Comparing Middle School Student Learning Outcomes Among In-person, Online, and Hybrid Modes of Instruction:
A Consideration of Student Engagement in Distance Learning During a Pandemic

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ABSTRACT

In this study, a comparative analysis was conducted to explore how students’ learning outcomes were potentially influenced by student engagement during different modes of instruction. The study compared the final mean grade point averages (GPAs) of a sample (N = 600) of middle school students during in-person, online, and hybrid modes of instruction. The sample group was divided into two subgroups (Group 1: n = 300 and Group 2: n = 300). The designated timeframes for the evaluation were before the COVID-19 pandemic (sixth grade, 2018-2019), at the onset of the COVID-19 pandemic (seventh grade, 2019-2020), and during the COVID-19 pandemic (eighth grade, 2020-2021) to determine if student engagement affected academic achievement. The three data analyses used to compare the students’ final mean GPAs included: (a) Paired t-test (between in-person and online instruction when compared among the entire sample); (b) One-Way Repeated Measures ANOVA (among in-person, online, and hybrid instruction when compared for Group 2); and (c) Independent Samples t-test (between online and hybrid instruction for the entire sample). The results from the analyses indicated there was no statistically significant difference when students transitioned from in-person before the pandemic to online instruction at the onset of the pandemic. However, a statistically significant difference was shown when students transitioned from online to online or online to hybrid instruction throughout the pandemic. Recommendations for practice and future research focusing on students’ needs were presented.

Keywords: hybrid, in-person, instruction, learning, online, and student engagement.
DEDICATION

I would like to dedicate this dissertation to my late father, James Mapp. From the time I was a young girl, he always believed in me. He was my strongest advocate, championing my highest hopes and dreams. His eternal spirit is the source of my inspiration, and I will be forever grateful for his love and support. Daddy, I love you and hope I have made you proud.
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CHAPTER I: INTRODUCTION

In the Spring of 2020, the Covid-19 pandemic impacted education concerning how nearly 55.1 million K-12 public school students acquired learning throughout the nation (Bond, 2020; Malkus & American Enterprise Institute, 2020; Stelitano et al. 2020; & Tinubu Ali & Herrera, 2020). As federal mandates required the closure of all nonessential businesses, the majority of the school districts were faced with the challenge of instantaneously transitioning educational platforms from face-to-face classroom learning to distance learning (Asio & Bayucca, 2020; Birch & Lewis, 2020; Davis et al., 2021; Jimenez & Center for American Progress, 2020; & Kamble et al., 2021). This abrupt change to the K-12 public school learning environment may have potentially influenced the students’ social interactions, which then possibly affected student engagement when assessed in multiple modes of instruction (Data Quality Campaign, 2020; & Tinubu Ali & Herrera, 2020). These prompt changes to instruction may have altered students’ learning outcomes, depicted in their final grade point averages (GPAs).

Initial studies regarding the effects of the pandemic on education have highlighted the experiences of instructors (e.g., K-12 teachers) and college students (Birch & Lewis, 2020; Lee, 2021; Seward & Nguyen, 2019; & Yates et al., 2014). In reviewing instructors’ experiences, the focus was placed on the consequences of their unpreparedness when facilitating online learning as well as their inability to communicate with K-12 students (and their families) within online learning environments (OLEs) (Birch & Lewis, 2020; Marek, et al., 2021; Sofianidis et al., 2021; & Stelitano et al., 2020). The main topics attributed to the unpreparedness included the lack of technology-based training and support from academic leaders needed for adapting to the OLEs.
(Marek et al., 2021; & Sofianidis et al., 2021). Meanwhile, college students have expressed the need for engaging instruction that was content-driven, readily available during and beyond designated class time, and challenging (van Esch et al., 2020).

Though many face-to-face classroom learning environments contain computers, digital tools, iPads/tablets, and smartboards, studies have shown that teachers lacked the knowledge and skills for utilization during instruction (Lee, 2021; Seward & Nguyen, 2019; & Tinubu Ali & Herrera, 2020). This lack of knowledge and skill, which translated into ineffective learning experiences for many students, was accentuated because of the expedited transition from in-person to online instruction, resulting from the pandemic (Ewing & Cooper, 2021; Lee, 2021; & Scales et al. 2020). Instructors have long communicated their lack of confidence and ability to utilize technology during in-person instruction; however, with the immediate transition to online instruction at the onset of the pandemic, studies revealed the importance for instructors to be comprehensible with the technology used to enhance student engagement (Bond, 2020). Lee's study of several Korean primary and secondary teacher perceptions described how teachers’ lack of technology-based skills and administrative support has negatively impacted student learning (2021). The results from the 60-minute interviews indicated that the teachers expressed being forced to facilitate instruction within OLEs without adequate training or the necessary tools for learning. The teachers also noted how the in-class experience did not transfer to the OLE due to the limitations of online interactions among students, and minimal support from academic leaders and parents. The issues with online instruction have been acknowledged as poor preparation which resulted in low student participation (Scales et al., 2019; & Stelitano et al. 2020).
However, with the necessary support from academic leaders, the instructors who were afforded essential *continuous* training were more prepared to implement technology-based skills during instruction. The execution of these technology-based skills was beneficial during online instruction (Birch & Lewis, 2020). For example, approximately 200 K-12 teachers and support staff participated in a study conducted by Birch & Lewis (2020). The results of the study suggested that in addition to initial training sessions, sustained training throughout the school year was beneficial for the teachers’ ongoing learning. The weekly microlearning sessions consisted of 30-minute, synchronous video conferencing that focused on narrowed topics based on feedback from the participants. The topics included using video conferencing, incorporating tools for assessing learning outcomes, and enhancing student engagement during online instruction. The teachers that frequently attended the microlearning sessions expressed their renewed ability to get through challenging situations and “be ahead of the game compared to their students” (Birch & Lewis, 2020). Because of the abbreviated and continuous training offered throughout the week, the teachers had access to real-time technology-based learning that was effectively integrated with online instruction. Attendance in the ongoing microlearning sessions increased their confidence which improved their technology-based skills and allowed instruction to focus on student learning, not the application of technology in the classroom (Birch & Lewis, 2020; Data Quality Campaign, 2020; & Stelitano et al., 2020).

Recent studies also have shown that the support provided to teachers not only entailed offering technology-based training for acquired knowledge, but also included addressing the lack of assistance with ensuring their students had prevalent access to
technology (e.g., Wi-Fi) and digital tools (e.g., laptops, Chromebooks, etc.) within OLEs (Kamble et al., 2021; & Seward & Nguyen, 2019). A report posted in the New York Times described the importance of understanding the technological needs of students before assigning coursework beyond in-person instruction (Kang, 2016). For example, students from a small town in Texas were reported as having to stand outside, on a crumbling sidewalk of a nearby elementary school, to access the Wi-Fi for downloading homework assignments to their smartphones (Kang, 2016). Before the pandemic, instructors could have scheduled time, before or following school hours, to allow students to use technological resources available in the school if students lacked access to digital tools at home. However, with school closures, instructors may not have been privy to the status of the families’ access to technology because of the lack of communication potentially associated with distance learning. To alleviate such situations, teachers must obtain information regarding students’ technology accessibility to determine the best mode of instruction, and delivery of content and resources, to ensure students are equipped with the essential tools to achieve academic success (Seward & Nguyen, 2019; Stelitano et al., 2020; & Wang et al., 2014).

Another option for ensuring all students have access to technology and supportive digital tools is to loan the required materials and create internet hotspots for consumption. Based on national findings by a 2014 publication of Speak Up, 32% of high school students utilized mobile devices (e.g., Chromebooks, iPads, laptops, etc.) issued by their schools, with 75% of K-12 students accessing course material online portals (p. 3). Since that timeframe, the use of technology in education has steadily increased with instructors relying on such platforms for posting grades, tracking attendance, and communicating
with parents and staff (Edwards & Rule, 2013; & Seward & Nguyen, 2019). These findings all lead to the necessity for equipping instructors with the required technology-based knowledge and adaptable skills to deliver online instruction in the 21st Century digital world (Harris-Packer & Segol, 2015; Hui et al., 2018; Pina & Harris, 2019; & Stelitano et al., 2020). In addition to having revealed instructors’ perceptions regarding online instruction, recent studies have also focused on college students’ experiences with the transition from in-person to online instruction due to the pandemic.

While nearly 30% of college students were enrolled in at least one online course in recent years, not all students have embraced this form of remote learning (Pina & Harris, 2019). Skepticism regarding the degree of quality learning that can be achieved from online versus traditional, in-person instruction remains questionable. Research conducted on college students’ perceptions of the immediate shift to online learning revealed that the students expressed the need to receive engaging pedagogy that was: (a) content-driven, (b) accessible at any time beyond the designed synchronous or asynchronous class timeframe, and (c) aptly challenging to enhance knowledge-based learning that connected education to real-life situations (Aydin & Erol, 2021; Seward & Nguyen, 2019; & van Esch et al. 2020).

van Esch et al. (2020) purported that when college students possessed positive attitudes toward instruction and the delivery of content, they expressed positive desires and established expectations for achieving learning outcomes based on increased academic performance and achievement. The goal-setting premise was for academic leaders to provide an OLE that promoted student learning for achieving academic success (Gratch-Lindauer, 2008). Engaging students during online instruction has shown to be
necessary for fostering an OLE, that delivered instruction and purposeful coursework which aligned with learning outcomes, enabled students to easily access the learning content at any time or place, and promoted consistent interactions (with instructors and peers) for constructing new ideas (Aydin & Erol, 2021; Czerkawski & Lyman, 2016; Data Quality Campaign, 2020; Gratch-Lindauer, 2008; Marek et al., 2021; Seward & Nguyen, 2019; van Esch et al., 2020; & Yates et al., 2014).

The design, development, and delivery of instructional materials must contain aspects of active learning and participation that support learning outcomes. Assignments that contained unclear instructions or ambiguous tasks that were incorrectly labeled (e.g., the date from the previous semester was listed instead of the current semester on the syllabus, or the indication of an essay when the assignment was a report), or required an excessive amount of reading in a short timeframe (e.g., in one scenario, over 800 pages were assigned to be read within one week) were specific examples that college students reported, in a study by Yates et al., (2014), as being frustrating when attempting to complete coursework. Adversely, college students expressed appreciation for instances where active learning was incorporated into the curriculum. For instance, as cited in Khan et al. (2017), a study conducted by Laws et al. (1999) indicated that when active learning was incorporated in a college-level physics course, a 40% to 60% increase in the students’ academic performance and knowledge retention was noted. Studies on college students have also indicated the need for accessing content from multiple mobile devices and physical locations, at any time (Kamble et al., 2021). College students tended to have more experience with online instruction (as opposed to K-12 students) and were more inclined to complete assignments on their own time, within a reasonable timeframe,
versus at a designated time set by the instructor. College students felt more empowered, thus encouraged, to complete assignments than if they were forced to do so at an inconvenient time resulting from working, participating in extracurricular activities or campus and community-oriented organizations, tending to family responsibilities, or any other host of activities in which students (e.g., traditional, aged 18-22, or non-traditional, aged 30+) were committed (Cole et al., 2021; Khan et al., 2017; & Yates et al., 2014).

Lastly, some research on college students expressed their need for engaging in learning content that was challenging. In this regard, challenging content not only applied to the level of difficulty, but was inclusive of content that argued conventional thought exhibited through collaborative peer interactions (Cole et al., 2021). For instance, a study in India indicated that more than 50% of the 35 MBA graduate students interviewed implied that while practical content consisting of numerical concepts (e.g., accounting, economics, statistics, etc.) was challenging to learn in any environment, the OLE allowed for more concise and interactive discussions among peers (Jacobs & Ivone, 2020; & Kamble et al., 2021). The participants appreciated the back-and-forth dialogue with other students possessing varying levels of knowledge and different experiences that strengthened debatable content that had been applied in real-world situations. This interaction was noted as having occurred more during online instruction and was described as more student-centered learning versus traditional, in-person instruction which involved more teacher lectures (instructor-led learning).

Based on previous studies that confirmed instructors possessed sufficient technology-based knowledge and skills, it was found that student-instructor collaborative learning was often promoted (Seward & Nguyen, 2021). This promotion of social
interaction among students and their instructors was important for enhancing student engagement through active participation during learning. The instructors were able to better assess students’ needs when accessing technology and completing assignments. As a result, students were able to form trusting relationships with their instructors. The enhancement of these interactions within OLEs contributed to the factors necessary for increasing student engagement. The focus on the aspects of increasing student engagement was important because it served as an essential measure for achieving learning outcomes associated with an increased academic performance which often led to improved academic achievement (Marek et al., 2021; & Scales et al., 2020).

**Missing Link to Research**

While much research has been conducted on the effects of the pandemic on the perspectives of teachers and college students, not enough studies have been completed on the perceptions of the impact on middle school students in the U.S. (Scales et al., 2020; & Tinubu Ali & Herrera, 2020). The study of the perception of as well as the impact on middle school students has been deemed important because, at this stage in a student’s education life cycle (Gentle-Genitty, 2019; & Scales et al., 2020), the degree of learning is dependent on social interactions (Bond, 2020; & Gentle-Genitty, 2019). The review of research that focused on students’ dependency on social interaction was necessary for assessing academic achievement (Thijs & Fleischmann, 2015).

Before the pandemic, research indicated that academic achievement was measured by students’ standardized assessment scores (Lake et al., 2021). However, because of the transition from in-person to online instruction, the evaluation of academic achievement through other measures has become essential when assessing all aspects of
distance learning (Bond, 2020). Lake et al. (2021) suggested that the need for establishing alternative accountability measures, which provided insight into students’ ability to accomplish set learning outcomes, was determined based on the necessary improvements in academic performance and overall achievement.

Because of the change to online instruction, where testing could not be properly administered, most school districts canceled the End of Course assessments (Western State Department of Education, 2021). The postponement of administering most standardized testing required academic leaders to determine another method for assessing students’ academic performance (Bond, 2020). As a result of the pandemic, in many instances, academic achievement has been evaluated by students’ final grade point averages (GPAs) in place of standardized assessments scores (El Refae et al., 2021; & Yates et al., 2014). Therefore, the purpose of this study was to explore how middle school students’ learning outcomes were potentially influenced by social interactions, through consideration of the level of student engagement in three modes of instruction.

A comparative analysis of three modes of instruction has suggested differences in the level of student engagement, based on social interactions and how students engaged within each learning environment. This chapter covered the Basis for the Study, Purpose of the Study, Research Questions, Significance of the Study, Definition of Key Terms, and Chapter Summary. Below, Figure 1 illustrates these sections in the following storyboard:

Figure 1

Storyboard for Chapter I: Introduction
The storyboard serves as a visual outline of the sections that were discussed in this chapter. First, the Basis of the Study introduced the background of the problem that focused on student engagement, about the different types of students’ social interactions, during three modes of instruction. The Statement of the Problem suggested how changes to the instruction may have impacted student engagement based on social interactions within OLEs. An indication of how social interactions have possibly influenced student engagement, within OLEs, led to the discussion for the Purpose of the Study. Next, a review of the changes made to instruction, stemming from the effects of the pandemic, provided the connection to the study. Then, an introduction of the Research Questions and Hypotheses preceded a discussion that correlated to the Significance of the Study. The Key Terms that were associated with the study and research factors were defined. Lastly, the Chapter Summary reiterated the purpose of the study and reviewed the need for evaluating academic achievement due to the abrupt change in instruction.
Basis for the Study

The basis for this study was rooted in the dependency of social interactions during learning and its consideration for how it has potentially influenced student engagement within OLEs (Thijs & Fleischmann, 2015). Because the majority of K-12 students in the U.S. transitioned to remote education due to quarantine protocols during the first quarter of 2020, academic leaders were required to provide a mode of instruction and access to learning resources to accommodate students in distance learning (Asio & Bayucca, 2020; Birch & Lewis, 2020; Davis et al., 2021; & Jimenez & Center for American Progress, 2020). Distance learning has been described as an educational practice where teachers and students are separated geographically while relying on technology for synchronous and/or asynchronous instruction (Aydin & Erol, 2021; Burdina et al., 2019; & Hobson & Puruhito, 2018). This mode of learning includes the use of digital tools and learning materials, online courses, remote access to technology, and virtual learning forums. These remote learning platforms are available within OLEs (Burdina et al., 2019; & Kamble et al., 2021).

Within OLEs, students are encouraged to participate in class discussions and group work, review assigned readings, and complete course work. However, students have not necessarily been held to the same regard for completing assignments online as when attending in-person instruction (Burdina et al., 2019). During in-person instruction, students’ face-to-face interactions with the teacher and other students have been shown to reinforce encouraging participation (Dennie et al., 2018). However, within OLEs, students must possess a sense of self-reliance and independent thought to be self-motivated when participating and completing assignments (Burdina et al., 2019; &
Dennie et al., 2018). The framework of social interactions within learning environments, discussed in the study, has implied how student engagement could be influenced by social interactions during learning (Thijs & Fleischmann, 2015). The review of these social interactions was used to explain the relationships between students and the factors that promoted or hindered learning between students and their instructors, the content, fellow students, activities performed, and technology accessed.

**Background of the Problem**

The demonstrated practices of social interaction have included students’ observations, the performance of acquired skills and abilities, methods for communication (verbal and nonverbal), and application of new information based on learned concepts and collaboration with others (Dennie et al., 2018; Khan et al., 2017; & Meyers, 2014). These factors play an essential role in educators’ design of traditional instruction, teachers’ delivery of content, and students’ acquisition of knowledge. The practices are best represented by interactive relationships that students adhere to during learning (Dennie et al., 2018; Khan et al., 2017; & Meyers, 2014). In traditional instruction, education occurs within an in-person classroom environment where the teacher facilitates learning and students acquire new knowledge through the reinforcement of practice (e.g., observing, asking questions, listening, reading, writing, and collaborating with other students) (Aydin & Erol, 2021). Students may obtain feedback that could be immediately applied to learning. In this traditional learning forum, social interaction among students primarily consists of the following three relationships (student-instructor, student-content, and student-student) as well as the two additional
innovative relationships for technology-based learning (*student-activity* and *student-technology*) (Moore, 1989; & Nilson & Goodson, 2017).

**Student-Instructor Interaction.** The *student-instructor interaction* has shown to be the most pivotal relationship as it sets the tone for students’ learning experiences (Nilson & Goodson, 2017; & Scales et al., 2020). This interaction includes *formal* direct instruction (e.g., guided facilitation from teacher to student) as well as *informal* guidance through mentoring and other supportive measures beyond in-class learning. Examples of student-instructor interaction include a teacher providing course orientation, guiding class participation (e.g., teacher to student and vice versa), presenting weekly announcements, providing feedback on assignments and tests, and offering one-on-one mentoring sessions (Meyer, 2014; & Nilson & Goodson, 2017). These activities provide informative interactions that test students’ ability to retain new information. Teachers’ ability to influence students’ experiences is largely due to the level of student-instructor interaction (Dennie et al., 2018; & Scales et al., 2020).

**Student-Content Interaction.** The *student-content interaction* allows for students to actively read resources (i.e., textbooks, guides, library resources, etc.), write responses that strengthen conceptualization, and devise inferences aligned with developing reading comprehension skills (Nilson & Goodson, 2017). The evaluation of this relationship is based on outcomes from students completing assignments, watching instructional videos, and participating in simulations that portray real-world experiences (Meyer, 2014). The construction of knowledge occurs as students begin to form individualized connections with the content and formalize deductive reasoning about the new information.
**Student-Student Interaction.** The *student-student interaction* serves as a reinforcement for the student-instructor and student-content interactions which allow students to develop knowledge through communication with one another. Examples of student-student interaction include class discussions, group work, peer reviews, role-playing, study groups, and social networking. These collaborative efforts encourage a deeper level of thought and the creative meaning necessary for students to comprehend details and processes associated with gathering new information (Dennie et al., 2018; Meyer, 2014; & Scales et al., 2020). These three student interaction criteria (student-instructor, student-content, and student-student) serve as the guiding principles for gauging student engagement during in-person classroom learning. However, the criteria do not specifically address the necessary skills required for distance learning. To encourage student engagement within OLEs, *student-activity* and *student-technology* interactions are the suggestive measures essential for enhancing student learning (Dennie et al., 2018; & Meyer, 2014).

