were two measures for each of these subcategories: Asynchronous Time on Task in Coursework and Asynchronous Time in the Learning Path, Synchronous Participation in Zoom, and Synchronous Participation in Blended Learning. All these measures quantify engagement based upon number of days enrolled in the program and number of participation opportunities. Three prior empirical studies address motivation and engagement in online learning (Alemayehu & Chen, 2023; Chen & Jang, 2010; Hartnett, 2012).

The first study to examine this relationship found that when students report satisfaction of their basic psychological needs, they increase the number of hits and study hours in online learning contexts (Chen & Jang, 2010). However, a measure for motivation derived from the Academic Motivation Scale – The Self-Determination Index – found no significant relationship with number of hits or study hours (Chen & Jang 2010; Vallerand et al., 1992). This finding is

particularly interesting due to its similarity to the findings of the current study. In this study, quantity of engagement measures were not predicted by increased motivation internalization for virtual learning. In Chen and Jang's (2010) empirical study, quantity of engagement measures were similarly unrelated to motivation internalization measured on a comparable scale. Although Chen and Jang (2010) study did not use identical motivation measurements, the Academic Motivation Scale is adapted from the same original survey as the Situational Motivation Scale (Guay et al, 2019; Vallerand et al., 1992). Therefore, situational motivation measures may have limited predictive utility for engagement quantity in online learning contexts.

Another study examined the relationship of motivation and engagement by analyzing active participation (posting messages), passive participation (reading messages, course hits), and overall quality of participation (Hartnett, 2012). This study also used a longer version of the Situational Motivation Scale to create a composite variable for motivation (Guay, et al., 2000). The study separated 21 participants into two case studies and conducted a simple correlational analysis to determine if motivational scores were related to active participation, passive participation, and quality of engagement. The study found that motivation was significantly positively correlated with active participation but unrelated to passive participation. Additional analysis determined that in one case study, higher motivation correlated with greater active collaboration but showed no relationship with passive participation. These findings provide insights for interpreting the current study's results. Hartnett's (2012) distinction between active and passive participation is consistent with the present findings – specifically, that passive forms of engagement (time on task) did not correlate positively with motivation. It is important to note that Hartnett's findings are limited by methodological constraints, including the small sample size and simple correlational analysis across two case studies (Hartnett, 2012).

The study by Alemayehu and Chen (2023) provides an interesting contrast to the present research, as it utilized both self-reported motivation and engagement measures, finding motivation positively related to behavioral, cognitive, and emotional engagement. However, measurement differences might largely explain this contrast. While self-reported measures risk social desirability bias and may not perfectly reflect actual engagement, they offer important insights into participants' perceptions of their own engagement – something that system generated metrics cannot provide. Thus, measurement differences alone might explain the disparities between Alemayehu and Chen's (2023) findings and those in the current study.

The current study's findings, along with those from existing literature, suggest that situational motivation alone may not effectively predict the quantity of engagement measured through online platforms. Future research should continue to explore the relationship between motivation and engagement among full-time virtual students using measures that capture not only quantity, but also quality and type of engagement in online learning. Although the present study could not directly confirm previous empirical findings, it contributes to clarifying measurement considerations and points toward the need for future studies to examine engagement in virtual schooling more holistically – focusing on quality and type of engagement rather than quantity alone.

Motivation and Academic Achievement

In this study, academic achievement was measured using Average Course Completion and Average Course Grade. This study's findings on academic achievement align strongly with previous research indicating a clear positive relationship between motivation and academic outcome (Kim et al., 2014). Kim et al., (2014) tested the relationship between motivation and achievement among high school students enrolled in a single online math course, finding that

motivation explained 13% of the variation in final course grade. This study reinforces the consistent relationship between motivation and performance outcomes in online education.

However, not all prior empirical research supports a direct correlation between academic achievement and motivation (Chen & Jang, 2010). Chen and Jang (2010) suggest the relationship may be more complex. They used two measures aligned with Self-Determination Theory to examine motivational factors, engagement, and achievement in online courses: Basic Psychological Need Satisfaction and a composite motivation score called The Self-Determination Index. The authors used one additional measure for contextual support that measured students' perceptions of their professor's autonomy and competence support in their online learning environment. Their findings indicated that need satisfaction positively predicted behavioral engagement (hits and study hours) but showed no significant relationship with final course grades (Chen & Jang, 2010). Surprisingly, the Self-Determination Index did not significantly predict any outcome variables measured. Chen and Jang (2010) concluded that contextual support in online learning environments was a stronger predictor of final grades than motivation itself.