**Student-Activity.** The *student-activity interaction* incorporates student engagement with active learning. This performative measure is best illustrated through experiential learning, game-based learning, and service learning which embody the scope of simulated activities. Learning through an interactive virtual model presents students with real-life scenarios where the expansion of knowledge becomes safe-guarded practices for learning (Meyer, 2014; & van Esch et al., 2020). For example, an activity that introduces geometric shapes could be designed via an interactive three-dimensional learning module. Here, students could manipulate abstract figures to understand the effect of volume, depth, and circumference as opposed to visualizing a one-dimensional
drawing composed of intersecting lines. The three-dimensional learning module would best represent the actual form of the geometric shape, as it appears in real-life. Another function of the interactive module could allow students to manipulate (i.e., rotate, expand, or condense) the dimensions of the figures to obtain hands-on experience which enhances learning. Here, students would be able to physically manipulate figures to gain an understanding of how the figure exists or functions in the real world.

**Student-Technology.** Lastly, the *student-technology interaction* has been the most innovative form of integration technology (Nilson & Goodson, 2017). To engage in this type of interaction, students must be able to access the learning tool or instrument (i.e., computer and access to the Internet or Learning Management System) and possess the required skills for navigation (i.e., using the keyboard and functions within the operating system) and software system (i.e., using browsers, emails, file, and document uploads or downloads) (Nilson & Goodson, 2017). Learners must be able to access and utilize components of technology for encouraging social interactions and learning to ensue. When access to online learning is not readily available, student persistence declines; therefore, students begin to lack the desire for engaging in learning (Khan et al., 2017).

Each form of interaction engages students through different instructional design methods for learning. Meyer (2014) suggested that the initial three interactions (student-instructor, student-content, and student-student) serve as the foundation for education used in distance learning. However, the latter two interactions (student-activity and student-technology) have been the most valuable contributions to online learning. With the emergence of distance learning imposed on many K-12 students at the onset of the
pandemic, educators, content designers, and instructors needed to increase social interaction for enhancing student engagement and advancing learning in a remote environment.

**Statement of the Problem**

The sudden change in instruction could influence student engagement, based on social interactions in different learning environments. Research conducted on distant learning has suggested that students who have completed distance learning by attending OLEs often earned lower course completion grades than students that attended in-person learning (Yates et al., 2014). This indication of students’ performance during online learning has been tested as the result of health and safety protocols enacted by federal mandates resulting from the COVID-19 pandemic (Birch & Lewis, 2020; & Lake et al., 2021). Because of the abrupt and disruptive transition to online learning practices, the accountability for evaluating learning practices once upheld in traditional, in-person instruction has been challenged (Lake et al., 2021). Before the pandemic, many school districts offered some form of a remote learning option (e.g., the use of a Chromebook during in-person learning and when completing assignments at home) to accommodate the new environment for using digital learning platforms in preparation for the 21st Century digital classroom (*ABC* County School District, 2021; & Seward & Nguyen, 2019). However, much of the instruction did not include objectives, goals, and outcomes that supported a fully online learning structure. Therefore, most instructors were left unprepared and thus unable to have implemented goals and outcomes for OLEs once schools were mandated to instantly transition from in-person to online learning (Lake et al., 2021; & Seward & Nguyen, 2019). The same notion could be implied with the
consideration of administering federal and state standardized tests within OLEs. Academic leaders and teachers have been unable to adhere to the requirements for monitoring administered assessments and student behavior during online learning. Therefore, other factors for evaluating academic performance (i.e., examination of course completion grades) became the alternative source for assessing academic achievement during distant learning (Lake et al., 2021).

As the effects caused by the pandemic persisted, many U.S. school districts were faced with establishing a K-12 student-based distance learning model that provided effective, continuous remote learning for the unforeseeable future (Malkus & American Enterprise Institute, 2020). Students must be provided with a positive learning experience. The composition of essential tools that promote positive student engagement and minimize barriers to learning must enhance the educational development that is needed for academic success (Dennie et al., 2018; Wang et al., 2014; & Yates et al., 2014). Student engagement is influenced by the accessibility to information, retention of knowledge, and achievement of learning outcomes (Alinsunurin, 2020; Czerkawski & Lyman, 2016; Khan et al., 2017; Wang et al., 2014; & Yates et al, 2014). Yates et al. (2014) have indicated the more students are engaged during remote learning, the more likely they are to achieve higher academic performance when evaluated on various assessments. Therefore, educators and instructors must continue to assess students’ academic performance and implement modes of instruction that encourage student engagement within OLEs.

In summary, because of the change in instruction resulting from the once-in-a-century pandemic, schools must be prepared for unexpected circumstances by providing
the necessary tools for students to maintain learning, remotely. Students’ need for being accustomed to methods of instruction and the learning outcomes that drive those interactions must be instilled for execution within any learning environment. The prime example of school districts needing to instantly transition from traditional, in-person classroom instruction to online instruction during the pandemic has shown that preparation must be made to support changes in learning at any given moment. Academic leaders and instructors must have strategies in place to monitor and evaluate students’ academic performance through student engagement within all learning environments. To monitor and evaluate student engagement, the effectiveness of the three prominent interactions (student-instructor, student-content, and student-student) during in-person learning and the integrated interactions (student-activity and student-technology) during technology-based learning were considered, within three modes of instruction. These interactions were reviewed as potential factors used to assess academic achievement, through the evaluation of course completion grades (Aydin & Erol, 2021; Dennie et al., 2018; Khan et al., 2017; Meyer, 2014; Moore, 1989; Nilson & Goodson, 2017; & van Esch et al., 2020). The tone for learning must be established by the instructor for developing cognitive and social presence among students. Meeting these standards for enhancing social interaction enabled students to develop a sense of belonging, which was imperative for sustaining learning persistence within an OLE (Scales et al., 2020). Once students developed and maintained a connection for learning, student engagement was perceived to have increased. This engagement then led to an increase in academic performance and achievement (Yates et al., 2014). This concept was directed to the
The purpose of the study which explored the influences of social interactions and student engagement, in different modes of instruction, resulting from the pandemic.

**Purpose of the Study**

This study explored how middle school students’ learning outcomes could be influenced by social interactions, which affected student engagement, based on three modes of instruction, across three timeframes. Similar to the need for recent studies that evaluated academic achievement, a focus on social interaction within distant learning environments increased resulting in changes to instruction, due to the effects of the pandemic (Birch & Lewis, 2020; Lake et al., 2021; Malkus & American Enterprise Institute, 2020; & Yates et al., 2014). Therefore, a comparison of three modes of instruction implemented at three different points in time served as the pivotal timeframes for reviewing the academic performance of middle school students. A group of middle school students was chosen as the population for the study based on the notion of social bonding being more prominent during this time in a student’s education life cycle (Gentle-Genitty, 2019, Scales et al., 2020; & Wang et al., 2014). To understand social bonding, the four constructs of the Social Control Theory and their connection to student engagement were further discussed in Chapter II: Literature Review.

The source of exploration for the purpose of the study involved comparing aspects of the three modes of instruction (*in-person*, *online*, and *hybrid*) across three timeframes (*Time Period 1*: before the pandemic; *Time Period 2*: at the onset of the pandemic; and *Time Period 3*: during the pandemic). The overall sample determined for this study was comprised of two subgroups (Group 1 and Group 2). These subgroups were defined in
the section **Groups 1 and 2 Defined**, within Chapter III: Methodology. Table 1 below illustrates the data sources and settings for the comparisons:

**Table 1**

*Data Source and Settings for the Comparisons*

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Time Period 1</th>
<th>Time Period 2</th>
<th>Time Period 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-person</td>
<td>Online</td>
<td><strong>Online</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Group 2**

| In-person | Online | **Hybrid** |

Each aspect of the exploration assessed the means of the calculated final GPAs of the two subgroups: Group 1 and Group 2. The description for Group 1 included all students that attended in-person instruction during Time Period 1 and online instruction during Time Periods 2 and 3. For Group 2, all students attended in-person instruction during Time Period 1, online instruction in Time Period 2, and hybrid instruction during Time Period 3. The comparison of the two groups was derived from the difference in instruction during the pandemic where Group 1 attended *online* instruction during the pandemic (Time Period 3) and Group 2 attended *hybrid* instruction also during the pandemic (Time Period 3). Both groups attended the same form of instruction during Time Period 1 (in-person) and Time Period 2 (online).

**Research Questions**

In this comparative analysis, the three modes of instruction (in-person, online, and hybrid) were explored over the three corresponding timeframes (Time Period 1, Time Period 2, and Time Period 3). The independent variable was the *mode of instruction*, which was studied across the three related periods (Time Periods 1, 2, and 3). The
dependent variable was each student’s calculated final GPAs. The research questions and hypotheses were designed to explore comparisons between and within the final mean GPAs. The datasets that were used for comparison included the following two groups of students: Group 1 – with in-person instruction in Time Period 1 and online instruction in Time Period 2 and Time Period 3, and Group 2 – with in-person instruction in Time Period 1, online instruction in Time Period 2, and hybrid instruction in Time Period 3 (refer to Table 1 – Data Source and Settings for the Comparisons for an illustration of the group alignments).

This study determined if there were any significant mean differences in students’ final GPAs, based on social interaction learning theories, during in-person, online, and/or hybrid instruction in Time Period 1, Time Period 2, and Time Period 3. The interactions served as a potential factor of student engagement with the instructor, content, other students, activities, and use of technology while learning. The analyses of the social interactions were studied through the following research questions that explored comparisons of the students’ final mean GPAs across the three different timeframes. Within each section of the research question, the relationship between the variables (e.g., Groups, Time Periods, and Mode of Instruction) that were used for each analysis was illustrated.

**RQ1**: Are there any differences in the means of the students’ final GPAs when measured during in-person instruction (before the pandemic in Time Period 1) and during online instruction (at the onset of the pandemic in Time Period 2)?
**RQ2:** Are there any differences in the final mean GPAs of Group 2 students when measured during *in-person instruction* (before the pandemic in Time Period 1), during *online instruction* (at the onset of the pandemic in Time Period 2), and during *hybrid instruction* (during the pandemic in Time Period 3)?

**RQ3:** Are there any differences in the means of the students’ final GPAs between Group 1 (*online instruction*) and Group 2 (*hybrid instruction*) when measured during the pandemic in Time Period 3?

**Significance of the Study**

As a result of the transition to online learning, state leaders sought permission from the U.S. Department of Education to waive annual federal and state standardized testing and accountability requirements (e.g., capturing attendance) for school years ending in 2020 and 2021 (Birch & Lewis, 2020; Jimenez & Center for American Progress, 2020; & Lake et al., 2021). These pre-established requirements have been essential for identifying and addressing gaps in education among evaluated students. Because of the omittance of these important variables for evaluation (e.g., standardized assessments) resulting from changes in instruction due to the pandemic, multiple concerned parties (e.g., policymakers, academic leaders, and parents) required another indicator for understanding how students performed, academically (Malkus & American Enterprise Institute, 2020; & Zhou et al., 2021). The information collected needed to capture aspects of students’ well-being (e.g., socio-emotional needs and engagement associated with the conditions sustainable for learning), then be analyzed to meet performative measurement standards for school districts and students, individually
In this study, another approach for assessing students’ academic performance was through the comparison of course completion grades. To manipulate the data for assessing student engagement, the course completion grades were manually calculated to determine the students’ GPAs. The final letter grades that were awarded from the course completion grades (e.g., A, B, C, D, and F) were converted to numerical values (e.g., 4, 3, 2, 1, and 0, correspondingly), then computed as average scores before being entered into the SPSS quantitative data software system. The Paired t-test, One-Way Repeated Measures ANOVA, and Independent t-test analyses were used to determine if there was any significance between the mean final GPAs. The analyses occurred among each of the three modes of instruction (e.g., in-person, online, and hybrid), across each timeframe (e.g., Time Periods 1, 2, and 3). Each mode of instruction was used for comparison based on the degree of social interactions (e.g., determined by student participation) during learning.

Definition of Key Terms

The definition of key terms, as applied in the study, which may not be of general knowledge included the following:

**English Learners (EL):** K-12 students that have been tested and classified as being non-proficient/limited proficient in speaking, reading, or writing English (*ABC CSD*, 2021).
**Free/Reduced Lunch (FRL):** K-12 students whose families’ (a) income is at or below the national poverty level and/or (b) are eligible to receive free or reduced-price lunch by attending a Title I funded school (*ABC CSD Data, 2021*).

**Gender:** the identification of male and female has been indicated by each student/parent guardian; for the data collected in this study, each student identified with the gender assigned at birth (*ABC CSD, 2021*).

**Hybrid instruction:** a combination of in-person and online learning – each school determines the number of days for in-person learning and online learning each week; online instruction resembles in-person instruction where students meet face-to-face with the teacher and peers via Zoom or Microsoft Teams; minimum of 5.5 hours of instruction per day, 5 days per week, for 180 days per school year; learning consists of synchronous instruction and asynchronous independent work (*McAndrew, 2020*).

**In-person instruction:** face-to-face classroom instruction; minimum of 5.5 hours of instruction per day, 5 days per week, for 180 days per school year (*McAndrew, 2020*).

**Individualized Education Plan (IEP):** K-12 students that have been identified as possessing one of the following federally classified disability types: *Specific Learning Disability, Speech/Language Impairment*, and *Health Impairments*; and students that meet the *twice-exceptional status* (i.e., academically gifted) that possess at least one of the federally classified disability types to participate in a designated program that offers academic support for maximizing learning potential (*McAndrew, 2020*).
**Online instruction**: learning that takes place remotely, beyond the classroom, via the use of technology forums; synchronous instruction and asynchronous independent work; minimum of 5.5 hours of instruction each week, 5 days per week, for 180 days per school year (McAndrew, 2020).

**Probability Sampling**: a method used to select members of a population for the overall sample; each member of the population has an equal chance of being chosen for the overall sample; valid method primarily used in quantitative research as the results most often represent the general population (McCombes, 2021).

**Random Assignment Versus Random Selection**: *random assignment* is a method for sorting the overall sample into control or experimental groups; improves the internal validity of the study – a reasonable causal link is drawn between the treatment/condition and the experiment conducted. *Random selection* is a method for sparingly choosing members of a population where each participant has an equal chance of being chosen; enhances the external validity/generalizability of results – the degree to which the results of a study could be associated, overall, with other people, settings, situations, or measures (Scribbr, 2021).

**Semester (T2, T4)**: *T2* is classified as the timeframe from the start of the school year through the end of the Fall semester; *T4* is classified as the timeframe from the first day of the new year through the end of the Spring semester (McAndrew, 2020).
Chapter Summary

In Chapter I: Introduction, the concept of how social interactions could have potentially influenced student engagement within different learning environments was presented. The consideration of student engagement in education became more prevalent because of the changes to instruction due to the COVID-19 pandemic. Because of federal mandates resulting from health and safety protocols, the closure of nonessential businesses required school districts across the U.S. to immediately transition from traditional, in-person learning to online learning (Asio & Bayucca, 2020; Birch & Lewis, 2020; Davis et al., 2021; & Jimenez & Center for American Progress, 2020). As a temporary condition for accommodating the newly enforced instructional model, federal and state standardized testing was not administered to students at the onset of the pandemic. Because the standardized assessment of academic performance was postponed for an indefinite time, another suggestive measure for educators and instructors to evaluate academic achievement became essential (Birch & Lewis, 2020; Jimenez & Center for American Progress, 2020; & Lake et al., 2021).

To evaluate academic achievement, student engagement served as a factor for assessing academic performance (Yates et al., 2014). The study of student behavior, as related to academic performance, not only included a review of social interactions found within in-person classroom learning, but social interactions within OLEs were also considered. Assessing course completion grades, through the manual calculation of GPAs, became a prominent gauge for evaluating student engagement and its influence on academic achievement (El Refae et al., 2021; & Yates et al., 2014). Therefore, a review of the five types of interaction (student-instructor, student-content, student-student,
student-activity, and student-technology) used to assess student engagement were discussed as factors for comparing social interactions among the three instructional modes of learning (in-person, online, and hybrid instruction) (Aydin & Erol, 2021; Dennie et al., 2018; Khan et al., 2017; Meyer, 2014; Moore, 1989; Nilson & Goodson, 2017; & van Esch et al., 2020). The next chapter reviewed social interaction and student engagement during distance learning, discussed emergent research regarding student engagement in online learning environments, described the instructors’ role in preparing and delivering learning content, and identified gaps in research regarding each of these measures for improving academic achievement.
CHAPTER II: LITERATURE REVIEW

Reviewed through the lenses of the Sociocultural Theory, Social Constructivism Theory, and Social Control Theory, which are based on social interactions, this chapter explored learning theories that connected the need for enhancing student engagement to improve overall academic achievement. However, before social interaction theories that have been found to promote learning were reviewed, the background of distance learning and student engagement, before, at the onset of, and throughout the pandemic, was discussed. This chapter commenced with a discussion regarding the role of social interaction and student engagement during distance learning. Then, how instructors prepared for and delivered content during learning was reviewed. Lastly, the gaps in research that were related to attaining academic achievement were addressed. In Figure 2 below, the organization for Chapter II: Literature Review is illustrated:

Figure 2:

Storyboard for Chapter II: Literature Review
As depicted in the storyboard, this chapter opened with a discussion regarding the roles of social interaction and student engagement and how each has potentially influenced traditional, in-person learning environments (Cherry, 2019; Gentle-Genitty, 2019; Khan et al., 2017; Li et al., 2020; Wang et al., 2014; & Yates et al., 2014). An introduction of the origins of distance learning within education and the modifications encountered that resulted from the changes in instruction were reviewed. The section then led to a discussion of how student engagement was assessed within each mode of instruction (in-person, online, and hybrid) before, at the onset of, and during the pandemic. Next, an overview of the theoretical framework associated with social interactions was presented. The theoretical framework that aligned with the learning theories (e.g., based on the construction of learning and behavior students exhibit during learning) and instructional design models (e.g., used for designing content and delivering instruction) was discussed. These concepts were used to describe the practices that influenced student engagement and assessed academic performance based on state and school district standards. A review of the research included a description of the factors, associated with this study, which was used as comparative analyses of student engagement. Then, a discussion regarding the key strategies for academic achievement led to the types of improvements for students’ access to learning connected to the purpose of the study: exploring how the students’ learning outcomes could be influenced by the student engagement, based on social interactions within each mode of instruction. Lastly, the Chapter Summary recapped the important aspects of the theoretical framework that coalesced student learning with how student engagement potentially influenced academic performance.
Social Interaction and Student Engagement During Learning

Yates et al. (2014) concluded that students enrolled in distance learning courses were inclined to have lower course completion grades and overall grade point averages (GPAs) than students enrolled in traditional, in-person classes. This observation, based on results from previous studies, implied students’ lower course completion grades and GPAs achieved were largely due to the lack of opportunities for students to interact with their instructor, the course content, other students, the completion of activities, and access to technology (Edwards & Rule, 2013; Furrer & Skinner, 2003; & Kamble et al., 2021). For example, as cited in Edwards & Rule (2013), a study by DiPietro, Ferdig, Black, & Preston (2010) presented factors that impacted a group of middle school students’ attitudes toward successfully engaging experiences within OLEs. The feedback from the interviews conducted was reported through the observations of 16 K-12 teachers. The feedback from the interviews implied that students felt lack of communication was the main theme that contributed to disengagement. Factors such as teachers being available to aid students for the duration of the online learning session, teachers building workable relationships with students, and teachers creating opportunities for students to develop peer to peer relationships were all indicated as essential components for establishing a positive OLE (Edwards & Rule, 2013). These interactions experienced among students were factors that have been attributed to how the evaluation of student engagement has potentially influenced academic success. To determine how social interactions have affected academic performance, the relationships that were used to assess student engagement within OLEs were explored.
During online learning, students’ participation has been evaluated by their level of engagement based on social interaction (Yates et al., 2014). How students connected with the learning was shown to have been influenced by relationships formed with their instructor, other students, the content, activities, and technology. When the interactions were not motivating, barriers to learning often occurred. Therefore, students needed to establish critical connections, through the evaluation of each factor, for social interactions and learning to drive student engagement. These factors potentially increased academic achievement (Yates et al., 2014).

When social interactions were assessed, if the instructor did not encourage active participation and/or provide immediate feedback to students during class instruction, students inevitably began to surmise that their involvement in education was not necessary for achieving academic success (Edwards & Rule, 2013; & Yates et al., 2014). If the course content did not align with the learning goals, objectives, and outcomes set by educators, students may not have perceived the learning forum as a viable option for increasing their knowledge. To attain an understanding of the course content, the course design must have been palpable for students to comprehend the new information and applicable for connecting the acquired knowledge to real-world situations (Khan et al., 2017). Comprehension of the content and implementation of the learning outcomes; therefore, enabled students to achieve academic success. If students did not form cohesive relationships with fellow students, the reinforcement for learning through networking would not have prompted the building of a community of learning (i.e., a forum comprised of instructors and students that actively interact by supporting one another and sharing common interests and goals for learning) (Khan et al., 2017).
In technology-based instruction, if students were not encouraged to complete assigned activities that supplemented instruction and reinforced learning, knowledge would not have ensued. When acquired information was not retained, the knowledge, skills, and abilities (KSAs) that were necessary for continued learning were not developed; thereby, becoming a possible factor in students’ underperformance on standardized assessments. These KSAs were essential for assessing academic performance (Cohen & Jackson-Haub, 2019; & Khan et al., 2017). And lastly, if students were unable to readily access technology (e.g., Internet, Learning Management System, software, or tools used for retrieving or submitting information) that was required for education, their level of engagement during learning diminished. When students were unable to physically connect with learning via online technological platforms (i.e., Learning Management Systems), a possible lack of confidence developed that conceivably hindered further aspirations for engaging within the OLE (Edwards & Rule, 2013; & Khan et al., 2017).

An important note for consideration was that each form of interaction must have been successfully executed for students to have acquired information and retained knowledge within OLEs. To have achieved successful execution, students must have met the performance standards specified in the goals and objectives designed for learning and accomplished in the learning outcomes (Edwards & Rule, 2013; & Yates et al., 2014). These essential factors for establishing collaboration within OLEs were necessary for promoting student engagement (Cohen & Jackson-Haub, 2019; Czerkawski & Lyman, 2016; & Marek et al., 2021). When the needs required for social interaction were not met, learning was negatively impacted. Studies have suggested that when students began to
experience sentiments of abandonment during instruction, students were less engaged with the learning or less connected to the learning environment (Bond, 2020; Czerkawski & Lyman, 2021; Mansouri et al., 2021; Wang et al., 2014; & Yates et al., 2014). This pattern of behavior during online instruction became more prominent during the pandemic.

As a result of the sentiments of abandonment, students’ desire to participate in learning activities, during real-time structured classroom learning (i.e., synchronous instruction) or when attempting to complete assignments outside of structured classroom learning (i.e., asynchronous instruction), deteriorated (Cohen & Jackson-Haub, 2019; Flannery et al., 2019; Furrer & Skinner, 2003; & Yates et al., 2014). When students encountered these barriers to learning, feelings of isolation that derived from a minimized sense of belonging were then attributed to a reduction in the evaluation of students’ self-esteem and self-resiliency. Yet, all hope for improving student behavior within distance learning has not been lost. Some factors could have been applied to learning that increased student engagement. But before overcoming those challenges was addressed in this study, a brief review of distance learning environments and the connection to educational practices before the pandemic was discussed in the next section.

**Distance Learning Before 2019 Pandemic**

Though the literature has indicated the practice of distance learning could be traced back to the early 1700s, research efforts have indicated that the focus on distance learning began with the establishment of cyber charter schools at the start of the 21st century (Aydin & Erol, 2021). The cyber charter schools (i.e., virtual schools) were created because parents were dissatisfied with a “less rigorous” course curriculum found...
in traditional public schools. However, since its inception, positive feedback regarding the use of distance learning has been received by educators (Harris-Packer & Segol, 2015; & Park & Shea, 2020). The K-12 student enrollment in virtual schools rose from fifty thousand students, in 2000, to one million, in 2008, with more than one million students who received online instruction (Harris-Packer & Segol, 2015). Since that timeframe, research models have predicted that enrollment for online learning would only continue to increase.

During the early 2000s, parents and K-12 educational leaders have cited that the learning environment found in virtual schools “increased student motivation” and “expanded educational access and choice” (Harris-Packer & Segol, 2015; Hobson & Puruhito, 2018; Park & Shea, 2020; & Wang et al., 2014). With the more successful transformation of cyber charter schools being recommended to parents seeking a more rigorous curriculum for their students, traditional public schools began offering online courses to complement in-person instruction. For example, some schools introduced aspects of technology to students by providing onsite computer labs and designing courses that supported technological use and learning (Harris-Packer & Segol, 2015; & Park & Shea, 2020). Because some schools offered distance learning as a means of reinforcing positive learning, other academic leaders wanted to utilize this premise by offering online courses as a stipulation for underperforming students. The idea was to allow these students to receive class credit recovery or remediation for low standardized test scores. Therefore, in 2001, President George W. Bush established a mandate that was intended to close the academic achievement gap while formalizing accountability
standards for success (Dennie et al., 2018; Edwards & Rule, 2013; & Harris-Packer & Segol, 2015).

Through the enactment of the No Child Left Behind (NCLB) Act of 2001, academic achievement became the central aim of many studies, policy changes, and political debates (Dennie et al., 2018; Edwards & Rule, 2013; & Harris-Packer & Segol, 2015). With a focus on the following four major components that measured academic achievement, (a) increased accountability, (b) increased flexibility, (c) increased choice, and (d) increased focus on reading, the reauthorization of the NCLB Act (by President George W. Bush in 2002) established a prioritization of closing the academic achievement gap (Dennie et al., 2018; Edwards & Rule, 2013; & Harris-Packer & Segol, 2015). With the enactment of the NCLB Act, each state’s Department of Education was required to establish and implement statewide systems of responsibility that focused on rigorous math, reading, and science standards for achieving academic success. This obligation for achieving such high regard for academic success was purposely placed on school districts by attaching federal funding to student performance. The standards were based on the students’ (Grades 3 through 8) standardized assessment results (Dennie et al., 2018; & Harris-Packer & Segol, 2015).

As a result of the NCLB Act, a national instrument was developed to equally measure students’ assessment scores and determine the degree of academic success. The national Adequate Yearly Progress (AYP) report evaluated student achievement on the standardized assessment as an instrument for measuring success. These tests were generated and administered by each state’s Department of Education; therefore, there was some noted concern regarding the reliability of each test since there was no consistency
with the creation of each test (Harris-Packer & Segol, 2015). For schools to receive federal funding, a goal of 100% target proficiency in mathematics and reading was set. Schools that did not meet the standard faced improvement and corrective action measures that included: (a) restructure; (b) parents having the option to transfer their children to another well-performing public, private, or charter school; or (c) remedial support costing up to four thousand dollars, per student. All associated costs were incurred by the failing school (Dennie et al., 2018; & Harris-Packer & Segol, 2015).

These examples illustrated how the design of online courses has been used to gauge academic success within OLEs, before the inception of federal mandates, to minimize the achievement gap. However, historically, distance learning models were developed to aid students that were not able to physically attend in-person class instruction. The accredited accommodations were mainly due to students that were: (a) mentally and/or physically disabled, (b) hospitalized, (c) devoted to multiple social commitments, (d) incarcerated, and/or (e) located in rural areas that did not have access to specialized courses (Dennie et al., 2019; Edwards & Rule, 2013; & Harris-Pack & Segol, 2015). With the onset of the COVID-19 pandemic, schools were challenged with providing those same accommodations for all students attending traditional, in-person instruction (Cole et al., 2021; Kamble et al., 2021; Marek et al., 2021; Scales et al., 2020; & Seward & Nguyen, 2019).

Distance Learning at the Onset of the 2019 Pandemic

Distance learning has afforded instructors the ability to offer education and students to receive education independent of their physical location (Aydin & Erol, 2021; & Park & Shea, 2020). Instructors have been empowered to design and facilitate
instruction by using digital tools (e.g., computers, tablets, Chromebooks, smartphones, etc.) and learning platforms (e.g., Learning Management System, school website, etc.) from their home or any other remote location that offered access to technology (Seward & Nguyen, 2019). Students were given access to the learning materials to acquire information needed for completing assignments or taking tests, remotely (e.g., at their home, at the residence of a relative or childcare giver, etc.). Offering continuing education while adhering to federal mandates for business closures was enforced by school districts during the onset of the pandemic. The best means for continuing education during this time was provided via distance learning (Asio & Bayucca, 2021; Aydin & Erol, 2021; & Birch & Lewis, 2020).

School districts relied on distance learning options, at the onset of the pandemic, based on the positive feedback received from the results of students’ academic performance within OLEs (Aydin & Erol, 2021; & Kamble et al., 2021). In previous studies, it had been noted that distance learning environments provided students with the flexibility for accessing online courses, via synchronous or asynchronous instruction. With the asynchronous instruction, students were able to complete coursework or studying practices based upon their preference and availability (e.g., a time when parents were able to assist with login, availability for a student to access digital tools or connect to the internet, etc.) (Aydin & Erol, 2021; Data Quality Campaign, 2020; & Kamble et al., 2021). Students were positioned to develop skills necessary for: (a) adapting to changing environments, (b) establishing lifelong independent learning, (c) improving responsibility and accountability, and (d) entrepreneurial and decision-making. All these skills were essential for sustaining learning practices and the preparation for adulthood in
the real world (Aydin & Erol, 2021; Jacobs & Ivone, 2020; & Kamble et al., 2021).

However, not all students possessed the necessary skills and preparedness to successfully perform within distance learning environments.

One note of contention was the difference in KSAs of students that were accustomed to distance learning versus those that were largely unfamiliar with this method of learning. For example, students deemed as successful learners within OLEs were classified as gifted learners. Harris-Packer & Segol (2015) defined gifted learners as highly academic achieving students that were independent thinkers, possessed high intrinsic motivation and time management skills, and exhibited high skill levels in reading and use of technology. These learners have been instilled with the KSAs needed for engaging within OLEs. For example, gifted learners have benefited from the individualized pace designated for learning which granted more time for reflecting on the learning content. This practice of autonomy and self-regulation has presented gifted learners with more control over their learning process; thereby, contributing to the achievement of their academic success (Harris-Packer & Segol, 2015; & McAndrew, 2020). However, many students do not possess these intrinsic KSAs that have been beneficial for navigating OLEs.

When students lacked the necessary KSAs for online learning, motivation for engaging in learning was diminished until students became acclimated to the new learning environment (Cohen & Jackson-Haub, 2019; & Harris-Packer & Segol, 2015). A study conducted by Harris-Packer & Segol (2015) concluded that when students developed the necessary KSAs for online learning over time, their motivation for engaging in OLEs increased. As students’ sense of belonging and being a part of a
community of learners increased, their desire to successfully practice accessing and navigating technology during remote learning led to an increase in overall academic performance (Cohen & Jackson-Haub, 2019; & Scales et al., 2020). Another study of nine middle and high schools described by Scales et al. (2020) indicated how students that possessed high levels of the sense of belonging (e.g., through characteristics of expressed care with teachers, challenged growth from content, shared power with activities during learning, etc.) exhibited greater academic performance and achieved higher academic success. The results showed that students were 130% to 222% more likely to express a sense of belonging to the school’s climate, and 53% to 61% more likely to feel academically empowered to achieve learning goals than students that did not demonstrate these characteristics. A third study by Thijs and Fleischmann (2015) also indicated that middle school students who expressed having high levels of closeness with their teachers reported increased levels of mastering academic goal orientation than their peers that did not state such a relationship. The increased level of connectedness from the student-instructor interaction was shown to promote higher levels of academic achievement (Thijs & Fleischmann, 2015). So, problem solved; educators should simply equip all students with the essential KSAs for learning within OLEs, correct? Though these findings seemed to be plausible for increasing academic achievement, researchers cautioned educators to not make generalizations about populations of highly academic achieving students. Because of the characteristic differences between gifted learners and the remaining student population that started distance learning at the onset of the pandemic, more research must be conducted to determine how external factors possibly influenced student learning (Harris-Packer & Segol, 2015; & McAndrew, 2020). An
exploration of the characteristics and differences among varying student populations may be impacted by the effects of the pandemic in conjunction with the typical concerns regarding in-person versus online instruction.

**Distance Learning During the 2019 Pandemic**

Current research indicated that middle school students and instructors have been challenged with receiving and delivering effective learning during the pandemic (Cole et al., 2021; Data Quality Campaign, 2020; Davis et al., 2021; Kuhfield et al., 2020; Marek et al., 2021; & Stelitano et al., 2020). With the varying individual state and school district mandates across the country, students and instructors have been unable to adapt methods for instruction to the ever-changing demands of school openings and closures. As a result, instruction has been affected as the shifts between in-person, online, and hybrid learning occurred without much notice (Cole et al., 2021; Data Quality Campaign, 2020; Davis et al., 2021; Kuhfield et al., 2020; Marek et al., 2021; & Stelitano et al., 2020). With the urgent nature of school closures and openings having occurred frequently, instructors were left scrambling with determining the most effective way to deliver learning. Because the effects of the COVID-19 pandemic still reside as school districts’ primary concern, educators must obtain useful data that provide insight into how students and their learning behaviors have been impacted (Cole et al., 2021; Davis et al., 2021; Kuhfield et al., 2020; Marek et al., 2021; & Stelitano et al., 2020).

There have been no specific details indicating how the cancellation of classes, changes in learning environments, and interaction among middle school students, their peers, and/or instructors have been measured and evaluated. The closest middle school learning environment that resembled the current learning atmosphere, where learning was
ceased or interrupted, could be best compared to the two- to three-month summer break (i.e., seasonal learning) (Kuhfield et al., 2020). The data obtained from seasonal learning studies allowed researchers and educators to conduct comparative analyses on the same groups of students across different times of the school year. Any differences noted when school was in versus out of session provided information regarding the degree of learning that was lost or remained unchanged across specific subjects. For example, the following graphs in Figure 3 and Figure 4 illustrate patterns of typical growth or loss, over the summer break, for students in Grades 3-8:

**Figure 3**

**Model for Summer 2020 Mathematics Projections**
Figure 4

Model for Summer 2020 Reading Projections

In each figure, the solid, arched lines indicated the projections for the typical school year, for Math and Reading (the prominent subjects that showed the most significant changes in RIT Scores). The dotted lines (i.e., COVID Slide and COVID Slowdown) indicated the projections for the interrupted learning schedule resulting from the pandemic, across Grades 3-8. The data used for the evaluations were the RIT Scores (Rasch Unit scale, created by Danish mathematician Georg Rasch) to measure students’ level of achievement based on the degree a student answered the assessment questions correctly, 50% of the time. The COVID Slide dotted lines indicated the equivalence to which students displayed patterns of academic declines that were comparable to a typical summer break. These evaluations were examined throughout an extended school closure, within a school year, due to the pandemic. The COVID Slowdown dotted lines indicated how students maintained a similar degree of academic achievement as when schools were
completely closed. This timeframe for evaluation began with schools completely closed on March 15, 2020, then resumed learning at the start of Fall 2020 (Kuhfield et al., 2020).

Within each scenario in the typical school year, student learning gradually increased over time, until the typical last day of school (illustrated as the second vertical dotted line). Then, the learning retention levels began to decrease over the summer break when the school was out of session. Next, the same projections were made for a scenario when the school closed and/or instruction was suspended because of the pandemic. Once schools closed, learning retention significantly declined. The decline was more significant during Grades 3 through 5 (elementary school) versus Grades 6 through 8 (middle school). More research was suggested to determine what could be the causes for the difference in the decline of learning retention between elementary and middle school students when schools temporarily closed (Kuhfield et al., 2020).

Because of the necessity for offering remote learning to students, distance learning became the only viable option for continuing education at the onset of the pandemic (Cole et al., 2021; Data Quality Campaign, 2020; Davis et al., 2021; Kuhfield et al., 2020; Marek et al., 2021; & Stelitano et al., 2020). With the federal mandates instantly implemented to reduce the risk of students, faculty, and staff contracting and spreading the potentially deadly coronavirus, educators were challenged with establishing minimal interruption for instruction while keeping students and instructors safe. The primary challenges, imposed by the instant conversion from in-person to online instruction, consisted of students being unprepared for remote learning. Many students were not taught how to utilize digital tools for learning; therefore, students were unable to develop and utilize the necessary skills that supported the self-regulated learning
environment found within OLEs (Aydin & Erol, 2021; Cole et al., 2021; Data Quality Campaign, 2020; Davis et al., 2021; Kuhfield et al., 2020; Marek et al., 2021; & Stelitano et al., 2020). In other instances, students did not possess the tools (e.g., computers, Chromebooks, access to the Internet, etc.) required for learning (Data Quality Campaign, 2020; & Kamble et al., 2021).

Studies have implied that students must take on partial responsibility for controlling their own learning experiences. However, responsibility has also fallen upon policymakers, academic leaders, and instructors to create learning environments that benefit all students. Students must have the necessary tools and access to achieve successful learning within an OLE (Aydin & Erol, 2021). For educators to determine the benefits of such access, understanding how students engage during learning was required.

**Evaluating Student Engagement During Learning**

Previous literature regarding K-12 distance learning environments suggested there was a need for further research that focused on the needs and experiences of students within OLEs (Furrer & Skinner, 2003; Harvey et al., 2014; Malkus & American Enterprise Institute, 2020; Sofianidis et al., 2021; & Tinubu Ali & Herrera, 2020). A study by Harvey et al., (2014) indicated that because online learning was relatively new and continued to evolve in the K-12 academic realm, research that focused on students’ satisfaction should be reviewed based on their social interactions during learning. This focus on student satisfaction and social interaction was deemed as important due to the perceived correlation with improving academic achievement.

Current research continued to predominately focus on the experiences of college students. Suggestions for future research aligned with K-12 studies on student
satisfaction, the characteristics of successful learners, and the successful learning outcomes that supported online learning (Costley & Lange, 2016; Edwards & Rule, 2013; Flannery et al., 2019; Marek et al., 2021; Park & Shea, 2020; & Sofianidis et al., 2021). Another aspect to be reviewed included the connection that student engagement had with the social interactions that middle school students demonstrated in different modes of instruction, within varying learning environments. These multifaceted criteria for assessing learning have been indicated as the foundation for evaluating student engagement. Bond et al., (2020, p. 3) have defined student engagement as:

“The energy and effort that students employ within their learning community, observable via any number of behavioral, cognitive, or affective indicators across a continuum. It is shaped by a range of structural and internal influences, including the complex interplay of relationships, learning activities, and the learning environment. The more students are engaged and empowered within their learning community, the more likely they are to channel that energy back into their learning, leading to a range of short and long term outcomes, that can likewise further fuel engagement.”

Exploring how students engaged during learning was essential for evaluating the effectiveness of distance education in this study (Flannery et al., 2021; Mansouri et al., 2021; Marek et al., 2021; & Merisotis & Phipps, 1999). Therefore, to determine the effects of student engagement within OLEs, an understanding of how student engagement was assessed within traditional learning environments must first be explained.

In traditional classroom learning forums, the assessment of student engagement has been based on two factors: ongoing engagement (i.e., how students thought, behaved,
and felt while learning) and reaction to challenge (i.e., how students coped when challenges arose during learning) (Yates et al., 2014). Capturing data associated with these types of engagement was imperative when determining the level of student persistence and retention associated with learning. The analyses of the data assisted educators with understanding the sentiments that contributed to students’ desire to continue education. Students were more likely to engage in learning when they felt as though they belonged, were valued, and accepted within their community of learning (Sofianidis et al., 2021; & Yates et al., 2014). Understanding these evaluations of students’ well-being was just as critical during distance learning.