This contrast suggests the relationship between motivation and academic achievement may be more nuanced and context-dependent than initially assumed. It may also provide some insight into the relatively low adjusted R^2 values for the regression models in the current study. While Internalized Motivation had a statistically significant relationship with Average Course Completion and Average Course Grade, the adjusted R^2 was very low for the model. Although this is normal in social sciences research, it suggests that there may be untested factors – like contextual support – that could better explain the variability academic achievement variables. Chen and Jang's (2010) study, in particular, highlights the importance of teacher supportive

practices as potentially influential factors affecting student achievement. Several studies have suggested that when teachers provide autonomy-supportive environments, students' motivation is internalized more effectively, enhancing both engagement and academic outcomes (Chatzisarantis & Hagger, 2009; Cheon & Reeve, 2015; Cheon et al., 2019; Reeve et al., 2004, Reeve & Cheon, 2021). Therefore, teacher supportive practices might be a significant, yet untested, factor contributing to variation in achievement beyond those variables included in this study's regression models.

Limitations, Strengths, and Contributions

Although the findings presented offer valuable insights into the nuanced relationship between motivation, engagement, and achievement in virtual learning environments, several limitations should be considered when interpreting these results. Limitations for this study can be categorized into four main areas: engagement measurement limitations, sample specific considerations, motivation measurement challenges, and lack of causal evidence.

Engagement measurement limitations complicate the generalizability of this study. First, the measures of Time on Task and Synchronous participation do not capture cognitive or emotional engagement. Additionally, measures for Time on Task may be conflated due to differences in student motivation. Students who are more highly motivated may not engage more in their online coursework; instead, they may engage differently, resulting in better outcomes (Hartnett, 2012).

Sample-specific considerations include school context and other demographic factors. This study was conducted in a single urban district-run virtual school, limiting broader generalizability to other virtual models, including charter, rural, fully asynchronous, or blended programs. In addition to contextual concerns, the sample for this study is relatively small

(N=212). Not only is statistical power limited with smaller samples, but parsimonious controls were necessary, further limiting the explanatory power of some models. Beyond the demographic controls, there are likely other unmeasured factors that influenced student motivation, engagement, and achievement.

One important limitation in this study relates to the measurement of motivation. This study did not address general student motivation but rather tested student's motivation toward a specific context. Using secondary data derived from the Situational Motivation Scale limited the study in several ways (Guay et al., 2000). The study did not test student's overall motivation, fulfillment of their basic psychological needs, psychologically supportive contexts, or other motivation measures frequently employed in Self-Determination Theory research. Often, basic psychological need satisfaction and contextual support mediate the relationship between motivation, engagement and achievement (Andersson et al., 2025; Chen & Jang, 2010; Guo, 2018; Jang et al., 2012). However, this study was not able to address these more nuanced mediating effects.

One additional limitation of this study is that it is correlational in nature. While linear regression was used to determine if a relationship exists between motivation, achievement, and engagement in online learning, causality cannot be established. Unmeasured factors could complicate the relationship between motivation and achievement or engagement, and since the study did not incorporate experimental design, causal relationships cannot be determined. This is notable because prior research has found a somewhat reciprocal relationship between motivation and engagement, suggesting there might not be a linear cause-and-effect relationship as typically assumed (Reeve, 2012).

Despite these limitations, this study has several strengths. First, it used secondary data not often available in empirical research. The study leveraged administrative reports containing system-level data for Time on Task across multiple learning platforms and synchronous participation data for both Zoom and Blended Learning. Despite engagement measurement, analyzing actual system-generated engagement data rather than self-reported data provides valuable insights for virtual school leaders and policymakers in determining meaningful metrics for tracking engagement in online learning.

Methodologically this study incorporated common demographic controls, accounting for socioeconomic status, special education status, multilingual learner status, ethnicity, and gender, and grade level, thereby determining if sociodemographic characteristics explain variability in outcomes and engagement for full-time virtual school students. Perhaps its greatest strength is that the study examined full-time virtual school students in grades 6-12. Prior empirical research has primarily focused on adult learners and single course enrollments for high school students.

This study contributes to the growing body of literature on motivation, engagement, and academic achievement among full-time virtual school students in grades 6-12. By expanding on current literature, this study helps researchers better understand the factors influencing virtual school students' outcomes. Furthermore, this research raises important questions about engagement measurement and how virtual school structures may influence student motivation. Finally, this study highlights the need for further mixed method approaches to further build upon its results.

Future Research

Given the rise in virtual school enrollments over the past few decades, the persistent academic underperformance of full-time virtual schools, potential negative selection into virtual

schools, and theoretical reasoning suggesting student motivation as a possible mechanism for understanding engagement and outcomes, future research should continue to explore the relationships among motivation, engagement and achievement for virtual students (Alemayehu & Chen, 2023; Chen & Jang, 2010; CREDO, 2015; Fitzpatrick et al., 2020; Greene & Paul, 2022; Hamlin et al., 2023; Hartnett, 2012; Kim et al., 2014; Molnar et al., 2023; Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Ryan & Deci, 2000). This study confirmed previous findings that internalized motivation positively relates to academic outcomes, but revealed a nuanced relationship between motivation and engagement, suggesting the need for further research.