Obtaining information regarding student engagement within OLEs was essential for evaluation purposes due to students’ physical isolation, apart from in-person instruction. Instructors’ ability for tracking details of how students interacted with one another and engaged in the content during online learning is not as apparent as when observing students face-to-face. Therefore, other techniques for analyzing student engagement must be implemented during remote learning (Costley & Lange, 2016; & Yates et al., 2014).

Another method used for analyzing student engagement during online instruction included data collected on students’ use of digital tools: learning analytics (Hui et al., 2018; & Mansouri et al, 2021). Learning analytics compiled data usage based on digital footprints that were associated with students’ performance within OLEs. The data gathered from the use of digital tools provided insight into (a) when students accessed the system and (b) the time students spent on various portals. For example, instructors could have provided credit for attendance by confirming if students accessed online learning,
on time, when completing assigned tasks (Aydin & Erol, 2021; & Hui et al., 2018;). If students did not access the online learning system at the designated time, this may have served as an indicator of factors impeding students’ access to the information.

When reviewing research regarding the time students spent on portals, instructors formed assumptions about the students’ connection to the content (Aydin & Erol, 2021; & Hui et al., 2018). For example, students may have spent more time on a specific topic due to interests in the subject matter or there could have been a need for additional processing of the information. The instructor could then follow up to determine if the student had any questions regarding the topic. Or, if there was a trend where many students spent more time on a specific portal, the instructor could have created discussion boards centered around the topic. As instructors created more opportunities for collaboration, student engagement could be encouraged through an increase in social interaction (Bond, 2020; & Scales et al., 2020). Students would have then learned from one another through the guidance of the instructor’s knowledge. These types of information gathered from learning analytics have been useful in providing details regarding students’ learning activities that predicted academic performance within OLEs (Bond, 2020; Hui et al., 2018; Mansouri et al., 2021; & Scales et al., 2020).

Emerging Research Regarding Student Engagement in OLEs

The effects of the COVID-19 pandemic revealed concerns regarding the unpreparedness academic leaders experienced when attempting to support student engagement within OLEs (Birch & Lewis, 2020; Jimenez & Center for American Progress, 2020; Marek, et al., 2021; Sofianidis et al., 2021; & Stelitano et al., 2020). To gauge how students acted and reacted while learning, collecting data that described
multiple aspects for understanding students’ well-being was necessary. The aspects of well-being that assist students with education include socio-emotional needs, engagement, and conditions that are sustainable for learning (e.g., access to online learning) (Dennie et al., 2018; Flannery et al., 2019; Hobson & Puruhito, 2018; Kamble et al., 2021; & Wang et al, 2014). The typical measure for evaluating student engagement includes administering standardized assessments. Educators examine the results of the assessment to determine if the learning goals and objectives are met based on standardized criteria (i.e., learning outcomes) (Birch & Lewis, 2020; Cohen & Jackson-Haub, 2019; Jimenez & Center for American Progress, 2020; & Khan et al., 2017). Yet, when federal and state mandates called for the temporary cancellation of standardized testing, the primary indicators for assessing how well students learned were no longer available. Without a formal evaluation of academic performance, academic leaders were unable to successfully assess students’ well-being or support initiatives that enforced educational goals and learning outcomes (Birch & Lewis, 2020; Cohen & Jackson-Haub, 2019; & Jimenez & Center for American Progress, 2020). Instituting modifications to the process for collecting critical data on student behavior has provided insight into how the disruption to instruction, due to the pandemic, can influence academic achievement.

Jimenez & Center for American Progress (2020) have suggested for federal and state departments of education to not simply waive standardized testing and accountability requirements, but to establish adaptative protocols to the nation’s new norm prompted by changes to instruction resulting from the pandemic. Options for how school districts administered tests and created new processes for accountability that supported the loss of educational evaluations should be researched and initiated for
implementation (Jimenez & Center for American Progress, 2020). By not establishing a secondary process for administering standardized assessments, a gap existed within the practices for assessing academic performance. The process should be equivalent for all students, during and post-pandemic. Until federal and state Departments of Education develop, modify, and resume standardized testing, data should be collected from other sources to assess academic performance (Birch & Lewis, 2020; Cohen & Jackson-Haub, 2019; Jimenez & Center for American Progress, 2022; & Khan et al., 2017). The model for collecting such data could be established by reviewing adjustments that have been made to instruction based on learning cognitive theories. The role that cognitive learning theories have played in assessing student engagement and enhancing instruction was discussed in the Theoretical Framework section, reviewed later in this chapter.

Instructor Preparation and Delivery

Identifying the needs of learners while introducing appropriate interventions should be facilitated through instructional design frameworks that support distance learning. One framework that encourages active participation and learning engagement is the flipped classroom (Costley & Lange, 2016; Hui et al., 2018; & Kamble et al., 2021). Using this instructional strategy requires instructors to prepare course content and develop activities that students access and assess before class. Here, instructors encourage active participation during in-class sessions by providing content before class so that students can read and explore learning materials. To permit engagement through collaboration, instructors should provide discussion forums before, during, and following in-class instruction that allows students to ask questions and seek resolutions to problems. This approach to learning enables students to gather information, analyze concepts, and
then form assumptions while passively listening to instruction that reinforces learning during in-class sessions (Hui et al., 2018; & Kamble et al., 2021). The designation of synchronous or asynchronous sessions must be pre-determined and effectively conveyed to students (Costley & Lange, 2016; Hui et al., 2018; & Kamble et al., 2021).

Quizzes should also be administered to students (before class) so that instructors can assess students’ current knowledge and focus on areas of content (during class sessions) where underperformance can be ascertained. Instructors can empower students to develop higher-order skills (e.g., problem-solving, critical thinking, analysis, synthesis, and evaluation) that prompt internalization of the knowledge versus passive learning via listening and memorizing. Students can become more engaged with learning through collaborated efforts that are based on cognitive, emotional, and social domains (Dennie et al., 2018; Flannery et al., 2019; Hobson & Puruhito, 2018; Hiu et al., 2018; Kamble et al., 2021; & Wang et al, 2014). The cognitive domain that is developed when knowledge is constructed, serves as an indication of students taking ownership of learning through self-regulation. The emotional domain is demonstrated when students feel confident to ask questions or seek confirmation within their community of learning. And, the social domain is then executed when students share their thoughts and ideas that contribute to the learning outcomes (Hiu et al., 2018; & Kamble et al., 2021).

Using the flipped classroom method for instruction promotes a deeper sense of learning as students become exposed to and familiar with learning content multiple times. When effectively implemented, using well-designed content and activities, this instructional strategy increases the aptitude for students to demonstrate constructed ideas, learned concepts, and retained knowledge during online instruction. Students become
psychologically invested in the learning process which enhances student engagement (Costley & Lange, 2016; Hui et al., 2018; & Kamble et al., 2021). While the modification of instructional strategies supports the development of necessary skills for effective learning, the identification and examination of gaps in the research must be explored to increase overall academic performance (Vuorinen, 2018).

**Gaps in Research**

As studies on distance learning and its effect on academic achievement have continued to evolve, more information has been needed regarding students’ experiences (Dennie et al., 2018; & Vuorinen, 2018). The factors associated with how and why students acquire information during online learning should be explored *within* as well as *beyond* the classroom environment (Dennie et al., 2018; & Vuorinen, 2018). Before the pandemic, factors used to evaluate student learning were largely based on legislative policy mandates (e.g., the NCLB Act of 2001) set by federal and state Departments of Education (Dennie et al., 2018; Edwards & Rule, 2013; Harris-Packer & Segol, 2015; & Lake et al., 2021). The policymakers created initiatives that reinforced the development of proficiency standards (e.g., the goal of achieving 100% proficiency) for each state to achieve. School districts were then challenged with preparing teachers to deliver content that facilitated learning for students and met performance standards. Because of the emphasis on meeting performance standards, most studies have focused on the skills and needs of instructors while a few studies have examined the performance and behavior of college students. However, limited studies have delved into middle school students’ personal needs (within and beyond the classroom environment) and the experiences of their parents that have actively supported online education (Davis et al., 2021; Edwards
When it comes to students’ current perceptions regarding the instant change from in-person to online learning, no clear information could be obtained from middle school students. However, limited research was attainable on the attitudes of middle school students before the pandemic (Harvey et al., 2014). Most research conducted has been based on the perceptions of educators and instructors; however, only a very few studies provided specific information on middle school students’ thoughts, values, and opinions regarding learning and instruction. The characteristics that have been shown to influence social behavior were used to explore options for increasing student engagement.

An example of a study with a focus on middle school student perspectives was conducted by Harvey et al. (2014). The qualitative research consisted of 14 questions about different aspects of online learning compared to traditional, in-person learning. The results from the study indicated that most students enjoyed certain aspects of remote learning. For instance, students liked the flexibility offered when reading and completing assignments; having the ability to learn at their own pace; being able to stay at home and not go to school, and working online while using technology. Aspects of online learning that students deemed unfavorable included not participating in any extracurricular activities (an indication from 31.4% of student responses); needing assistance from parents to complete homework assignments (30.2%); not having physical education, art, or music classes (18.6%); and missing recess time where they could hang out with friends (25.7%) (Harvey et al., 2014). These are just a few attributes associated with the perceptions of middle school students within OLEs that should be further explored.
Although these results provided some insight regarding attitudes middle school students had about online learning versus in-person learning, more details surrounding the unique characteristics of the students interviewed were needed for comparison. For instance, if students previously attended traditional, in-person instruction and had established social connections, connecting with peers during online instruction was not imperative because the students could connect with their friends outside of the classroom. The students indicated that it was not necessary to have a friendship or connection with a peer during online learning. Also, the study noted that if students preferred solitary learning styles and were not motivated by social interactions, online learning would be an ideal mode of instruction (Harvey et al., 2014). Again, this study was conducted before the pandemic; therefore, student perceptions of online learning compared to traditional, in-person learning may have shifted because of the effects of the pandemic. Investigative research on matters concerning food scarcities, health and wellness, medical costs, death of loved ones affected by COVID-19, anxiety over political ideals, and the family’s income status could all be factors that were not as considerable before the pandemic (Davis et al., 2021; Lake et al., 2021; & Tinubu Ali & Herrera, 2020). Another perspective that lacked context included the experiences of parents that supported online learning and how that involvement possibly influenced student engagement.

When it came to evaluating students’ academic achievement during distance learning, the perspectives and experiences of parents have been often overlooked (Davis et al., 2021; Edwards & Rule, 2013; Harvey et al., 2014; Merisotis & Phipps, 1999; Sofianidis et al., 2021; & Vuorinen, 2018). During the pandemic, parents became proxy educators without the proper training being obtained. Whether supporting their children
by facilitating full-time (in the instance of guided asynchronous learning) or part-time (assisted with synchronous learning) instruction, proxy educators played a critical role in the online learning that was orchestrated (Davis et al., 2021; & Ewing & Cooper, 2021). Some of the roles imposed on proxy educators included managing the individualized content taught and the emotional needs of students assessed while attempting to retain teaching knowledge. These responsibilities bestowed onto many parents were assigned in addition to their existing responsibilities of being providers for their families while dealing with uncertainties that stemmed from the pandemic. When the parents became overburdened, they began experiencing burnout (Davis et al., 2021, Ewing & Cooper, 2021; &Vuorinen, 2018).

Research has concluded that there was a cause-and-effect relationship between teacher burnout and student academic achievement (Davis et al., 2021, Ewing & Cooper, 2021; &Vuorinen, 2018). As teachers’ stress levels increased, mental health distress and student learning outcomes were negatively impacted. When traditional teachers became extremely exhausted, they often left the role. Inconveniently, proxy educators did not necessarily have the option of vacating their position. If the proxy educators did leave their role, subsequently, their child most likely suffered the consequence. Without the guidance and support of their proxy educator, students’ academic performance may have faltered (Davis et al., 2021, Ewing & Cooper, 2021; & Vuorinen, 2018). As proxy educators attempted to maintain their role, they were unable to focus on fostering the needs of their child, the student. When learning was no longer sustainable, an intermittent decline in the student’s academic performance occurred (Davis et al., 2021, Ewing & Cooper, 2021; &Vuorinen, 2018).
How the Study Fills in the Gaps

This study explored the course completion scores (with manual conversion into GPAs) to determine if there was any significant difference among the mean GPAs, during the three modes of instruction, across three timeframes. Within each timeframe (Time Period 1-Sixth Grade, Time Period 2-Seventh Grade, and Time Period 3-Eighth Grade), a different method of instruction (in-person, online, and/or hybrid) was facilitated to a group of middle school students. The group of students was chosen from a random selection of a student population within a single school district. The findings from this study provided insight into how students met or failed to meet the performance standards set for achieving academic success (e.g., proficiency in all subjects with advancement to the next grade level). However, the information did not provide intricate details regarding students’ attitudes and behaviors associated with learning during each of the three modes of instruction. Instead, the findings presented possible implications associated with students’ needs, during remote learning, while confirming if student engagement could have influenced overall academic achievement.

This study contributed to research in two significant ways. From one aspect, the utilization of course completion grades, instead of results from standardized assessments, was used to determine if students have met minimum performance standards with the postponement of standardized assessments. The other contributing method offered comparisons of student achievement before, at the onset of, and during the pandemic. When mandates from federal and state Departments of Education called for temporary cancellations of administered standardized testing, educators needed to determine another way of assessing academic success for the unforeseeable future. The use of final course
completion grades (that have been manually calculated into GPAs) was established as a supplemental factor for assessing academic performance; however, limited research suggested its use as the sole contributing factor for evaluating proficiency (El Refae et al., 2021). While the GPAs were not a sole indicator for determining factors that contributed to students’ academic success or failure, the results from the analyses (Paired t-test, One-Way Repeated Measures ANOVA, and Independent Samples t-test) suggested the need for further research that focused on the needs of students and the experiences of parents for achieving academic success.

Obtaining insight into what kind of influences impacted student engagement empowered educators in proposing the advancement of policies that created new legislatures established by federal and state governments that supported families experiencing barriers to academic achievement (El Refae et al., 2021). Instructors were able to personalize content or develop instruction that supported proxy educators to lessen the burden of teaching while parenting. Understanding why academic performance was greater during one mode of instruction in comparison to another signified the need to evaluate if student demographic characteristics influenced learning outcomes. To acquire the information that supported these claims, a qualitative study should then be conducted to inquire about specific details of what students experienced during each mode of instruction. This inquiry could be used to determine if any intrinsic or extrinsic factors hindered students’ desire to engage in learning and/or completely prohibited access to the learning environment (El Refae et al., 2021).

The results from this study served as a suggestion for how instructors and educators could further explore how students’ use of digital tools and accessibility to
digital platforms possibly corroborated the need for enhancing the overall learning content design. Modifications made to content potentially improved academic success by aligning with students’ learning styles (e.g., visual, auditory, kinesthetic, or a combination of all) (Harvey et al., 2014). With an understanding of students’ learning styles, educators would be enabled to clearly define learning criteria that aided students, possessing various demographic characteristics, in achieving academic success across multiple modes of instruction. School districts could then enforce curriculum development that supported each student’s perceived learning style by aligning learning outcomes with learning goals, objectives, and activities that utilized each learning style within OLEs (Merisotis & Phipps, 1999).

**Theoretical Framework**

This section discussed the study’s theoretical framework. The cognitive learning theories associated with the social interactions depicted in the study were introduced. The association of the cognitive learning theories (e.g., based on the construction of learning and behavior students exhibited during learning) to the instructional design models (e.g., used for designing content and delivering instruction) that were utilized for creating learning content were reviewed. These concepts were used to describe the practices that influence student engagement and measure academic performance based on the study’s state and school district standards. Below, Figure 5 demonstrates the theoretical, content design, and behavioral process flow of these measures:
To demonstrate the connection each measure had with attaining academic achievement, the influence that cognitive learning theories had on student engagement and instructional design models was the premise of this chapter.

Reviewed through the lenses of the, (a) *Sociocultural Theory*, (b) *Social Constructivism Theory*, and (c) *Social Control Theory*, which are based on social interactions, this section explored cognitive learning theories that connected the need for enhancing student engagement to improve overall academic achievement. When evaluating theories that explained student behavior, a review of the three social interactive theories was necessary through a depiction of how the culmination of each theory contributed to the understanding and evaluation of student engagement within learning environments. The following section introduced the study’s theoretical framework through the lens of each social interactive theory and discussed its application in the development of cognitive learning.
**Theory 1: Sociocultural Theory**

The basis of the Sociocultural Theory implied that a person’s cognitive development was mainly influenced by their culture and the historical aspects of that culture (Cherry, 2019; Fosnot, 2005; Fosnot, 2013; Furrer & Skinner, 2003; Gredler, 2009; Hendy, 2020; Paleeri, 2015; & Rovai, 2004). People within a culture become engaged in its historical context (e.g., social, religious, economic, or political conditions) when they acquire new information that offers deeper, meaningful connections with their environment. One’s parents, caregivers, elders, and other intellectual members of society provide a unique perspective that influences the development of their beliefs. The knowledge and skills gained become revered principles of society (Cherry, 2019; Fosnot, 2005; Furrer & Skinner, 2003; Gredler, 2009; & Rovai, 2004). As the continuance of gaining new information is confirmed by experienced members of society, learning occurs. Therefore, the Sociocultural Theory infers that learning is cultivated through the process of social interaction.

In the early twentieth century, psychologist Lev Vygotsky introduced the concept of Sociocultural Theory through an applied framework for how people learn (Cherry, 2019; Fosnot, 2005; Fosnot, 2013; & Gredler, 2009). Vygotsky believed that basic, biological cognitive functions for learning were innate, but then developed into higher-mental functions. The characteristics that describe the cognitive functions (i.e., attention, memory, perception, and sensation) have different implications when depicted at birth through the time children construct new concepts as their understanding and memory to comprehend complex ideas expand (Cherry, 2019; Fosnot, 2005; Fosnot, 2013; & Gredler, 2009). The elementary-mental and higher-mental functions are arranged from
basic to complex composites of learning structures. Social interactions are based on one’s experiences within their surroundings and the connections and/or experiences with people in their society (Cherry, 2019; Fosnot, 2005; Fosnot, 2013; & Gredler, 2009). A comparison of the four functions for learning is characterized in Table 2, below:

**Table 2**

*Vygotsky’s Comparison of Elementary and Higher-Mental Functions*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Elementary-Mental Function: Biological (innate)</th>
<th>Higher-Mental Functions: Cultural-historical (Developed over time)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attention</strong></td>
<td>Involuntary Attention: Controlled externally; repelled by or attracted to different objects</td>
<td>Voluntary Attention: Controlled internally; directed by symbols</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>Simple Memory: Based on visual images &amp; concrete experience</td>
<td>Logical Memory: Directly connected with comprehension, analysis, &amp; systemization of material</td>
</tr>
<tr>
<td><strong>Perceptions</strong></td>
<td>Simple Perceptions: Based on concrete experience</td>
<td>Categorical Perception: Synthesis of visual perception, and abstract &amp; conceptual thinking</td>
</tr>
<tr>
<td><strong>Sensation</strong></td>
<td>Syncretic Thinking: Preconceptual; thinking proceed from specific to specific</td>
<td>Conceptual Thinking: Recognizing something in all its connections &amp; relations that are synthesized in concept</td>
</tr>
</tbody>
</table>

With attention, an infant’s senses (e.g., possessing elementary-mental functions) are stimulated based on external factors. The stimulus arises activity, which then drives the infant’s behavior. For example, an infant is drawn to touch a red, hot iron because of its bright color and sizzling sound effects. In comparison, an adolescent (possessing higher-mental function) processes the bright color and unique sound that is emitted from the iron, then recalls that bright, red, sizzling objects tend to be hot and therefore, unsafe to
be touched. Further analysis of this example describes how the adolescent uses memory to recall previous experience (e.g., whether having observed someone touching a hot iron or experienced the touch of a hot iron, themselves) which signals how to conduct themselves around the hot iron. Whereas the infant’s behavior was based on naive thoughts regarding the hot iron because they did not understand that touching a hot iron is unsafe. The infant’s perception of what is safe or unsafe is not developed until observed and/or experienced behavior dictates the reward of safe or consequences of unsafe items. Lastly, with sensation, the adolescent implements the knowledge gained from developed behavior that is associated with a red, hot iron and applies that theory to other red, hot items that sizzle. The use of conceptual thinking skills allows the adolescent to construct a deeper level of understanding by making the connection that all red, hot items that sizzle were unsafe to touch (Fosnot, 2013; Gredler, 2009). Based on cultural experiences, these learning concepts of implying what was right from wrong were applied to the classroom environment through the use of the zone of proximal development (Baker, et al., 2020; Cherry, 2019; Fosnot, 2005; Fosnot, 2013; Gredler, 2009; & Kusmaryono et al., 2021).