A key area for future research is improving measurement of student engagement. In this study, engagement metrics were limited to quantity – capturing only time on task and synchronous participation frequency – and did not measure engagement quality or type of engagement. While testing quantity-based engagement metrics was both a strength and limitation of this research, future studies should explore how internalized motivation relates to qualitative measures of student engagement among full-time virtual school students. Specifically, future research should combine quantity-based metrics (such as time on task) with qualitative and self-report measures to better reflect emotional, cognitive, or behavioral engagement. Mixed-method research that integrates motivation surveys with qualitative insights on student engagement quality could provide richer, nuanced understandings of how motivation influences student behavior in virtual settings (Chen & Jang, 2010; Hartnett, 2012).

Additional empirical research is needed to further clarify the mechanisms driving student academic outcomes in full-time virtual school settings. While Internalized Motivation had a significant positive relationship with academic achievement in this study, adjusted R^2 values

were relatively low, suggesting numerous unmeasured variables may explain variation in academic performance. Future studies might consider investigating factors such as negative selection into virtual schools, teacher supportive practices, basic psychological need satisfaction, prior academic achievement, and student or family characteristics as potentially influential variables (Andersson et al., 2025; Behzadnia et al., 2023; Chen & Jang, 2010; Chiu, 2021; Greene & Paul, 2022; Guo, 2018; Jang et al., 2012). A mixed-methods approach integrating qualitative insights (student interviews, teacher perspectives) could offer deeper understanding of the complex interplay between these factors and student achievement.

Finally, researchers could explore differences across virtual school models. Do virtual school programs (synchronous vs asynchronous, charter vs district run) differ significantly in their ability to foster internalized motivation and, consequently, improved academic outcomes (Günes & Alagözlü, 2021; Ismailov & Chiu, 2022; Serdyukova & Serdyukov, 2012; Wang et al., 2019). These investigations may provide valuable insights into whether certain virtual school structures or instructional practices are effective in creating conditions that support internalized motivation and improve student engagement and achievement (Günes & Alagözlü, 2021; Ismailov & Chiu, 2022; Serdyukova & Serdyukov, 2012; Wang et al., 2019).

Questions for Policy and Practice

Given the findings of this study and their implications for understanding motivation, engagement, and achievement in full-time virtual school environments, several important questions emerge for policy and educational practice. Specifically, policymakers and practitioners must carefully consider how engagement is defined and measured and how different student populations may require tailored supports. This study has clarified the important distinctions between the quantity, quality, and type of student engagement. Results indicate that

the quantity-based measures of engagement may not be as important as previously thought for understanding student outcomes in virtual learning environments. Virtual school leaders currently have easy access to engagement quantity data through administrative and system reports, However, time on task and synchronous participation metrics may not adequately capture student engagement. Students who are more highly motivated may not engage more in their online coursework but may engage differently with better academic results (Hartnett, 2012). Virtual school leaders should carefully consider how quantity-based measures of engagement function within their learning contexts. Leaders should carefully review and potentially revise systems that rely exclusively on quantity-based engagement metrics for attendance policies, early warning indicators, or multitiered support systems. In doing so, they may find that incorporating qualitative measures could better capture meaningful student engagement and more accurately identify students needing intervention.

Another consideration involves the implications of negative selection into virtual schools. Many students enroll in virtual schools due to negative experiences in prior learning environments, and report factors such as disengagement, negative experiences or struggles in traditional settings as reasons for enrollment (Greene & Paul, 2022; Scafidi, 2023). Given this context, virtual school leaders should carefully consider the importance of creating psychologically supportive learning environments that address these negative experiences and better support motivation internalization (Andersson et al., 2025; Chen & Jang, 2010; Greene & Paul, 2022; Guo, 2018; Jang et al., 2012). Special attention should be paid to demographic group differences identified in this study. Special education and middle school students showed higher levels of engagement in asynchronous learning paths, while white students were less likely to participate in blended learning. Virtual school leaders should recognize these differences and

design targeted interventions tailored to the distinct needs and preferences of specific student groups. One way that virtual school leaders might be able to identify at risk students early is by using the Situational Motivation Scale for virtual learning as a screener for student motivational profiles that could indicate challenges in the virtual environment. Early identification of students who may struggle in online learning could lead to early intervention and improve student academic outcomes.

Conclusion

The purpose of this study was to explore the relationship between motivation, engagement, and achievement among full-time virtual school students in grades 6-12. Current empirical literature testing these relationships focuses primarily on adult learners and single-course enrollments in high school. This study found that Internalized Motivation had a significant and positive relationship with both Average Course Completion and Average Course Grade, reinforcing findings in prior empirical literature suggest that motivation plays an important role in academic success in online learning (Kim et al., 2014). This study found no relationship between motivation and three of the four engagement measures: Asynchronous Time on Task in Coursework, Asynchronous Time on Task in the Learning Path, and Synchronous Participation in Zoom. However, there was a significant negative relationship between motivation and Synchronous Participation in Blended Learning.

Self-Determination Theory served as the theoretical lens for this study, and findings support the assumption that internalized motivation fosters academic achievement (Ryan & Deci, 2000). However, findings related to motivation and engagement appear to challenge the assumption that higher motivation leads to greater engagement. This study only tested quantity of engagement, rather than quality or type, which aligns with prior findings showing that

motivation does not predict passive participation but is associated with active participation and engagement quality (Hartnett, 2012). The quantity-based measures in this study are likely insufficient for understanding the types of engagement believed to improve outcomes for students (Reeve, 2012). This distinction has key implications for policy and practice. Virtual school leaders should pay careful attention to systems that exclusively use quantity-based engagement measures to identify students for targeted interventions.

The continued concerns related to the academic underperformance of full-time virtual schools compared to their brick-and-mortar peers and the proposed impact of negative selection into virtual schools should lead virtual school leaders and policymakers to consider ways to assess and address the diverse student populations who choose to enroll in full-time virtual school (Greene & Paul, 2022). Considering students' motivational profiles and prior school experiences could enhance early warning systems to identify students who may struggle academically in the virtual school environment. Early identification could facilitate timely intervention, supporting student academic growth and mitigating challenges associated with negative selection. One possible strategy is pre-enrollment screening that assesses both motivational fit and negative selection factors. For instance, an intake survey that combining the Situational Motivation Scale for virtual learning open-ended questions about students' reasons for enrolling in virtual school could help identify at-risk students and provide appropriate support (Guay et al., 2000).

The primary limitations of this study center around measurement and sample size. The engagement measures did not fully capture cognitive, emotional, and behavioral engagement, and the motivation measure did not capture students' overall motivation, but rather situational motivation specific for virtual learning. Although helpful, demographic controls were not able to

account for differences in family structure, negative selection, or prior academic achievement, all of which may have shaped student engagement and achievement. Additionally, the sample was relatively small for this kind of statistical analysis, limiting statistical power. The study population was drawn from a highly specific context: an urban, district-run, primarily asynchronous full-time virtual school. This limits the study's generalizability to other virtual models that may foster different educational environments. Given these limitations, future research should address existing gaps in empirical literature by testing alternative engagement measures (qualitative and quantitative), broader motivational indices (e.g., BPNS, Teacher Supportive Actions), and different virtual school models (charter, rural, synchronous).

This study contributes to the growing body of research on motivation, engagement, and achievement in full-time virtual school students in grades 6-12. It underscores the importance of analysis of more comprehensive engagement metrics in future research and reinforces existing literature demonstrating that motivation is linked to improved student outcomes (Alemayehu & Chen, 2023; Chen & Jang, 2010; Hartnett, 2012; Kim et al., 2014; Niemiec & Ryan, 2009; Reeve, 2012; Reeve & Cheon, 2021; Ryan & Deci, 2000; Reeve & Cheon, 2021; Ryan & Deci, 2000).

References

Ahn, J., & McEachin, A. (2017). Student enrollment patterns and achievement in Ohio's online charter schools. *Educational Researcher*, *46*(1), 44-57.

Alemayehu, L., & Chen, H. L. (2023). The influence of motivation on learning engagement: The mediating role of learning self-efficacy and self-monitoring in online learning environments. *Interactive Learning Environments*, *31*(7), 4605-4618.

Andersson, C., Granberg, C., Palmberg, B., & Palm, T. Basic Psychological Needs Satisfaction as a Mediator of the Effects of a Formative Assessment Practice on Behavioural Engagement and Autonomous Motivation. In *Frontiers in Education* (Vol. 10, p. 1523124). Frontiers.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Macmillan.

Barbour, M. K., & Reeves, T. C. (2009). The reality of virtual schools: A review of the literature. *Computers & Education*, *52*(2), 402-416.

Behzadnia, B., Mollaei Zangi, F., Rezaei, F., & Eskandarnejad, M. (2023). Predicting students' basic psychological needs, motivation, and well-being in online physical education: a semester-term longitudinal study. International Journal of Sport and Exercise Psychology, 1-19.

Branham, D. (2019). *Epic embezzled millions with 'ghost students,' OSBI says*. The Oklahoman. https://www.oklahoman.com/story/news/columns/2019/07/17/epic-embezzled-millions-with-ghost-students-osbi-says/60445326007/.

Bueno, C. (2020). Bricks and mortar vs. computers and modems: The impacts of enrollment in K-12 virtual schools. Computers and Modems: The Impacts of Enrollment in K-12 Virtual Schools (July 3, 2020).

Center for Research on Education Outcomes, C. (2015). Online charter school study. Technical Report. https://charterschoolcenter.ed.gov/sites/default/files/files/field_publication_attachment/Online%20Charter%20Study%20Final.pdf.

Burris, C., & Cimarusti, D. (2023). Chartered for Profit II: Pandemic Profiteering. *Network for Public Education.*

Chatzisarantis, N. L., & Hagger, M. S. (2009). Effects of an intervention based on self-determination theory on self-reported leisure-time physical activity participation. *Psychology and Health*, *24*(1), 29-48.

Chen, K. C., & Jang, S. J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in human behavior*, *26*(4), 741-752.