The zone of proximal development is described as the measurable extent between a learner’s actual development (e.g., determined by independent problem-solving) and the level of potential development (e.g., determined through problem-solving, guidance, and/or collaboration with the instructor or other students) (Baker, et al., 2020; Cherry, 2019; & Kusmaryono et al., 2021). The assessment of the zone of proximal development allows teachers to determine students’ skill levels, then deliver instruction that extends learning to the limits of the students’ competency. This distance that bridges the actual
and potential development is known as the *knowledge gap*. Educators’ desire to reduce the knowledge gap is established through the expansion of the zone of proximal development. To achieve this goal, instructors must have implemented each of the following:

- Strategically planned and organized instruction to encourage engagement (i.e., for group activities, paired less-skilled students with students that had a higher skill level),
- Used hints, prompts, or direct instruction to bolster student learning, and
- Used scaffolding to provide a solid foundation for learning, then used prompts to progressively guide student learning.

Vygotsky suggested that these “tools of intellectual adaptation” enabled students to utilize their abilities to adapt to the new instructional learning environment: their culture (Cherry, 2019; Fosnot, 2005; Fosnot, 2013; & Gredler, 2009). Through the lens of the Sociocultural Theory, the investigation of how one’s cognitive development was primarily influenced by their culture aligned with the purpose of this study. When reviewing social interactions within each mode of instruction (i.e., in-person, online, and hybrid), each form of instruction was similar to a culture in society. Within each instructional model, students’ ideals and beliefs formed are based on the observation of others and/or individual experiences with learning in that environment. The use of the zone of proximal development enables instructors to evaluate the knowledge gap by assessing students’ abilities (academic performance) and their capabilities (aptitude) to learn in new environments. The administering of pre- and post-assessments provides insight into what knowledge and skills students possess which are evaluated against their
capability for acquiring information to complete an activity. For example, a student completes a pre-assessment regarding their knowledge of using Adobe Painter. Based on the results of the assessment, the student has limited knowledge about Adobe Painter, but does not know how to create three-dimensional photos. The instructor then creates content that focuses on the steps for taking a one-dimensional photo to a three-dimensional layout. Once the student understands how to apply the instruction to create a three-dimensional photo, the knowledge gap for this specific skill is eliminated.

Educators and instructors must design content that supports instruction for fostering cognitive development to minimize the knowledge gap (Cherry, 2019; Gredler 2009). Achieving this goal establishes learning objectives and activities that effectively satisfy learning outcomes that enable students to achieve academic success. The construction and application of knowledge, through social interactions within a society, was the basis of the Social Constructivism Theory (Fosnot, 2005; Fosnot, 2013; Hendy, 2020; Li et al., 2020; Rovai, 2003; &Yates et al., 2014). The relationship that students experienced within their cultures must be shared within the changing culture of remote learning.

**Theory 2: Social Constructivism**

With the Sociocultural Theory being the core for how knowledge was mainly acquired through the experiences in one’s culture, Vygotsky’s introduction of the Social Constructivism Theory was based on the development of social interactions during learning (Fosnot, 2005; Fosnot, 2013; Hendy, 2020; Li et al., 2020; Rovai, 2003; & Yates et al., 2014). The emphasis is placed on collaboration and the interactive experiences that students engage in during learning: active learning. The use of active learning has
resulted in the co-construction of knowledge (Li et al., 2020). This concept is a key factor of Social Constructivism as its approach calls for *additional* interactional processes (e.g., cooperation and coordination). For example, the theory’s use of increased social interaction suggests that students advance their knowledge when they partner with other students to solve problems that relate to local issues. The students expand their knowledge by sharing independent ideas and gaining more insight from one another while focusing on matters that affect their immediate society (Cherner, 2020; Fosnot, 2005; & Fosnot, 2013).

This form of active learning is often practiced during traditional, in-person instruction. However, when instruction abruptly shifted from in-person to online instruction at the onset of the pandemic, the concern that the student-instructor and student-student interactions would be replaced by the use of digital tools became an instant reality (Asio & Bayucca, 2020; Aydin & Erol, 2021; Birch & Lewis, 2020; Cherner, 2020; Data Quality Campaign, 2020; Davis et al., 2021; El Refae et al., 2021; Ewing & Cooper, 2021; Lake et al., 2021; & Malkus & American Enterprise Institute, 2020). At this time, students and instructors had limited knowledge of navigating full-time online learning. Once in-person, face-to-face interactions transformed into instructor-led lectures and video-conferencing sessions, with limited opportunities for interpersonal communication, many studies reported a decline in student engagement and overall academic achievement (Aydin & Erol, 2021; Birch & Lewis, 2020; Cherner, 2020; El Refae et al., 2021; Ewing & Cooper, 2021; Lake et al., 2021; & Malkus & American Enterprise Institute, 2020).
Cherner (2020) suggested that instructors combine pedagogical strategies with the use of intuitive digital tools and technology to increase social interaction. This process served as a method for increasing student engagement during online learning. To simply call for an increase in student engagement through modifications of the content design was plausible; however, understanding the behaviors that drove student engagement was imperative for acquiring academic achievement (Gentle-Genitty, 2019; Ontario Ministry of Children, Community and Social Services, 2016; & Wang et al., 2014).

Theory 3: Social Control Theory

To understand how middle school-aged students formed relationships and integrated into their culture (society or classroom environment), the Social Control Theory was reviewed. Exploration of this theory offered insight into how behavior factored into student engagement during learning (Gentle-Genitty, 2019). Introduced by American criminologist Travis Hirschi during the 1960s, the Social Control Theory served as an extension of the concepts of social control (e.g., rules and standards set in a society that insisted its members maintain a certain level of decorum) (Ontario Ministry of Children, Community and Social Services, 2016). The Social Control Theory has purported that one’s positive association with family, school (community of learning), peers, and other facets of a society lessened their desire for engaging in deviant behavior. The theory has suggested there was an inclination for members to commit crimes when those bonds were weakened or became non-existent. Based on the assumptions of the theory, there is a direct correlation between positive relations and positive behavior as well as negative relations and negative behavior within society (i.e., social bonding) (Ontario Ministry of Children, Community and Social Services, 2016). To gauge which
end of the spectrum a member of society falls within, the four constructs of social bonding that are used to evaluate behavior include: (a) attachment, (b) commitment, (c) involvement, and (d) beliefs (Gentle-Genitty, 2019; Ontario Ministry of Children, Community and Social Services, 2016; & Wang et al., 2014).

The four constructs of social bonding generally are used to explore student behavior since social bonding is developed early during a student’s educational life; during middle school. The characteristics of each construct are listed below:

- **Attachment**: affection towards or close relationships with others.
- **Commitment**: investment one makes in conventional activities (e.g., peer relationships and school activities).
- **Involvement**: what individuals find themselves doing to stay busy and deterred from delinquent activities.
- **Beliefs**: The moral conscience of society determined what was right from what was wrong.

Each construct has a specific role in or connection to the overall social bonding that students experience. Students possessing stronger attachment are less likely to participate in delinquent or antisocial activities such as violating school rules or society laws because they feel connected to the environment. Students that do not possess high levels of attachment tend to not follow school values or abide by societal laws. They do not embrace norms because they have no stake in the cultural system (Gentle-Genitty, 2019; Ontario Ministry of Children, Community and Social Services, 2016; & Wang et al. 2014).
When time, energy, money, and personal resources are invested into the school’s culture, students are less likely to disrupt the connection to the school’s culture. Some of the connections that students have with peers, instructors, and self-identity are associated with a display of school pride (e.g., cheering for the school’s athletics teams). When there is a connection to the school’s culture, students feel a commitment to exceeding performance expectations. Therefore, through engagement in academics, extracurricular activities, or leadership opportunities and building relationships with instructors, peers, and group associations, students tend to be less likely to participate in disruptive behavior (Gentle-Genitty, 2019; Ontario Ministry of Children, Community and Social Services, 2016; & Wang et al., 2014).

When students are engaged in activities that kept them occupied, they are more likely to be deterred from disobedient behavior. Involvement in structured activities (i.e., study groups) and prosocial (i.e., leadership positions on teams or in clubs) require more time and energy from students. However, when students are not involved in conventional activities that promote feelings of belonging, they become involved in alternative activities that satisfy their need for validation (Gentle-Genitty, 2019; Ontario Ministry of Children, Community and Social Services, 2016; & Wang et al., 2014).

The final construct of social bonding in students addresses the moral conscience of one’s culture: beliefs. To set the boundaries for what is right and wrong in a society, belief systems become practices that students adhere to within their communities of learning. The basis of how a student behaves in school is first established at home. Values and morals taught at home are often emphasized in school; thereby, contributing to expressions of behavior that are exhibited in a student’s learning culture. A student’s
behavior in school becomes a direct factor in deciding to or not to engage in the cultural beliefs of the school’s educational system (Gentle-Genitty, 2019; Ontario Ministry of Children, Community and Social Services, 2016; & Wang et al. 2014).

The Social Control Theory suggests that when there is a greater presence of each of the four constructs, a student possesses a higher level of social bonding (Gentle-Genitty, 2019; Ontario Ministry of Children, Community and Social Services, 2016; & Wang et al., 2014). Adversely, when there is a decrease in either one of the four constructs, social bonding also declines. Consideration must be given to understanding the factors that drive student engagement, based on social interaction, during learning. Though educators cannot obtain an understanding of how all factors from one’s society influence student engagement, it is imperative for some aspects of external factors to be included. Educators utilize this cognitive theory when considering the design of content and instruction within the learning environment’s cultural systems (e.g., in-person, online, and hybrid instruction). With the understanding that positive interactions yield positive behavior, instructors utilize the Social Control Theory to create content that encourages social interactions. The more students interact with the content, instructor, peers, and technology; the more likely engagement increases within the learning activities. An increase in these direct relationships contributes to improving academic performance (Gentle-Genitty, 2019; & Wang et al., 2014). This premise of social interaction serves as an aid in fostering performance in OLEs by increasing student engagement which leads to achieving academic success.
Instructional Design (ID)

To create content that is concise and easy to follow, yet engaging while meeting the needs of learners, the creators of the content (i.e., instructional designers) must possess an understanding of how to deliver quality instruction and learning that is creative, active, and iterative: instructional design (ID) (Czerkawski & Lyman, 2016; Gustafson & Branch, 2002; Khalil Elkhider, 2016; Kilgore et al., 2019; Liu & Velasquez-Bryant, 2003; & Pina & Harris, 2019). ID models have followed a procedural design that provided a framework for implementing theories into classroom learning. The approaches to ID models have guided instructional designers with the planning, creating, constructing, applying, and assessing of educational processes (Czerkawski & Lyman, 2016; Gustafson & Branch, 2002; Khalil & Elkhider, 2016; Liu & Velasquez-Bryant, 2003; & Pina & Harris, 2019). The use of these frameworks has assisted instructional designers with creating quality learning. Some of the frameworks used to design learning content have focused on students’ participation, motivation, and academic achievement which were aspects of student engagement (Czerkawski & Lyman, 2016; Gustafson & Branch, 2002; & Pina & Harris, 2019).

This systematic approach for developing learning experiences has extended to the need for understanding how learners think, feel, behave, act, react, and perform during learning. To connect instructional strategies to the theoretical evidence for human learning, ID models must refer to various cognitive theories that have assisted in understanding how students engage during learning. Any preconceived notions about the topic for learning or the learning environment must be acknowledged during the design
Because it has been impossible to foretell the individual needs of each learner, instructional designers must follow a guideline for designing content that sets effective standards and yields measurable performance. A model that has displayed methods of approaching content creation was the key element for applying general systematic theories to instruction and learning. Though many models have been developed and used for instructional design, the primary model that serves as the guide for others is the ADDIE model (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016).

**ADDIE.** ADDIE is the acronym for Analyze, Design, Development, Implementation, and Evaluation which describes the various phases of content design (Khalil & Elkhider, 2016). Each phase plays a unique role in creating content that is designed to meet the strategic goals for effective instruction and learning. Below, Figure 6 illustrates the process flow of the stages for designing content and instruction:

**Figure 6**

**ADDIE Model Process Flow**
Though often presented linearly, the ADDIE model does not necessarily follow an end-to-end process flow. In the initial step of the ADDIE model, the *analysis phase* determines the instructional goals through a process called a needs assessment (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016). Here, the needs of learners are analyzed through the identification of specific characteristics associated with their previous experience, existing knowledge, beliefs, and attitudes about learning and the learning environment. Understanding what students may or may not know and what skills they may or may not possess before learning has assisted instructional designers with determining the objectives for learning (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016).

In the next step, the *design phase*, the learning objectives are identified for outlining the content and instructional strategies that are used during learning. The instructional strategies indicate the pre-instruction activities (for determining students’ knowledge or skill level) and the presentation of the content (what the instructor uses to facilitate learning). Also, the types of delivery methods, that are selected for learning, are determined during this phase (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016). The learning objectives must be written in measurable terms for which the learning outcomes are to be evaluated. The creation of specific, detailed learning objectives is necessary for students to know what is expected of them as well as enabling the instructor to effectively facilitate the content. The design phase is the blueprint for creating instruction and learning content.

The following step, the *development phase*, includes the creation of the content, the preliminary model of the actual course, and assessment tools (Gustafson & Branch,
2002; & Khalil & Elkhider, 2016). The overall structure of the information and delivery method are developed within this phase. The instructional designers plan, select, and create content that best meets the learning objectives. Also, during this phase, the assessment strategies are determined for measuring the level of achievement established by the learning objectives (The Online Curriculum and Digital Innovation Team, 2021). In this phase, the learning objectives are modified to align with the goals and activities, or new materials are created if it is determined that the initial design no longer supports the appropriate resources. This is the phase where the instructional designers endure the majority of effort to ensure the content design is aligned with the learning (Gustafson & Branch, 2002).

Next, during the implementation phase, the actual content and materials that are used to support the students’ competency and mastery of the learning objectives are delivered to the target audience (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016). Learning technologies are implemented to increase students’ social and cognitive engagement. Here, instructors verify that the learners have obtained the necessary prerequisites and received the proper orientation for using the hardware and software that is used during the delivery of the training. Instructors ensure that the learners have access to all supporting materials and digital tools. This practice is useful in promoting an engaging learning environment that sets students up for achieving academic success (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016).

Lastly, data that is collected for identifying the areas of content that need revision occurs during the evaluation phase (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016). An evaluation of the content and mode of instruction can occur during any phase
of the ID process making this a very flexible tool to use within the ID model. The assessment of the overall effectiveness and delivery of the content occurs during learning (i.e., formative evaluation) or once the learning has concluded (i.e., summative evaluation). For example, instructors perform a pilot instructional delivery of a newly developed program with a small group of participants. Instructors observe and record the group’s performance and obtain their feedback during instruction, then make edits in preparation for the final rollout of the learning following instruction. This is an essential feature of the ADDIE model because it allows for modifications to the content and instruction at any time during learning. This flexibility enables instructors to modify the content based on the needs of the students and/or changes in the learning environment, in real-time.

The phases of the ADDIE model represent the functional concepts of the ID process. The overarching premise for the ADDIE model is that the focus is on establishing instruction that meets the performance standards of learners known as the learner-centered approach. The goal is to shift from the instructor-led to the learner-centered approach to empower students to engage in their learning by offering content, instruction, and technology tools needed for academic achievement. Instead of creating tasks (e.g., recalling information) for students to complete to fulfill a requirement, ID models establish strategic goals that focus on students performing meaningful activities that develop cognitive learning skills. Instructors can measure the results from students’ performance, then evaluate their ability to meet the goals and learning objectives. This data collected assists instructors with modifying existing or developing new content based on the learners’ needs. Adjustments to the content can be made at any time, during
any phase, and as often as necessary to ensure the maximum level of student engagement is encouraged and academic achievement was attained (Gustafson & Branch, 2002; & Khalil & Elkhider, 2016). While ID models have offered an effective way for enhancing learning through creating content and instruction that best serve learners, the utilization of a tool that connects a technology-based framework to practical learning (technology integration model) is needed for improving the development of content and the delivery of instruction within an OLE (Liu, 2008). Enhancing the delivery of instruction and development of content that aligns with serving the needs of students contributes to increasing overall student engagement which, in turn, increases academic achievement (Yates et al., 2014).

**Technology Integration Model**

As a result of the continuous effects of the pandemic, the transition from in-person to online learning has prompted an increased dependency on advanced technology (Aydin & Erol, 2021). Remote learning became the temporary model for education where the development of content and delivery of instruction was designed to meet the needs of students. Satisfying this primary need for student learning entailed offering wider access to technology to keep up with the demands of the evolving educational platform (Aydin & Erol, 2021). To accommodate the need for accessing technology, students must be connected to adequate information through the facilitation of effective instruction. This connection must be linked to how technology was used during online learning (Liu & Velasquez-Bryant, 2003).

Gustafson & Branch (2002) have indicated that traditional ID models (e.g., ADDIE) focused on information (the creation of learning content) that adhered to
specified rules and guidelines for delivering instruction. The set rules and guidelines intended for learning are demonstrated as the learning goals and objectives that align with the learning outcomes (Liu & Velasquez-Bryant, 2003). By meeting the standards set by the learning outcomes, measurements are taken to assess academic performance. Therefore, a correlation of the development of information with the delivery of instruction is necessary for enhancing student learning outcomes. The evaluation of successful outcomes has been used as a method for increasing academic achievement. This framework for learning is ideal for designing instruction for in-person learning. However, to improve learning within OLEs, the incorporation of technology-based designs must be included within the ID model (Aydin & Erol, 2021; Kimmons & Hall, 2018; & Liu & Velasquez-Bryant, 2003).

Technology-based learning is only achieved with the integration of all three components of learning (information, technology, and instructional design) (Liu & Velasquez-Bryant, 2003). The learning materials used to support online learning must align with the design of the content and delivery of instruction (Aydin & Erol, 2021; Liu & Velasquez-Bryant, 2003). For use in OLEs, technology-based design models must be paired with effective ID models. The pairing of learning concepts occurs through the implementation of information and technology integration. Here lies the difference between previous ID models (e.g., the ADDIE ID model) and the latest methods that support digital learning platforms: the incorporation of access to technology within the content design (Liu & Velasquez-Bryant, 2003). Designing effective content, which supports technology-based designs, requires the inclusion of pertinent information that clearly describes how to utilize the digital tools and platforms that are included during
online learning. But, learning could only be as successful as how well the content is designed and the delivery of instruction that engages students (Kimmons & Hall, 2018; & Liu & Velasquez-Bryant, 2003). To determine how effective information technology integration has been implemented during learning, the technology-based design must be assessed.

A measure for assessing how the evolution of technology has been successfully incorporated into education has been identified through the failures associated with information technology integration within the content design. A model used to describe such failures is called the Information Technology Integration Life Cycle (Liu & Velasquez-Bryant, 2003). There are four components of the life cycle: (a) a missing link, (b) a misguided direction, (c) a major dilemma, and (d) an area of weakness. When developing the content used during learning, these four components of the life cycle are used to identify the contributing descriptors of an unsuccessful integration of technology and the impact on overall learning (Liu & Velasquez-Bryant, 2003). The components are designed to fill in the missing gaps, needed for effective learning, that are associated with implementing technology into ID models.