Cheon, S. H., & Reeve, J. (2015). A classroom-based intervention to help teachers decrease students' amotivation. *Contemporary educational psychology*, *40*, 99-111.

Cheon, S. H., Reeve, J., Lee, Y., Ntoumanis, N., Gillet, N., Kim, B. R., & Song, Y. G. (2019). Expanding autonomy psychological need states from two (satisfaction, frustration) to three (dissatisfaction): A classroom-based intervention study. *Journal of Educational Psychology*, *111*(4), 685.

Chiu, T. K. (2021). Digital support for student engagement in blended learning based on Self-Determination Theory. Computers in Human Behavior, 124, 106909.

Chiu, T. K. (2022). Applying the self-determination theory (SDT) to explain student engagement in online learning during the COVID-19 pandemic. *Journal of Research on Technology in Education*, *54*(sup1), S14-S30.

Chiu, T. K., Lin, T. J., & Lonka, K. (2021). Motivating online learning: The challenges of COVID-19 and beyond. *The asia-pacific education researcher*, *30*(3), 187-190.

Clark, T., & Berge, Z. (2005). Virtual schools and eLearning: Planning for success. In *19th Annual Conference on Distance Teaching and Learning* (pp. 1-5).

Common Core of Data (CCD). (n.d.). Nces.ed.gov. https://nces.ed.gov/ccd/tables/201314_Virtual_Schools_table_3.asp.

Common Core of Data (CCD). (n.d.). Nces.ed.gov. https://nces.ed.gov/ccd/tables/201920_Virtual_Schools_table_3.asp.

DeArmond, M., Chu, L., & Gundapaneni, P. (2021). How Are School Districts Addressing Student Social-Emotional Needs during the Pandemic? *Center on Reinventing Public Education*.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11,* 227-268.

Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former Eastern Bloc country. *Personality and Social Psychology Bulletin,* in press.

Diliberti, Melissa Kay and Heather L. Schwartz, The Rise of Virtual Schools: Selected Findings from the Third American School District Panel Survey. Santa Monica, CA: RAND Corporation, 2021. https://www.rand.org/pubs/research_reports/RRA956-5.html.

Fitzpatrick, B. R., Berends, M., Ferrare, J. J., & Waddington, R. J. (2020). Virtual illusion: Comparing student achievement and teacher and classroom characteristics in online and brick-and-mortar charter schools. *Educational Researcher*, *49*(3), 161-175.

Furrer, C. and Skinner, E.A. (2003) 'Sense of relatedness as a factor in children's academic engagement and performance', *Journal of Educational Psychology* 95:148–62.

Greene, J. P., & Paul, J. D. (2022). *Investigating the Relationship Between Negative Selection into Online Schooling and Achievement Growth* (No. 02-2022). Educational Freedom Institute Working Paper.

Guay, F., Vallerand, R. J., & Blanchard, C. (2000). On the assessment of situational intrinsic and extrinsic motivation: The Situational Motivation Scale (SIMS). *Motivation and emotion*, *24*, 175-213.

Günes, S., & Alagözlü, N. (2021). Asynchronous Distance Learning and Blended Learning in Terms of Learner Autonomy, Motivation and Academic Success. *Turkish Online Journal of Educational Technology-TOJET*, *20*(3), 54-65.

Guo, Y. (2018). The influence of academic autonomous motivation on learning engagement and life satisfaction in adolescents: the mediating role of basic psychological needs satisfaction. *Journal of Education and Learning*, *7*(4), 254-261.

Hamlin, D. (2018). "The types of kids we get are different"—The distinguishing characteristics of school choosers in Detroit, Michigan. *Journal of School Choice*, *12*(1), 52-79.

Hamlin, D. (2021). Can a positive school climate promote student attendance? Evidence from New York City. *American Educational Research Journal, 58*(2), 315-342.

Hamlin, D., Adigun, O., & Adams, C. (2023). Do virtual schools deliver in rural areas? A longitudinal analysis of academic outcomes. *Computers & Education*, *199*, 104789.

Hamlin, D., & Li, A. (2021). Factors mediating school safety in charter schools: An analysis of five waves of nationally representative data. *Journal of School Choice*, *15*(3), 371-392.

Hamzeh, N. (2021). Learnings from the Impact of Online Learning on Elementary Students' Mental and Social-emotional Well-being Amid the COVID-19 Pandemic.

Hartnett, M. (2012). Relationships between online motivation, participation and achievement: More complex than you might think. *Journal of open, flexible, and distance learning*, *16*(1), 28-41.

Hsu, H. C. K., Wang, C. V., & Levesque-Bristol, C. (2019). Reexamining the impact of Self-Determination Theory on learning outcomes in the online learning environment. Education and information technologies, 24, 2159-2174.

Ilardi, B. C., Leone, D., Kasser, R., & Ryan, R. M. (1993). Employee and supervisor ratings of motivation: Main effects and discrepancies associated with job satisfaction and adjustment in a factory setting. *Journal of Applied Social Psychology, 23,* 1789-1805.