The *missing link* occurs when content created lacks the proper design for technology instruction. If the content design does not provide adequate instruction on how to access and utilize technology, learning does not ensue. The *misguided direction* occurs when instruction is based on the appeal of the latest trends in technology without assessing the needs of learners. In most instances, once instructors have reached the pinnacle stage in delivering the new technology tool, the next new trend is released. Instead of focusing on temporary trends, technology integration must be designed to
enhance learning by achieving learning goals and outcomes. The dilemma occurs when instructors and students feel as though they must embrace the newest technology tool to keep from being unfamiliar with the latest technological advancement. Instructional designers must decide if the latest technology tool is necessary for meeting the students’ needs for learning. If the technology tool does not align with the students’ needs or is ineffectively utilized, student engagement will likely decrease. And lastly, an area of weakness associated with technology integration is the necessary time needed to complete the integration. Typically, it takes instructors and learners three to five years to become proficient with the use of a technology tool. Because technology evolves in less time than it takes to become highly skilled in its usage, a standardized method for assessment quickly becomes outdated and is therefore rendered ineffective for continued learning (Kimmons & Hall, 2018; & Liu & Velasquez-Bryant, 2003).

Instead of focusing on nonessential aspects of technology, Liu & Velasquez-Bryant (2003) suggested that instructional designers concentrate on the learning goals and objectives and not attempt to incorporate the latest technology tool. Many technology tools become trends versus a transformational technology platform that shapes learning. When this occurs, the instruction and delivery of content become incomplete integration processes. The lack of connection to the technology process results in a decrease in student engagement. And, once student engagement decreases, academic achievement declines (Edwards & Rule, 2013; Furrer & Skinner, 2003; Kamble et al., 2021; & Yates et al., 2014). Therefore, the introduction and adoption of technology into learning content must serve the purpose of engaging students during learning, aligning with the learning
outcomes, and meeting the standards of academic achievement (Czerkawski & Lyman, 2016; Kimmons & Hall, 2018).

When effectively incorporated into education, technology-based designs could offer many benefits for enhancing the learning environment by providing students with another pathway for receiving instruction and completing assignments (Czerkawski & Lyman, 2016; Edwards & Rule, 2013; & Kimmons & Hall, 2018). To increase student-technology interactions, students must attain a level of expertise when accessing content and navigating technology platforms. For example, a study by Kay (2011) collected feedback from over 400 middle school students regarding their use of online learning tools in place of traditional, in-person instructional activities (Edwards & Rule, 2013). The student perceptions regarding technology use, in comparison to in-person instruction, yielded mixed reviews where some students expressed sentiments regarding the difficulty in following the layout of concepts and taking too much time to locate learning materials. Adversely, students that exhibited ease with accessing content and navigating the online platform responded that the online tools and instruction were effective in assisting with learning concepts beyond the scope of what in-person instruction offered. These students cited having liked the interactive games and websites, overall use of the technology, and welcomed the change from traditional, in-person learning (Edwards & Rule, 2013).

Students could apply technical skills to learning by completing tasks that involve problem-solving and critical thinking skills. Instructors could more effectively measure academic achievement and provide instant feedback to students regarding their performance. These models of design are developed to increase social interactions that prompt student engagement (Czerkawski & Lyman, 2016; & Kimmons & Hall, 2018).
Theoretical frameworks used to structure content and evaluate student behavior are implemented into the development of learning through various instructional and technology design models. The use of technology and digital tools enhances education by supporting the development of learning content, delivery of instruction, and the design of the overall learning environment (Czerkawski & Lyman, 2016; Kimmons & Hall, 2018; & Liu & Velasquez-Bryant, 2003).

By eliminating the failures associated with technology integration, the implementation of information and instructional design methods could enhance student engagement which thereby, improves academic performance. When the four components of the Information Technology Integration Life Cycle have been alleviated (e.g., missing links, misguided direction, major dilemma, and area of weakness), students are empowered to actively engage in the learning content and instructional design model (Liu & Velasquez-Bryant, 2003). The application of the content design and delivery of instruction is deemed to be purposeful learning tools when the life cycle components are no longer areas of concern; thereby, satisfying the needs of students within OLEs. To understand how the integration of technology has influenced the learning content and instruction, an introduction of one model, the information technology design, demonstrates the use of a conceptual framework to support student engagement (Liu, 2008; & Liu & Velasquez-Bryant, 2003).

Information Technology Design (ITD). The information technology design (ITD) model is a framework consisting of instructional design theories and information system development structures used when creating learning content and instruction (Liu, 2008). This framework has been at the center of designing content and delivering
instruction by imparting functions of technology that connect learning with student engagement in the classroom learning environment. The ITD procedural system follows the same theories, logic, and models of standard instructional design methods; therefore, its application, in creating content that encompasses the necessary components for learning and technical skill, is ideal for use in OLEs (Liu, 2008; & Liu & Velasquez-Bryant, 2003). To understand how the framework aligns with other learning design models, a review of its three dimensions (information, technology, and instructional design) will be discussed.

The integration of the ITD model suggests that the dimensions of information, technology, and instructional design are functions of learning (Liu et al., 2018). Each function offers a unique contribution to the online learning process. The function of the information dimension exemplifies the facilitation of content and presentation of supporting materials and resources. The function of the technology dimension symbolizes the software and hardware tools used to support or enrich pedagogy. And, the function of the instructional design dimension describes the set of rules or guidelines for delivering instruction (Liu & Velasquez-Bryant, 2003). Because each dimension presents a unique function, the ITD model demonstrates a directional relationship that contributes to the online learning process. Though each dimension functions in a separate manner, all three components must interact and equally contribute to the ITD model for the design to be an effective learning tool during online learning. No single dimension could independently account for all aspects of learning that are needed for students to accomplish academic achievement. Below, Figure 7 illustrates the relationship between each dimension within the framework:
There are unique characteristics associated with each function of the ITD model. For example, in the first dimension, *information*, instructors must make a series of decisions that determine the: (a) facts, ideas, or generalizations to be made about the content, (b) order the information is presented for learning based on the degree of difficulty, and (c) scope and focus of the content that is developed within a lesson or unit (Liu et al., 2018). Similar to the considerations when utilizing an ID model, the content designer must determine the learners’ needs and establish the learning objectives, goals, and outcomes before the issues of creating content are addressed. For learning to occur, the content information must coincide with the mode of instruction that indicates the use of technology aligns with students’ needs for meeting academic achievement standards (Liu et al., 2018).

In the second dimension, *technology*, when the content is designed, decisions must be made regarding: what technology to use, how the technology promotes learning,
and how the technology’s use applies to all learning environments. These decisions are based on an analysis of the content, instruction, and learners’ needs. For technology to be effective during learning, its application must align with the content and instructional design (Liu et al., 2003).

Lastly, guidelines are developed to address how the content is created, delivered, and evaluated within the third dimension, *instructional design*. This dimension of the ITD model focuses on the development of instruction while considering the needs of learners through the application of cognitive learning theories (Liu & Velasquez-Bryant, 2003). The underlying theory associated with the ITD model aligns with the ID model. The purpose of this third dimension is to focus on establishing specific rules and guidelines intended to assist learners with accomplishing the learning outcomes that signify academic achievement (Liu & Velasquez-Bryant, 2003). Here, four phases of the *instructional design* dimension (e.g., planning instruction, designing instruction, implementing instruction, and evaluating instruction) are associated with the four phases of the ADDIE ID model (Analyze, Design, Implementation, and Evaluation). This connection is important because the development of effective instruction is necessary for implementing the delivery of learning practices that enable students to engage in strategies designed to enhance learning (Liu & Velasquez-Bryant, 2003). The three phases of the ITD model align with the four fundamental elements for instructional design which focus on the learners, learning objectives, methods for instruction, and process for evaluating learning outcomes. Each of these elements, within the instructional design, describes aspects for developing instruction that enhances learning as follows:
Learners – planning instruction where the content, learners’ needs, and assigned tasks are analyzed,

Objectives – designing instruction where the strategies for each lesson, methods for delivering the instruction, and plans for evaluating the instruction are decided,

Methods – implementing instruction where the procedural methods to carry out the instruction are executed, and

Evaluation – evaluating instruction where formative and summative assessments are conducted for improving content through modifications and revisions.

Completion of the third dimension of the ITD model is essential for ensuring a strong theoretical framework is supported by cognitive learning theories that are used for understanding behavior and increasing student engagement. Traditionally, the use of the information and instructional design components is effective for in-person instruction. However, with the addition of technology-based learning, technology is a necessary component in producing effective online learning (Liu & Velasquez-Bryant, 2003).

Liu et al. (2008) suggested that technology-based learning does not occur unless all three dimensions are effectively implemented into the design. For example, if there is a reduction in information and oversaturation of the technology and instructional design, the learning lacks the necessary content that instructs students on how to access and navigate digital tools. Through theoretical and practical structures, Figure 7 – ITD Information Technology Design Model illustrates the intricate components needed to bridge the gap between content development and instruction with the use of digital tools.
within OLEs. The model also reveals what is effective, what is missing, and what should be examined when creating content, delivering instruction, and implementing technology-based designs required for online learning (Liu & Velasquez-Bryant, 2003). Each dimension (information, technology, and instructional design) must equally support the ITD model for the learning framework to be operative within OLEs. The reinforcement of each dimensional relation enhances student engagement by providing content and instruction that aligns with the learning goals, objectives, and outcomes that support online learning. Because the use of the ITD model is ideal for developing technology-based learning within OLEs; the resources, digital tools, and online platforms used by the ABC County School District were reviewed in Chapter III: Methodology.

When evaluating student behavior within OLEs, a review of cognitive learning and instructional design theories is important for understanding how to improve academic performance. Used as the basis for determining the influence of social interactions on student engagement, instructional designers must consider three aspects of learning: (a) development of content, (b) students’ accessibility to technology, and (c) instructor’s delivery of instruction. Each aspect aligns with one of the dimensions of the ITD model: (a) information, (b) technology, and (c) instructional design. For effective learning to occur, each aspect of online learning must equally contribute to the content design (Gustafson & Branch, 2002; Kimmons & Hall, 2018; Liu & Velasquez, 2003).

The prominent ADDIE ID model is traditionally used when creating learning content for in-person instruction (Gustafson & Branch, 2002; Khalil & Elkhider, 2016). However, due to the pandemic, students must be able to access digital tools and platforms during distance learning. For student engagement to increase within OLEs,
instruction on how to access the learning materials and complete assignments must be included in the content design (Yates et al., 2014). To gain a better understanding of how student engagement could influence course completion grades, one school district was investigated. For this study, a school district, in a western state, served as the population for which the sample of students was obtained. However, before the study was conducted, a review of the student achievement standards implemented within a state’s public school system was assessed.

**Measure of Academic Performance Within the Study**

In this study, student engagement was measured based on academic performance within in-person, online, and hybrid instructional environments. However, before evaluating student engagement within the learning environments, the criteria used to determine the public schools’ academic achievement standards were discussed. A review of the academic achievement standards, as described by the western state’s Department of Education, provided insight into what factors of academic performance were used for measuring student engagement. For purposes of anonymity, the application of the following aliases was used to express the actual names of the state and school district that were investigated in the study:

- **Western State** represented the name of the actual state and
- **ABC County School District** represented the name of the actual school district.

**Western State Student Academic Achievement Standards**

As required by state law, a five-year strategic plan for improving the academic achievement of students enrolled in public schools, across the state, must be submitted by
the State Board of Education. The initiative, “Statewide Plan for the Improvement of Pupils” or *STIP*, must be submitted or revised and resubmitted by March 31 of each year. Once reviewed by the State Board of Education, the plan is submitted to the *Western* State Department of Education (WS-DOE) for consideration, approval, and adoption into law (*Western* State Department of Education, 2021).

During the development of the plan, the WS-DOE reviews the collected accountability and achievement data and examines the common challenges facing students, families, academic leaders, schools, and school districts (*Western* State Department of Education, 2021). The WS-DOE then creates long-term strategies that address the expressed needs, identifies gaps in learning or accessibility to learning, and sets aspirational goals. The WS-DOE (2021) indicates that evidence-based strategies are used for improving academic achievement in the areas of “literacy, English language, school discipline, attendance, curriculum, assessments, instructional practices, professional learning, access to technology, and the allocation of resources.” The improvement plan must also contain clear goals, benchmarks and timelines for success, measurable criteria, and provisions for implementing attainable learning outcomes.

**Key Strategies for Academic Achievement**

The latest improvement plan implemented (the 2020 STIP) supports the WS-DOE’s vision of ensuring “all students are equipped and feel empowered to attain their vision of success and the mission to improve student achievement and educator effectiveness by ensuring opportunities, facilitating learning, and promoting excellence” (*Western* State Department of Education, 2021). Grounded in the vision and mission, this framework for excellence ensures students are prepared for graduation by providing the
necessary instruction, tools, and resources for learning throughout grades K-12. Input from the district and academic leaders, boards of trustees, students and families, and the community has been collected for developing key strategies used to measure academic achievement. The feedback obtained serves as a guide for improving education across the state, during five-year increments for planning. Following each timeframe, the measures for academic achievement are reassessed. The following six attributes to academic achievement (values) align with the goals established within the improvement plan:

Equity, Access to Quality, Success, Inclusivity, Community, and Transparency (Western State Department of Education, 2021). Below, Tables 3 and 4 describe each value by illustrating the connection among the key strategies and goals set by the WS-DOE:

**Table 3**

*Description of the 2020 STIP Values*

<table>
<thead>
<tr>
<th>VALUES</th>
<th>DESCRIPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity</strong></td>
<td>The learning needs of every student are supported in an environment where all students are valued, respected, and see themselves in their curriculum and instructional materials while experiencing academic success without regard to differences in age, gender, socioeconomic status, religion, race, ethnicity, sexual orientation, ability, native language, national origin, or citizenship status.</td>
</tr>
<tr>
<td><strong>Access to Quality</strong></td>
<td>Students, educators, and families have opportunities to take full advantage of Western State’s education system, regardless of their zip code, district, or setting.</td>
</tr>
<tr>
<td><strong>Success</strong></td>
<td>Lead the nation in the excellence and rigor of our standards, assessments, and outcomes for students and educators.</td>
</tr>
<tr>
<td><strong>Inclusivity</strong></td>
<td>Learners are served in their least restrictive environment in culturally responsive and sustaining school</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>WS-DOE collaborates with educators, districts, families, stakeholders, and partner agencies to lead a high-performing and responsive system of education for all Western State residents.</td>
</tr>
<tr>
<td><strong>Transparency</strong></td>
<td>Districts, schools, and communities are served through efficient and effective use of public funds and fulfillment of statutory responsibilities.</td>
</tr>
</tbody>
</table>
### Table 4

**Listing of 2020 STIP Key Strategies Aligned to Values**

<table>
<thead>
<tr>
<th>Goal 1</th>
<th>All children, birth through third grade, have access to quality early care and education.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity</strong></td>
<td>Increase enrollment of children from families experiencing poverty in Pre-K.</td>
</tr>
<tr>
<td><strong>Access to Quality</strong></td>
<td>Support quality early childhood education providers.</td>
</tr>
<tr>
<td><strong>Success</strong></td>
<td>Accelerate Read by Grade 3.</td>
</tr>
<tr>
<td><strong>Inclusivity</strong></td>
<td>Increase Pre-K inclusion for differently abled students.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Conduct multilingual early childhood education public outreach.</td>
</tr>
<tr>
<td><strong>Transparency</strong></td>
<td>Improve data analysis and reporting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Goal 2</th>
<th>All students have access to effective educators.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity</strong></td>
<td>Ensure effective educators in low-performing schools.</td>
</tr>
<tr>
<td><strong>Access to Quality</strong></td>
<td>Provide quality professional learning.</td>
</tr>
<tr>
<td><strong>Success</strong></td>
<td>Decrease licensed educational personnel vacancies.</td>
</tr>
<tr>
<td><strong>Inclusivity</strong></td>
<td>Serve students in the Least Restrictive Environment.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Increase candidates in the educator pipeline.</td>
</tr>
<tr>
<td><strong>Transparency</strong></td>
<td>Engage in effective communication.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Goal 3</th>
<th>All students experience continued academic growth.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity</strong></td>
<td>Increase access to STEM learning.</td>
</tr>
<tr>
<td><strong>Access to Quality</strong></td>
<td>Support schools to exit designation status.</td>
</tr>
<tr>
<td><strong>Success</strong></td>
<td>Close Pre-K – 8 opportunity gaps.</td>
</tr>
<tr>
<td><strong>Inclusivity</strong></td>
<td>Increase the percentage of students attending 3-, 4-, or 5-star schools.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Promote civic engagement.</td>
</tr>
<tr>
<td><strong>Transparency</strong></td>
<td>Streamline reporting requirements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Goal 4</th>
<th>All students graduate future-ready and globally prepared for postsecondary success and civic life.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity</strong></td>
<td>Increase participation in college-level and CTE coursework.</td>
</tr>
</tbody>
</table>
Access to Quality Success Expand access to CTE for all students. Reduce graduation rate opportunity gaps.

Inclusivity Enhance support for English Learners.

Community Increase college enrollment.

Transparency Co-create policy with stakeholders.

Goal 5 All students have access to new and continued educational opportunities supported by funding that is administered transparently, consistently, and by legislative or grant guidelines.

Equity Implement pupil-centered funding.

Access to Quality Success Fully expand education funding. Assess and manage risk.

Inclusivity Manage funds proactively.

Community Improve customer service.

Transparency Communicate programmatic impact.

Goal 6 All students and adults learn and work together in a safe environment where identities and relationships are valued and celebrated.

Equity Address disproportionate discipline.

Inclusivity Improve school climate.

Access to Quality Success Implement a Multi-Tiered System of Supports. Improve school safety.

Community Expand access to behavioral health professionals.

Transparency Cultivate a public-friendly Department.

Each value and key strategy coincide with the WS’s-DOE plan to provide a safe and welcoming learning environment for all students enrolled in public schools. The word “all” encompasses every student regardless of “age, gender, socioeconomic status, race, ethnicity, religion, sexual orientation, ability, native language, national origin, or
citizenship status” (Western State Department of Education, 2021). The WS’s-DOE focus on the well-being of all students aligns with the set goals that express the commitment to ensuring each student has the resources to attain academic success within any learning environment. The drive for creating learning environments that not only meet the educational needs of students today, but are necessary for preparing students to acquire postsecondary education and/or obtain a career must be engaging.

**Purpose of the Study**

The purpose of the study was to explore the potential influence of student engagement among middle school students through the comparison of three modes of instruction (in-person, online, and hybrid), among three timeframes. The comparisons were reviewed through the lens of social interaction among the students, the instructor, course content, and technology resources. The *in-person* mode of instruction was the traditional mode of instruction that each student followed before the pandemic. As indicated in Chapter I: Introduction, once the infection cases and consequential deaths began to exponentially rise in the U.S., in-person instruction had to abruptly cease. This instantaneous response to the COVID-19 pandemic has led to the transformation from face-to-face to virtual learning. Initially, in-person instruction transformed into online instruction. Then as the number of cases decreased, the reintroduction of hybrid instruction was permitted in most states (Lake et al., 2021). To accommodate the need and desire for students and instructors to return to in-person instruction, the hybrid became an alternative to online learning (Lake et al., 2021). The adjustment to partial or full online instruction became the emerging precedent for education. Because of this
extensive modification to education, online instruction was evaluated to determine if student engagement affected academic achievement.

**Chapter Summary**

In Chapter II: Literature Review, how student engagement was measured within learning environments was discussed. To understand why students enrolled in distance learning courses were likely to have lower course completion grades than students enrolled in in-person courses, an exploration of how social interactions potentially influence student engagement was reviewed. The various interactions that students encounter with an instructor, fellow students, and the learning content, while performing activities, and accessing digital tools and platforms were based on the correlation between cognitive learning theories and ID models. The learning theories and ID models were used as indicators for evaluating the level of student engagement within learning environments. How students engage during learning was based on factors associated with student behavior. Therefore, to improve academic achievement, student engagement was assessed during three modes of instruction (in-person, online, and hybrid).

Another method for assessing student engagement includes evaluating students’ knowledge, skills, and abilities (KSAs) to minimize the knowledge gap. Assessing students’ abilities (academic performance) and their capabilities (aptitude for learning) enable instructional designers to develop content that minimizes the knowledge gap. This process of evaluation could be achieved by comparing and contrasting students’ pre- and post-assessment results. To determine what indicators for success were measured and evaluated for the study, the academic achievement standards established by the Western State DOE and ABC County School District were reviewed. The level of student
engagement was assessed based on students achieving the academic performance standards required by the state DOE and county school district. The comparison of these results determined if student behavior was influenced by their learning environment; thereby, potentially enabling instructors to modify the learning to accommodate students’ learning needs. These efforts for improving education were addressed to increase students’ academic achievement.
CHAPTER III: METHODOLOGY

This chapter of the study reintroduced the research questions and hypotheses to add clarity to what the outcome of the study was intended to measure. The clarification was necessary for proving or disproving the roles that the Sociocultural, Social Constructivism, and Social Control theories played in influencing student engagement. Then, the framework for the research setting, used to conduct the study, was discussed. Next, an indication of the varying levels of the participant groups and the sampling process of the selected sample size was explained. Following the identification of the participants, the procedures utilized to gather the data were reviewed. Then, a discussion regarding the measurement, instrumentation, and data analysis that was used to conduct the study was evaluated. Finally, the chapter summary highlighted the main areas of focus conveyed in this section, Chapter III: Methodology. Below, Figure 8 illustrates the outline of this chapter via the use of the following storyboard:

Figure 8

Storyboard for Chapter III: Methodology
As demonstrated in the storyboard, this chapter began with a review of the research questions. The testing of the hypotheses determined if there was any significant difference among the students’ final mean GPAs. A description of the three modes of instruction (in-person, online, and hybrid) and three-time periods (Time Period 1, Time Period 2, and Time Period 3) were used as measures for comparisons of the final mean GPAs. Next, a discussion, regarding how the levels of the population were established, initiated a description of how specific calculations and coding determined the sample size. Then, an explanation of the data collection process clarified how the data was compiled and categorized within each timeframe. The description of the three data analyses (Paired t-test, One-Way Repeated Measures ANOVA, and Independent Samples t-test) was used to evaluate the relationships of the final mean GPAs between Groups 1 and/or 2. Next, a depiction of how the variables were measured, within the study, preceded the discussion of how the validity and reliability of the instrument were used during the analysis. Then, each research question was reviewed to determine how the three data analyses were used to conduct the study. Lastly, the chapter concluded with an overall summary of the research setting that was needed for completing the formal investigation of the study.

**Research Questions and Research Setting**

The presentation of the research questions established the guidelines that were used in the study. A discussion regarding how the study was conducted and the data analyzed was presented in this section. The details regarding inquiries presented by the research evaluated the final mean GPAs for each student, within each mode of instruction, across three time periods.
Research Questions and Null Hypotheses

This study aimed to explore the results of course completion grades of middle school students, before and throughout the pandemic, to determine if the calculated GPAs were potentially impacted by student engagement. The following research questions (RQ) were used to explore relationships among the students’ final mean GPAs across three timeframes (Time Period 1, Time Period 2, and Time Period 3), among three modes of instruction (in-person, online, and hybrid). In association with each research question below, Tables 5, 6, and 7 illustrate the relationship between the variables that were used for each data analysis.

RQ1: Are there any differences in the means of the students’ final GPAs when measured during in-person instruction (before the pandemic in Time Period 1) and during online instruction (at the onset of the pandemic in Time Period 2)?

Table 5

Data Source and Settings for Research Question 1

<table>
<thead>
<tr>
<th>Overall Sample</th>
<th>Time Period 1: Before the Pandemic</th>
<th>Time Period 2: Onset of the Pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In-person</td>
<td>Online</td>
</tr>
</tbody>
</table>

RQ2: Are there any differences in the final mean GPAs of Group 2 students when measured during in-person instruction (before the pandemic in Time Period 1), during online instruction (at the onset of the pandemic in Time Period 2), and during hybrid instruction (during the pandemic in Time Period 3)?
Table 6

Data Source and Settings for Research Question 2

<table>
<thead>
<tr>
<th></th>
<th>Time Period 1: Before the Pandemic</th>
<th>Time Period 2: Onset of the Pandemic</th>
<th>Time Period 3: During the Pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 2</td>
<td>In-person</td>
<td>Online</td>
<td>Hybrid</td>
</tr>
</tbody>
</table>

RQ3: Are there any differences in the means of the students’ final GPAs between Group 1 (online instruction) and Group 2 (hybrid instruction) when measured during the pandemic in Time Period 3?

Table 7

Data Source and Settings for Research Question 3

<table>
<thead>
<tr>
<th></th>
<th>Time Period 3: During the Pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>Online</td>
</tr>
<tr>
<td>Group 2</td>
<td>Hybrid</td>
</tr>
</tbody>
</table>

The null hypothesis (H₀) for each research question presented a notion of equal GPA means for the designated timeframes. Each null hypothesis is indicated below:

**H₀₁**: There is *no* difference in the means of the students’ final GPAs when measured during *in-person instruction* (before the pandemic in Time Period 1) and during online instruction (at the onset of the pandemic in Time Period 2).

**H₀₂**: There is *no* difference in the final mean GPAs of Group 2 students when measured during *in-person instruction* (before the pandemic in Time Period 1), during *online instruction* (at the onset of the pandemic in Time
Period 2), and during hybrid instruction (during the pandemic in Time Period 3).

**H03:** There is no difference in the means of the students’ final GPAs between Group 1 (online instruction) and Group 2 (hybrid instruction) when measured during the pandemic in Time Period 3.

The research questions, which were composed of three inquiries that described the influence of student engagement and reflected by the students’ final mean GPAs, were assessed for each grade level (sixth, seventh, and eighth) across the following three time periods:

- **Sixth grade:** Time Period 1 (end of Fall 2018: T2; end of Spring 2019: T4).
- **Seventh grade:** Time Period 2 (end of Fall 2019: T2; end of Spring 2020: T4).
- **Eighth grade:** Time Period 3 (end of Fall 2020: T2; end of Spring 2021: T4).

**Research Setting**

To capture various comparisons among the means for the students’ GPAs, the analyses of the three modes of instruction (in-person, online, and hybrid) implemented for teacher instruction and student learning were explored throughout the study. To determine the difference among the final mean GPAs, the following three data analysis methods were used to evaluate the data: Paired t-test, One-Way Repeated Measures ANOVA, and Independent Samples t-test.

**Three Modes of Instruction.** The three modes of instruction that were used to analyze the data in this study were: (a) in-person, (b) online, and (c) hybrid. As indicated
in Chapter I: Introduction and Chapter II: Literature Review, in-person instruction was the traditional method for student learning in most educational practices throughout the U.S. (Czerkawski & Lyman, 2016; Gustafson & Branch, 2002; Khalil & Elkhider, 2016; Kimmons & Hall, 2018; & Pina & Harris, 2019). Within this customary framework for education, students attended in-person classroom instruction to acquire new information implemented through interactions with the teacher, their peers, and the learning content. During this form of instruction, students physically experienced hands-on learning with the actual content. Teachers implemented activities that reinforced learning by enabling students to perform specific tasks that were designed to meet academic standards.

During online instruction, learning was facilitated strictly through the use of technology (Aydin & Erol, 2021; Park & Shea, 2020; & Seward & Nguyen, 2019). In this forum, students participated in distance education via technological platforms that mediated the process of learning. This mode of instruction was used at the onset of the pandemic, indefinitely, as quarantine mandates for K-12 education took effect. Learning that occurred via synchronous or asynchronous instruction presented an opportunity for students and instructors to easily share information while being physically apart. This method of learning was necessary for school districts to adhere to, for the continuance of education, at the onset of the pandemic (El Refae et al., 2021; Park & Shea, 2020; & Seward & Nguyen, 2019).

With hybrid instruction, learning consisted of in-person and online learning. The implementation of face-to-face and remote instruction was offered during the pandemic as a safeguard measure for transitioning back into the classroom. This method for reintroducing students and instructors to in-person learning, while still seeking to
minimize the exposure to COVID-19, enabled school districts to assess both methods of instruction, simultaneously. The evaluation of social interactions among each mode of instruction provided the necessary feedback regarding how students engaged during learning to determine if academic performance was enhanced (El Refae et al., 2021; & Lake et al., 2021). These measures of performance were associated with social interactions between the instructor and students (Gustafson & Branch, 2002; Meyer, 2014; Moore, 1989; Nilson & Goodson, 2017; & Seward & Nguyen, 2021).

The reactive nature of the instant conversion from in-person to online then, hybrid instruction created a dynamic within student learning that was explored. Therefore, a comparison of the students’ final mean GPAs before, at the onset of, and during the pandemic was analyzed to determine if there was a relationship among the final mean GPAs, during each timeframe.

**Three Time Periods.** The three timeframes and the relation to each mode of instruction are indicated below:

- **Time Period 1**: 2018 – 2019 school year with in-person instruction only,
- **Time Period 2**: 2019 -2020 school year with online instruction only, and
- **Time Period 3**: 2020 – 2021 school year with online or hybrid instruction.

The classification of each timeframe was necessary to make a comparative analysis of the students’ final mean GPAs while using one of the three modes of instruction. Any relation between each timeframe, and the association with the corresponding mode of instruction, were investigated to determine if there was a likelihood that students’ level of student engagement was influenced by their social interaction, during that designated mode of instruction. An investigation of each mode of instruction and its associated
timeframe was indicated within each of the three research questions that first compared the two modes of instruction. Below, Table 5 describes this analysis regarding the overall sample:

**Table 5**

*Data Source and Settings for Research Question 1*

<table>
<thead>
<tr>
<th></th>
<th>Time Period 1: Before the Pandemic</th>
<th>Time Period 2: Onset of the Pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Sample</td>
<td>In-person</td>
<td>Online</td>
</tr>
</tbody>
</table>

Next, a comparison of all three modes of instruction (in-person, online, and hybrid) was investigated across all three timeframes (Time Periods 1, 2, and 3) to determine if there were any similarities for a specific group of the sample (Group 2) that attended the hybrid instruction during Time Period 3 (eighth grade). Below, Table 6 describes this analysis:

**Table 6**

*Data Source and Settings for Research Question 2*

<table>
<thead>
<tr>
<th></th>
<th>Time Period 1: Before the Pandemic</th>
<th>Time Period 2: Onset of the Pandemic</th>
<th>Time Period 3: During the Pandemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 2</td>
<td>In-person</td>
<td>Online</td>
<td>Hybrid</td>
</tr>
</tbody>
</table>

Finally, a comparison between one group of students (Group 1) that attended the online instruction and the remaining group of students (Group 2) that attended the hybrid instruction during Time Period 3 (eighth grade) were examined. Below, Table 7 describes this analysis:

**Table 7**

*Data Source and Settings for Research Question 3*
In summary, this study utilized the comparative analysis because the pre-existing data collected was not manipulated; therefore, there was no assignment of an experimental group and a control group. Instead, the research questions and hypotheses were developed to test comparisons of variables (e.g., modes of instruction and the students’ final mean GPAs) across multiple timeframes. This comparative analysis was not conducted within a laboratory environment where factors that could influence elements of the study were introduced for testing the hypothesis. Instead, preexisting data was collected based on actual student course completion grades. This process appeared to be more evidential as the data was acquired from a real-world scenario, not a predesigned environment that established a control (unchanged) group and an experimental (manipulated) group. To test the hypotheses of the real-world scenarios, certain assumptions associated with each variable were met.

The assumptions aligned with a preconceived narrative where one group was tested and then compared to another group held constant (unchanged). Based on the results of the study, the hypothesis was neither proven nor disproven. Instead, in this study, the research questions and hypotheses were developed to compare the means of the students’ final GPAs to determine if a relationship existed between the three modes of instruction across three timeframes. Therefore, the three research analyses (Paired t-test, One-Way Repeated Measures ANOVA, and Independent Samples t-test) were used in this study because of the need to determine if any inferences could be drawn based on the
association of the students’ final mean GPAs to the level of student engagement. Student engagement was theoretically based on the different types of social interactions found within in-person, online, and hybrid instruction.

**Participants and Sampling**

This section of the study described the different levels of the study’s population and the depiction of how participants were selected within each level of the population. When establishing the study’s population, an assessment of GPA scores for the two groups of participants that attended one of the three modes of instruction, across the three timeframes, was reviewed. For the first timeframe (*Time Period 1*), the GPA scores of all participants were explored based on attending *in-person* instruction. During the second timeframe (*Time Period 2*), an assessment of GPA scores obtained from all participants that attended *online* instruction was reviewed. Lastly, the GPA scores of each participant were explored during the third timeframe (*Time Period 3*). The assessment in Time Period 3 was based on attendance in one of the two modes of instruction: *online* or *hybrid*.

The process for determining the sample size to be tested and analyzed was reviewed. The demographic structure comprising each population level was introduced to provide context for the overall sample that was selected. However, before discussing the participant groups, an introduction of the following *levels of the population* was described: total population, target population, and study population.

**Levels of the Population**

The levels of the population used in this study included the: (a) total population, (b) target population, and (c) study population. The largest group utilized for determining
the participants for the study was the overall population. Within this group, the *total population* was the complete set of students from *ABC County School District*, in a western state. The students from this group possessed specialized characteristics that were needed for the study. The next level was comprised of the *target population*. The participants formed within this subgroup possessed specific characteristics that were essential for guiding the researcher’s inquiry. Then, the *study population* was an even more specialized subgroup of the overall population that the researcher deemed to be the group to be explored within the study. Lastly, the study’s overall *sample* was the finite subset of the overarching population that became the representative group to be analyzed, within the study. The factors that determined the overall sample included a more feasible number of participants to be analyzed due to the researcher facing time limitations, lack of necessary resources, and funding (Scholarly Journal, 2021). Below, Figure 9 illustrates the correlation between the levels of the population and the overall sample:

**Figure 9**

**Population Levels**

![Population Levels Diagram](image-url)
**Total Population.** In this study, the total population was classified as the total number of students within the ABC County School District, in a western state. This school district was categorized as urban-based which was dependent on the number of students attending elementary, middle, and high school (Guinn Center, 2020). During the timeframe of this study, approximately 64,400 students attended one of 117 public or academy K-8 and K-12 schools (Western Department of Education, 2021). Based on the criteria for this study, students that did not attend one of the schools for sixth, seventh, or eighth grade from the beginning of Spring 2018 through the end of Spring 2021 were not included in the results. The results, from the report, were obtained from the ABC County School District. The data that met this criterion was considered inclusive for this study and thus, classified as the target population.

**Target Population.** In this study, the target population was classified as the total number of students that attended sixth, seventh, or eighth grade, at any time between the beginning of Spring 2018 through the end of Spring 2021. The initial dataset received contained an exhaustive list of multiple line items for each student. The line items included data from the following criteria, across the three school-year timeframes:

- Term (T2 or T4).
- Course name for each class attended, per term.
- Course completion grade for each class, per term.
- Classification of each mode of instruction (in-person, online, or hybrid), per term.

The completion grades (for T2 and T4) for the following five courses were provided within the dataset that met the criterion requirement: English/Language Arts,
Mathematics, Science, Social Studies, and an Elective. These courses were recommended for satisfying an academic performative standard for a student to be promoted from one grade level to the next grade level (*ABC* County School District, 2021). To narrow the dataset to the specific criterion that was met for the study, data was extracted. The results from the data extraction yielded the *target population*. Below, Table 8 illustrates the descriptors that were included in the target population:

**Table 8**

*Target Population and Term Description*

<table>
<thead>
<tr>
<th>GRADE</th>
<th>TERM</th>
<th>SCHOOL YEAR</th>
<th>INSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6th</td>
<td>T2, T4</td>
<td>Beginning of Fall 2018 – End of Spring 2019</td>
<td>In-person</td>
</tr>
<tr>
<td>7th</td>
<td>T2</td>
<td>Throughout Fall 2019</td>
<td>In-person</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>Throughout Spring 2020</td>
<td>Online</td>
</tr>
<tr>
<td>8th</td>
<td>T2, T4</td>
<td>Beginning of Fall 2020 – End of Spring 2021</td>
<td>Online or Hybrid</td>
</tr>
</tbody>
</table>

The description of Grades 6, 7, and 8; Terms T2 and T4; and each school year’s timeframe (2018-2019, 2019-2020, and 2020-2021) were aligned with the corresponding mode of instruction to describe the dataset. Based on these specifications, any criterion within the dataset that did not meet the guidelines was removed. The results from this additional extraction were classified as the *study population*.

**Study Population.** In this study, the study population (*N*) was classified as the dataset that provided the descriptors (indicated each student) that included at least the designated five courses, enrolled in elementary (for sixth grade only) and/or middle school (for sixth, seventh, and eighth grades) during the specified timeframes and the
associated mode of instruction. The remaining dataset included useable data for \( N = 4,094 \) students that attended 66 elementary and middle schools throughout the school district.

To quantify the course completion grades, the final GPAs for each student, per term and the school year, were calculated (an explanation of GPA calculations was provided in the Measurement and Instrumentation section). Because manually calculating the GPAs for over 4,000 students across three years would be a daunting task, a sample size of the study population was generated. Completing this process created a more feasible dataset necessary for formulating the computations. The process of a single researcher manually assigning a numerical value, then computing the GPAs for thousands of students would take a significant amount of time (e.g., four months or more) to complete. This excessive amount of time could be better served in reviewing the relationships among the final mean GPAs for a smaller representation (sample) of the study’s population.

**Sample Size**

In this study, the sample size (\( N \)) was classified as the representative group taken from the study population. Here, the participants were not randomly assigned, but rather randomly selected from the study population. Observations or information obtained from a questionnaire/survey were not the source of data collection for this sample. Because the dataset was obtained from preexisting data, there was not a control group or an experimental group that utilized random assignment for designating which group a participant was designated. Instead, specified characteristics from the population (i.e., one of the three modes of instruction) were proportionately represented within the
sample. To achieve this representation, the target population was separated by the identifiable strata to form the subgroup (e.g., the study population). Then, each participant aligned with the specific characteristic was randomly selected to form the overall sample.

Probability Sampling, a form of random selection, was used as the process of selection. The utilization of this process allowed for the overall sample to be a representation of the study population (Scribbr, 2021). Probability Sampling was used to select participants for Group 1 and Group 2, a subset of the overall sample in the study (Scribbr, 2021). Here, specific characteristics were equally represented in the sample. The sample was then strategically defined and divided into the three sets of strata (i.e., modes of instruction: in-person, online, and hybrid). Each distinct subset of the sample was needed for improving the statistical quality of the findings. Once the strata were formed, the researcher randomly selected a sample within each stratum. This sampling technique allowed the researcher to divide a broader population into smaller subgroups that met separate criteria while representing the entire population.