Ismailov, M., & Chiu, T. K. (2022). Catering to inclusion and diversity with universal design for learning in asynchronous online education: A Self-Determination Theory perspective. *Frontiers in Psychology*, *13*, 819884.

Jang, H., Kim, E. J., & Reeve, J. (2012). Longitudinal test of self-determination theory's motivation mediation model in a naturally occurring classroom context. *Journal of Educational psychology*, *104*(4), 1175.

Kasser, T., Davey, J., & Ryan, R. M. (1992). Motivation, dependability, and employee-supervisor discrepancies in psychiatric vocational rehabilitation settings. *Rehabilitation Psychology, 37,* 175-187.

Kim, C., Park, S. W., & Cozart, J. (2014). Affective and motivational factors of learning in online mathematics courses. British Journal of Educational Technology, 45(1), 171-185.

King, R. B., Haw, J. Y., & Wang, Y. (2024). Need-support facilitates well-being across cultural, economic, and political contexts: A self-determination theory perspective. *Learning and Instruction*, *93*, 101978.

Koestner, R., & Zuckerman, M. (1994). Causality orientations, failure, and achievement. *Journal of Personality*, *62*(3), 321-346.

Korth, R. (2020, July 28). *Epic charter schools becomes Oklahoma's Largest School District*. KOSU. https://www.kosu.org/education/2020-07-27/epic-charter-schools-becomes-oklahomas-largest-school-district.

Kuningas, K. (2020). Mindfulness and the Virtual School: Effects of Mindfulness Interventions in the Aftermath of Emotional Trauma and Isolation.

Liu, J. D., & Chung, P. K. (2014). Development and initial validation of the psychological needs satisfaction scale in physical education. Measurement in Physical Education and Exercise Science, 18(2), 101-122.

Lonsdale, C., Sabiston, C. M., Taylor, I. M., & Ntoumanis, N. (2011). Measuring student motivation for physical education: Examining the psychometric properties of the Perceived Locus of Causality Questionnaire and the Situational Motivation Scale. *Psychology of Sport and Exercise*, *12*(3), 284-292.

Molnar, A. (Ed.), Miron, G., Hagle, S., Gulosino, C., Mann, B., Huerta, L.A., Rice, J.K., Glover, A., & Bill, K. (2023). *Virtual schools in the U.S. 2023*. Boulder, CO: National Education Policy Center. Retrieved 10.06.2023 from http://nepc.colorado.edu/publication/virtual-schools-annual-2023.

Molnar, A. (2023). Virtual Schools in the US 2023. *National Education Policy Center*.

Miron, G., & Urschel, J. (2012). Understanding and improving full-time virtual schools.

Naciri, A., Radid, M., Sine, H., Kharbach, A., & Chemsi, G. (2023). Self-determined motivation and associated factors among health professions students in distance learning: a cross-sectional study in Morocco. *Korean Journal of Medical Education*, *35*(1), 33.

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying Self-Determination Theory to educational practice. *Theory and research in Education*, *7*(2), 133-144.

Reeve, J. (2012). A Self-Determination Theory perspective on student engagement. In *Handbook of research on student engagement* (pp. 149-172). Springer, Boston, MA.

Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of educational psychology*, *105*(3), 579.

Reeve, J., & Cheon, S. H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. Educational Psychologist, 56(1), 54-77.

Reeve, J., & Halusic, M. (2009). How K-12 teachers can put Self-Determination Theory principles into practice. *Theory and Research in Education*, *7*(2), 145-154.

Rummel, A., & Feinberg, R. (1988). Cognitive evaluation theory: A meta-analytic review of the literature. *Social Behavior and Personality: an international journal*, *16*(2), 147-164.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology*, *25*(1), 54-67.

Ryan, R. M., & Deci, E. L. (2002). Overview of Self-Determination Theory: An organismic dialectical perspective. *Handbook of self-determination research*, *2*, 3-33.

Ryan, R. M., & Deci, E. L. (2017). *Self-Determination Theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Ryan, R. M., Mims, V., & Koestner, R. (1983). Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of personality and Social Psychology*, *45*(4), 736.

Salikhova, N. R., Lynch, M. F., & Salikhova, A. B. (2021). Adult Learners' Responses to Online Learning: A Qualitative Analysis Grounded in Self-Determination Theory. Eurasia Journal of Mathematics, Science and Technology Education, 17(10).

Scafidi, B. (2023). Difficult circumstances and negative selection into virtual charter schools. *Available at SSRN 4502429*.

Serdyukova, N., & Serdyukov, P. (2013, May). Student autonomy in online learning. In *International Conference on Computer Supported Education* (Vol. 2, pp. 229-233). SCITEPRESS.

Standage, M., Duda, J. L., Treasure, D. C., & Prusak, K. A. (2003). Validity, reliability, and invariance of the Situational Motivation Scale (SIMS) across diverse physical activity contexts. *Journal of Sport and Exercise Psychology*, *25*(1), 19-43.

State public enrollment totals | Oklahoma State Department of Education. (n.d.). Oklahoma State Department of Education. https://sde.ok.gov/documents/state-student-public-enrollment.

U.S. Department of Education, National Center for Education Statistics. (n.d.). *District detail for Epic Charter Schools*. National Center for Education Statistics. Retrieved January 31, 2025, from https://nces.ed.gov/ccd/districtsearch/district_detail.asp?Search=1&State=40&DistrictPageNum=12&ID2=4000777.

Wang, C., Hsu, H. C. K., Bonem, E. M., Moss, J. D., Yu, S., Nelson, D. B., & Levesque-Bristol, C. (2019). Need satisfaction and need dissatisfaction: A comparative study of online and face-to-face learning contexts. *Computers in Human Behavior*, *95*, 114-125.

Wang, C. K. J., Liu, W. C., Nie, Y., Chye, Y. L. S., Lim, B. S. C., Liem, G. A., ... & Chiu, C. Y. (2017). Latent profile analysis of students' motivation and outcomes in mathematics: an organismic integration theory perspective. *Heliyon*, *3*(5).

Wasicek, B., & McHugh, D. (2024). Validity evidence for using the situational motivation scale to assess Pre-clerkship Medical Student Motivation. *International Medical Education*, *3*(3), 212-228.

Wuryania, E., Rodlib, A. F., Sutarsib, S., Dewib, N. N., & Arifb, D. (2021). Analysis of decision support system on situational leadership styles on work motivation and employee performance. *Management Science Letters*, *11*, 365-372.

Youth Truth National Non-Profit. (2020). *Students Weigh In: Learning and Well-Being During Covid-19*. https://youthtruthsurvey.org/student-weigh-in/.

Zimmer, R., Buddin, R, Chau, D., Gill, B., Guarino, C., Hamilton, L., Krop, C., McCaffrey, D., Sandler, M., & Brewer, D. (2003). Charter school operation and performance: Evidence from California. Santa Monica: RAND.

Appendix A: Correlational Analyses

Table 20 *Correlations for Internalized Motivation Items from the Situational Motivation Scale*

Variables	IR1	IR2	IR3	IR4
IR1: Because I am doing it for my own good	1	0.600**	0.428**	0.515**
IR2: Because I think virtual learning is good for me	0.600**	1	0.575**	0.652**
IR3: By personal decision	0.428**	0.575**	1	0.511**
IR4: Because I believe that virtual learning is important for me	0.515**	0.652**	0.511**	1

The subscales for Internalized Motivation (Table 25) show moderate correlations with one another. The lowest correlation of 0.428 ($p < .01$) was between Internalized Motivation Item 1: “Because I am doing it for my own good” and Internalized Motivation Item 3: “By personal decision”. The highest correlation of 0.652 ($P < .01$) is found among Internalized Motivation Items 2 and 4 which are “Because I think virtual learning is good for me” and “Because I believe that virtual learning is important for me”. The correlations seen in this subscale that are between 0.428 and 0.652 indicate that the items are related but address unique aspects of Internalized Motivation. Following the correlational analysis, factor loadings were run, and reliability was checked using Cronbach’s alpha which was 0.831 for the Internalized Motivation composite variable (Table 5).

The items for External Regulation (Table 26) are all positively correlated with one another with a significance of $p < .01$. The lowest correlation of 0.469 appears among External Regulation items 2 and 3 which include: “Because it is something that I have to do” and “Because I don’t have any choice”. The highest correlated items are External Regulation Items 1 and 2 with a correlation of 0.743. The items state “Because I am supposed to do it” and “because it is something that I have to do”. These items are approaching a very high correlation, but still

seem to address unique enough constructs to not be correlated above a 0.800. Following the correlational analysis, factor loadings were run, and reliability was checked using Cronbach's alpha which was 0.826 for the External Regulation composite variable (Table 5).

Table 21. *Correlations for External Regulation Items from the Situational Motivation Scale*

Variables	ER1	ER2	ER3	ER4
ER1: Because I am supposed to do it	1	0.743**	0.478**	0.536**
ER2: Because it is something that I have to do	0.743**	1	0.469**	0.489**
ER3: Because I don't have any choice	0.478**	0.469**	1	0.527**
ER4: Because I feel that I have to do it	0.536**	0.489**	0.527**	1

Subscales for Amotivation (Table 27) were positively correlated with one another with a significance of $p <. 01$ among all relationships. The lowest correlation of 0.484 was seen between Amotivation items 1 and 4 which say, "There may be good reasons to do it, but I personally don't see any" and "I do virtual learning, but I am not sure it is a good thing to pursue it". The highest correlations among Amotivation items came from items 2 and 4 with a correlation of 0.746. They state, "I do virtual learning, but I am not sure if it is worth it" and "I do virtual learning, but I am not sure it is a good thing to pursue it". The correlations among all items in this composite variable fall within an acceptable range, indicating a relationship between items that target the same construct while still allowing each item to provide unique information. Following the correlational analysis, factor loadings were run and reliability was checked using Cronbach's alpha which was 0.877 for the Amotivation composite variable (Table 5).

Table 22. *Correlations for Amotivation Items from the Situational Motivation Scale*

Variables	A1	A2	A3	A4

A1: There may be good reasons to do it, but I personally don't see any	1	0.592**	0.628**	0.484**
A2: I do virtual learning, but I am not sure if it is worth it	0.592**	1	0.714**	0.746**
A3: I don't know why; I don't see what virtual learning brings me	0.628**	0.714**	1	0.687**
A4: I do virtual learning, but I am not sure it is a good thing to pursue it	0.484**	0.746**	0.687**	1

Appendix B: The Situational Motivation Scale

The Situational Motivation Scale Adapted for Virtual Learning

(Guay, Vallerand, & Blanchard, 2000, p. 210)

Directions: Answer each item according to the following scale: 1: corresponds not at all; 2: corresponds a very little; 3: corresponds a little; 4: corresponds moderately; 5: corresponds enough; 6: corresponds a lot; 7: corresponds exactly.

	Why are you currently engaged in virtual learning?							
1.	Because I am doing it for my own good	1	2	3	4	5	6	7
2.	Because I am supposed to do it	1	2	3	4	5	6	7
3.	There may be good reasons to do it, but personally I don't see any	1	2	3	4	5	6	7
4.	Because I think virtual learning is good for me	1	2	3	4	5	6	7
5.	Because it is something that I have to do	1	2	3	4	5	6	7
6.	I do virtual learning, but I am not sure if it is worth it	1	2	3	4	5	6	7
7.	By personal decision	1	2	3	4	5	6	7
8.	Because I don't have any choice	1	2	3	4	5	6	7
9.	I don't know why; I don't see what virtual learning brings me	1	2	3	4	5	6	7
10.	Because I believe that virtual learning is important for me	1	2	3	4	5	6	7
11.	Because I feel that I have to do it	1	2	3	4	5	6	7
12.	I do virtual learning, but I am not sure it is a good thing to pursue it	1	2	3	4	5	6	7

Appendix C: Descriptive Statistics Summary

Table 3 provides descriptive statistics for all variables (N=212) in the study, including dependent, independent, and control variables. The table reports the mean (or proportion), standard deviation, minimum and maximum values for each variable. The dependent variables show measures of academic engagement and achievement. Table 3 shows that students spend an average 35 minutes and 11 seconds in each class per day, with a standard deviation of 27 minutes and 38 seconds. This represents a large variance, with daily time spent per credit ranging from a minimum of 4 minutes and 45 seconds to a maximum of 5 hours, 45 minutes, and 56 seconds (Table 3).

Students spend an average of 4 minutes and 28 seconds per day on their individualized learning path, with a standard deviation 5 minutes and 56 seconds. The minimum time spent per day is 0 minute, while the maximum is 31 minutes and 42 seconds. On average, students participate in .19 Zoom sessions per day while enrolled in virtual school and attend .04 blended learning days per school day that they are enrolled in school. Students completed an average of 76.66% of their coursework, with a wide range from a minimum of 1.64% to a maximum of 100% course completion. The average final course grade is 62.21 with a standard deviation of 23.79 points.

Descriptive statistics for the independent variables from the Situational Motivation Scale are available in Table 3 (Guay et al., 2000). Among the motivation variables, Internalized Motivation has the highest overall of 3.02 with a standard deviation of 0.79. In contrast, Amotivation has the lowest overall mean of 1.89, with a standard deviation of 0.87. Intrinsic Motivation has a mean of 2.76 and a standard deviation of 0.82, while External Regulation has a mean of 2.56 and a standard deviation of 0.88. Table 3 provides population statistics for the

sample in this study for all the demographic controls including grade level, gender, ethnicity, special education status, multilingual learner status, and socioeconomic status,

Appendix D: IRB Approval

The UNIVERSITY of OKLAHOMA

Institutional Review Board for the Protection of Human Subjects

Human Research Determination Review Outcome

Date: June 27, 2024

Principal Investigator: Kandi Council

Study Title: THE RELATIONSHIP BETWEEN MOTIVATION AND LEARNING ENGAGEMENT AMONG FULL TIME VIRTUAL SCHOOL STUDENTS

Review Date: 6/26/2024

I have reviewed your submission of the Human Research Determination worksheet for the above-referenced study. I have determined this research does not meet the criteria for human subject's research. The researcher will be receiving de-identified data from Tulsa Virtual Academy who certifies they own the data and are sharing it with the researcher with an understanding that it will be used for the researcher's dissertation. Furthermore, the project entails analysis of de-identified data collected by someone else that is shared with the researcher. No interactions with human subjects and no intent to re-identify participants. Therefore, IRB approval is not necessary so you may proceed with your project.

If you have questions about this notification or using iRIS, contact the HRPP office at (405) 325-8110 or irb@ou.edu. Thank you.

Cordially,

Ioana Cionea, Ph.D.
Vice Chair, Institutional Review Board