The criterion used to distinguish the two groups for the study included the difference in the modes of instruction for Time Period 3: online versus hybrid. Then, the participants were randomly selected (per order of the assigned Identification Number, which was defined in the following section entitled Groups 1 and 2 Defined) that became members of Group 1 (online instruction during Time Period 3) or Group 2 (hybrid instruction during Time Period 3) (QuestionPro, 2022). Each participant had an equal opportunity for being selected, at random. These two groups, within the overall sample, were not equivalent, nor did either group contain a treatment or a condition.
Power Analysis. To determine the minimum number of participants that were included in the sample, the use of the GPower 3.1 analysis tool depicted the approximate number of students required for making broad inferences about unexplored populations of interest (e.g., generalizations). The basis for making generalizations in this study was purposeful for being able to apply aspects of the overall sample to the overall population and minimize the time that would otherwise be dedicated to formulating calculations and testing analyses for approximately 64,400 students. Based upon the GPower Analysis for each data analysis, reporting of the partial sample sizes is depicted in Table 9 below:

Table 9

GPower Analysis

<table>
<thead>
<tr>
<th>Data Analysis Method</th>
<th>Statistical Test</th>
<th>Effect Size</th>
<th>Partial Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pairwise Comparison t-test</td>
<td>Means: Difference between two dependent means (matched pairs)</td>
<td>$d = 0.50$</td>
<td>$n = 45$</td>
</tr>
<tr>
<td></td>
<td>Alpha Level – 0.05</td>
<td>(medium)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confidence Level – 0.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-Way Repeated Measures ANOVA</td>
<td>ANOVA: Repeated measures within factors</td>
<td>$f = 0.25$</td>
<td>$n = 44$</td>
</tr>
<tr>
<td></td>
<td>Alpha Level – 0.05</td>
<td>(medium)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confidence Level – 0.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent Samples t-test</td>
<td>Means: Difference between two independent means (two groups)</td>
<td>$d = 0.50$</td>
<td>$n = 175$</td>
</tr>
<tr>
<td></td>
<td>Alpha Level – 0.05</td>
<td>(medium)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confidence Level – 0.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With the Paired t-test, an analysis of the difference between the two matched pairs (dependent) means across two groups (Group 1 and Group 2) was completed. This analysis determined if there were any differences in the students’ final mean GPAs (dependent variable) between in-person and online modes of instruction (independent
variable). Here, the two groups of students attended the same instruction that aligned with each of the two timeframes (Time Period 1 and Time Period 2).

With the One-Way Repeated Measures ANOVA design, an analysis of the difference across all timeframes for one group (Group 2) was investigated. This analysis determined if there were any differences among the final mean GPAs for students that attended in-person (Time Period 1), online (Time Period 2), and hybrid (Time Period 3) instruction.

Then, the Independent Samples t-test design analyzed the differences between two groups (Group 1 and Group 2), separately, at one point in time (Time Period 3). This analysis determined if there were any differences among the final mean GPAs for the group of students that attended online instruction. The same analysis was then used to examine any differences among the final mean GPAs for the group of students that attended the hybrid instruction (Group 2).

The constant GPower factors for each of the data analyses included: the type of power analysis (A Priori), error probability (Alpha: $\alpha = 0.05$), and power (Confidence Level: $1 – \beta = 0.95$). In this study, the overall sample of 600 participants was randomly selected to be examined with 300 students identified as Group 1 and 300 students identified as Group 2.

Groups 1 and 2 Defined. Each participant from the target population was assigned an 8-digit Unique Identifier to maintain the anonymity of each participant. To compare the difference between the final mean GPAs, two independent groups were identified as Group 1 and Group 2, which were the subset groups derived from the sample. Below, Table 1 illustrates the difference between each group:
Table 1

Data Source and Settings for the Comparisons

<table>
<thead>
<tr>
<th></th>
<th>Time Period 1</th>
<th>Time Period 2</th>
<th>Time Period 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1</strong></td>
<td>In-person</td>
<td>Online</td>
<td><strong>Online</strong></td>
</tr>
<tr>
<td><strong>Group 2</strong></td>
<td>In-person</td>
<td>Online</td>
<td><strong>Hybrid</strong></td>
</tr>
</tbody>
</table>

Each group consisted of 300 students that attended in-person instruction during the sixth grade (Time Period 1) and online instruction during the seventh grade (Time Period 2). The difference between these two groups was found during the eighth grade (Time Period 3). The significance of the difference between the two groups was related to the mode of instruction (*online* versus *hybrid*). While the online mode of instruction consisted of students that attended remote learning for the entire school year, the students that attended the hybrid mode of instruction had a combination of remote and in-person learning. The identification of Group 1 contained the 300 students that attended online instruction during the eighth grade (Time Period 3) while the remaining 300 students, Group 2, attended hybrid instruction during Time Period 3.

**Demographics of the Overall Sample**

The participants’ demographic characteristics obtained (e.g., *gender* - male or female, *free and reduced lunch* (FRL), *individualized education program* (IEP), and *English learner* (EL) statuses) were not evaluated in this study. However, to provide context for the participant demographic characteristics, the numerical breakdown of each characteristic is clarified within Group 1 (online mode of instruction in Time Period 3) and Group 2 (hybrid mode of instruction in Time Period 3). Below, Table 10 illustrates
the numerical description of the demographic characteristics for Group 1 and Group 2 derived from the overall sample \((n = 600\) students) and \((N = 4,094)\) obtained from the study population:

**Table 10**

*Demographic Characteristics*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Online Group 1</th>
<th>Hybrid Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>137 45.67%</td>
<td>155 51.67%</td>
</tr>
<tr>
<td>Female</td>
<td>163 54.33%</td>
<td>145 48.33%</td>
</tr>
<tr>
<td>Total</td>
<td>300 100%</td>
<td>300 100%</td>
</tr>
</tbody>
</table>

Previous research has overwhelmingly indicated there were no statistically significant differences found between these variables when the final mean GPAs were compared (Hobson & Puruhito, 2018; & Scales et al., 2019).

**Procedures**

This section of the study discussed how the data was collected to conduct the analysis. First, the course completion grades were collected. Next, an overview of the process for submitting the application and obtaining approval for requesting research information was described. Then, a description of each Time Period distinguished the timeframe for each mode of instruction. Lastly, an explanation of the manual calculations and coding of the students’ GPAs were provided.
Data Collection

Before submitting a request to conduct research, successful completion of the certified Human Subjects Projection training (i.e., CITI equivalent) was required. Data collection was initiated upon the completion and submittal of the electronic application to the university’s Institutional Review Board (IRB). Upon review and processing of the application by the IRB, approval to commence with data collection was permitted. Next, the electronic Research Study Request form was completed and submitted to the ABC County School District’s Department of Accountability. A copy of the following documents accompanied the request for research information:

- Approval letter from the university’s IRB.
- The CITI certification of completion.
- A detailed study protocol describing the following:
  - The study population;
  - Recruitment procedures;
  - Study procedures;
  - Type of data to be collected;
  - Data collection materials;
  - How the student, parent, and/or ABC County School District staff’s privacy would be protected; and
  - The study’s short-term and/or long-term benefits.

Upon approval from the school district, a request for research information containing characteristics that met the specified criteria, required for the study, was submitted to the school district’s Data Analytics Team. This team provided statistical data consisting of
the students’ course completion letter grades (i.e., A, B, C, D, or F), course names, and
details regarding the timeframe for when the three modes of instruction were attended.

The information was collected from an existing statistical dataset associated with
student enrollment in the sixth, seventh, and eighth grades. The timeframe for the data
requested ranged from the school terms (i.e., T2 and T4) beginning Spring 2018 through
the end of Spring 2021. Students enrolled, at any point in time, in one of the school
district’s elementary (sixth grade) and/or middle school (sixth, seventh, and eighth grade)
were identified as the target population. The data aligned with this group of students were
categorized within three points of time: Time Periods 1, 2, and 3.

**Description of Time Periods 1, 2, and 3**

Time Period 1 consisted of students enrolled in the sixth grade from the beginning
of Fall 2018 through the end of Spring 2019. This timeframe consisted of two terms:
Term 2 (T2) designated as Fall 2018 and Term 4 (T4) designated as Spring 2019. Time
Period 2 consisted of students enrolled in the seventh grade from the beginning of Fall
2019 through the end of Spring 2020. This timeframe consisted of two terms: T2 (Fall
2019) and T4 (Spring 2020). Then, Time Period 3 consisted of students enrolled in the
eighth grade from the beginning of Fall 2020 through the end of Spring 2021. This
timeframe consisted of two terms: T2 (Fall 2020) and T4 (Spring 2021). The breakdown
of each term during the associated Time Period and mode of instruction delivered were
reiterated in Table 8 below:

**Table 8**

*Target Population and Term Description*
The participants meeting this level of enrollment criterion, collectively, were identified as the study population.

The information collected from the study population (i.e., course completion grades and modes of instruction) was manipulated through manual calculations and coding (e.g., assigned numerical figures). Once this process was completed, the data was entered and then assessed via results from the SPSS analytical tool. An indication of how the data was measured was reviewed through other resourceful information obtained from the ABC County School District’s website. The implementation of these resources and supporting online documentation sources were included in the study, in Appendices A and B.

### Measurement and Instrumentation

This section of the study discussed what resources the ABC County School District implemented for measuring student performance. A review of traditional instructional practices, digital learning tools, and traditional versus modified assessments supported the selection of resources implemented by the school district. First, a description of the traditional and digital resources utilized for learning before, at the onset of, and during the pandemic was presented. Next, a comparison between the traditional
and modified assessments was reviewed. Then, an evaluation of how each of the variables was calculated was reported. Any assumptions based on the measurements of the instruments and research settings used were included in this discussion. Lastly, an evaluation of the quality of the research, a measurement of the instrument’s validity and reliability, provided insight into how likely the results from the study corresponded to real-world scenarios.

Implementation of the School District’s Resources

Additional resources offered by the school district provided intricate details that enhanced the study’s factors for measurement and assessment. An understanding of what materials were available for the students pre-pandemic and additional resources used to advance learning during the pandemic was explained. How the modes of instruction were delivered through various platforms and tools used to supplement learning were reviewed.

As initially specified for this study, the school district offered in-person, online, and hybrid instruction for educating middle school students before (Grade 6), at the onset of (Grade 7), and during the pandemic (Grade 8). Because each of the students selected for the study followed the traditional in-person mode of instruction pre-pandemic, the ABC County School District’s website outlined resources that were used to support this mode of instruction for each of the four common core subjects (English/Language Arts, Math, Science, and Social Studies). The school district followed the Western State Academic Content Standards (SACS) for each common core subject.

Traditional Instruction. For English/Language Arts (ELA), the SACS introduced the six ELA Instructional Shifts found within the common core framework for
Grades 6 through 12. These descriptors were used to highlight the necessity for students to meet the standards set for constructing knowledge through reading, writing, and building upon academic vocabulary that was essential for college and career readiness (ABC County School District, 2021). The information was obtained from the school district’s source of literature that was provided in textbooks and other supplemental classroom learning aids found within the Common Core State Standards (CCSS, 2002-2021). As endorsed by authors of the CCSS (2002-2021), the descriptor for each Shift is listed below:

- **Shift 1: PreK-5 Balancing Informational and Literary Text** – Students must be able to read informational and literary texts.

- **Shift 2: 6-12 Knowledge in the Disciplines** – Students are required to learn from the text read from textbooks within classroom learning.

- **Shift 3: Staircase of Complexity** – Scaffolding from close and careful reading enables students to build knowledge upon reading new textual information.

- **Shift 4: Text-Based Questions and Answers** – Students are required to impose evidentiary arguable dialogue with fellow students and independently in writing to demonstrate comprehension of the text.

- **Shift 5: Writing from Sources** - Students must demonstrate the use of evidence to inform or make arguments when responding to ideas, events, facts, or opinions constructed in the text.

- **Shift 6: Academic Vocabulary** – Students are required to build on the ability to access more complex texts based on grade level.
These criteria were the standards for ELA students in Grades 6 through 12, inclusive of the study’s overall sample – *Grades 6 through 8*. The fulfillment of each Shift was met before advancement to the next Shift. Students developed competencies that demonstrated the construction and retention of knowledge. To enhance this learning tool, a list of resources that supported the six ELA Instructional Shifts and served as the authorized learning guides are presented in Appendix A. These additional resources assisted teachers and curriculum designers to advocate learning strategies used to enhance students’ reading and writing proficiencies (Common Core State Standards, 2002-2021).

For Mathematics in Grades 6 through 8, the SACS also aligned with the requirements of the CCSS. Here, each grade level began with an introduction to Mathematics that reinforced previously learned competencies while building upon more complex numerical expressions. Then, the mathematical topics were introduced based on criteria set for each grade level (Common Core State Standards Initiative, 2021). Below, Figure 10 describes the critical areas that are covered in each grade level for Mathematics concepts:

**Figure 10**

**Mathematical Critical Areas of Focus**
These areas of focus displayed that the standards for each grade level were attainable for students based on previous knowledge. Comprehension achieved in Grades K through five established the foundation for more complex mathematical skills to be practiced and applied to learning. The CCSS (2021) delineated the following mathematical standards (established for sixth, seventh, and eighth grades) which provided precision and specificity as an alternative to broad generalizations interpreted for knowledge, skills, and comprehension developed: *Ratios and Proportional Relationships, The Number System, Expressions and Equations, Geometry, Statistics and Probability, and Functions*. Confrey (2007), as cited in Common Core State Standards Initiative, 2021, suggested that these topics presented a stratum of sequenced obstacles and challenges for students to
overcome; therefore, to ensure the criteria had been met for each grade level, mastery of the specified mathematical standards was necessary for learning to ensue and advancement to the next level (e.g., scaffolding). As a guiding principle for learning outcomes, scaffolding allowed students to build upon previous knowledge while retaining new information as a measure for reinforcing learning (Gredler, 2009). To enhance this learning tool, a list of resources that reinforced the initiative for setting mathematical standards is presented in Appendix B.

For Science Grades 6 through 8, the *Western State Department of Education* (2021) followed the same common core standards established for English/Language Arts; however, the CCSS Initiative (2021) utilized a more specific framework for understanding the relationships between the course’s standard for learning and student achievement which were measured by learning outcomes. Each course level covered three dimensions for students to acquire scientific knowledge: Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. Aligning with *Science and Engineering Practices*, the students adhered to the use of specific evidential information when applying investigative practices with scientific and technical text. For example, the respective grade level course structure required students to determine the meaning of scientific key terms, symbols, and other domain terminology as implied in experimental research. Within *Crosscutting Concepts*, students integrated quantitative or technical information used as visual expressions (i.e., diagrams, flowcharts, graphs, models, and tables) (Common Core State Standards Initiative, 2021). Contrasts and comparisons among student findings were made based on results from experiments, multimedia,
simulations, and/or videos. Below, Table 11 illustrates the *Disciplinary Core Ideas* presented in the course overview for each grade level:

**Table 11**

*Science Disciplinary Core Ideas*

<table>
<thead>
<tr>
<th>SIXTH GRADE SCIENCE – Disciplinary Core Ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester A (T2)</strong></td>
</tr>
<tr>
<td>Structure, Function, and Information Processes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEVENTH GRADE SCIENCE – Disciplinary Core Ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester A (T2)</strong></td>
</tr>
<tr>
<td>Organisms and Non-living Things Are Made of Atoms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EIGHTH GRADE SCIENCE – Disciplinary Core Ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester A (T2)</strong></td>
</tr>
<tr>
<td>Evolution Explains Life’s Unity and Diversity</td>
</tr>
</tbody>
</table>

To enhance this learning tool, a list of resources that reinforced the initiative for setting scientific standards is presented in Appendix B.

For Grades 6 through 8, the *Western* State Academic Content Standards for Social Studies aligned with the principles established by the CCSS (2002-2021). The central ideas aimed to include students acquiring the ability to summarize and cite specific textual evidence concerning historical primary and secondary sources. Students were also required to demonstrate the ability to identify the main steps associated with the processes of historical legislature found within the text. For example, students were required to describe the process of how a bill becomes law and how interest rates rise or fall (Common Core State Standards Initiative, 2021).
The overview of the course entailed an understanding of how cultural differences impacted events at the local, state, national and international levels. The six content areas included civics, economics, financial literacy, geography, history, and multiculturalism. Within each content area, there were a set of disciplinary skills that created more complex skill development as students continued to build upon prior knowledge (Western Department of Education, 2021). To enhance these learning tools, a list of resources that reinforced the initiative for setting social studies standards were presented in Appendix C. In addition to the common core standards set by national and state educational resources, students were equipped with digital learning in preparation for future endeavors.

**Digital Learning.** Preparing students for the use of future technologies required schools to offer a solid foundation of abundant access to and application of digital tools and resources (ABC County School District, 2018-2021). The school district designated an entire learning team that focused on the design and instructional components for online and blended (hybrid) learning environments for students, teachers, and academic leaders that supported the digital learning platform. What better time to assess the implementation of these tools and established competencies of learners than during the pandemic when the transition from traditional, in-person instruction to online learning was mandated. The ABC County School District (2018-2021) presented the following prioritized programs, tools, and ideologies to assist students with accessing digital platforms and developing the necessary competent skills:

- **Microsoft Teams:** platform used for delivering instruction and student participation.
• **21st Century Learning**: development of digital learning competencies by grade level.

• **Digital Citizenship**: a guide that informs students of the pitfalls associated with the use of digital forums and facilities the process for becoming a responsible user.

• **Digital Learning Tools**: a tool that seeks to protect and secure student data and personally identifiable information throughout the digital platform.

• **Computer Science**: beyond the scope of computer programming, this tool imparts computational thinking, logical reasoning, critical thinking, and problem-solving skills that students need to effectively utilize resources within the digital platform.

Each aspect of the digital learning platform strategically aligns student learning to the development of competencies necessary for present and future technological advancements (*ABC* County School District, 2018-2021). As a result of the pandemic, the expansion of the protocols for traditional common core instruction ushered in the necessity for use of digital platforms for just-in-time remote learning requirements. And for future preparation, students were provided access to these tools and resources which garnered many opportunities to learn and experience scenarios designed for college readiness and career paths (*ABC* County School District, 2018-2021).

**Traditional and Modified Assessments.** The *Western* State Assessment System was designed to prepare students *for* and to assess the performance *of* educational readiness in the 21st Century (*ABC* County School District, 2018-2021). Pre-pandemic (Time Period 1), the National Assessment of Educational Progress (NAEP) measured
student performance in reading and writing (components of ELA), math, science, and
U.S. history (a component of Social Studies) (Western Department of Education, 2021). The ELA Proficiency rating for middle school students was 50.6% and 36.8% for Mathematics Proficiency. There were no results reported for Science and Social Studies during this timeframe as assessments for these subjects were not an evaluation requirement for students in the sixth grade.

The results of the assessments were collectively presented as a continuous national representation of student performance within each core course. The Western Department of Education (2021) provided the following listing of assessments administered for students in Grades 6, 7, and/or 8:

- **Grades 6 through 8**: English Language Proficiency Assessment;
- **Grades 6 through 8**: Smarter Balanced Assessment (SAB) for ELA and Math;
- **Grades 7 and 8**: End of Course Examinations (EOC), for ELA and Math; and
- **Grade 8**: State Science Assessment.

These assessments aligned with federal and state education laws. Each assessment was governed by the National Assessment Governing Board (NAGB) and administered by the National Center for Educational Statistics (Western State Department of Education, 2021).

Because of the transition from in-person to online and hybrid instruction, modifications to the assessment timelines were made. For instance, the chronic absenteeism rates were waived for the Western State School Performance Framework (WS-SPF) reporting. The WS-SPF (an annual summary of school performance) was
based on a compensatory accountability system containing a series of Performance Indicators and Measures. The \textit{Performance Indicators} were general categories while the \textit{Measures} represented the building blocks of the Performance Indicator (Western Department of Education, 2021).

The results from the English Language Proficiency assessment were scheduled to be provided in early 2022 (Western Department of Education, 2021). Due to the pandemic, the 95\% participation requirement was waived for the 2020-2021 school year (Time Period 3). Also, there was no End of Course (EOC) assessment administered or scores obtained; therefore, this evaluation was not included in this study. Instead, the GPAs, manually calculated from the course completion grades, were used to assess overall student achievement.

\textit{Measurement of the Variables}

This study explored the level of student engagement based on social interactions among students that attended three different modes of instruction (in-person, online, and hybrid), across three timeframes (before, at the onset of, and during the pandemic). Because the standardized assessments were modified and/or waived, the anticipated results were used as the measurement indicator of academic achievement. While the two most common instruments used in quantitative research are questionnaires/surveys and tests that provide data for statistical analyses, in this study, the final mean GPAs for each student were used. The use of this instrument determined the relationship between the quantitative ability (e.g., students’ ability to solve Aptitude test questions) and academic achievement in ELA, Mathematics, Science, Social Studies, and an elective course taken among the students within the overall sample. A note of contention was though the
assessment criteria may have varied across the three Time Periods (Time Periods 1, 2, and 3), the assessment criteria was the same for all student participants within each Time Period. In this study, the students’ GPAs were used for comparing the assessment criteria across the three time periods.

The variables that were obtained from the school district, calculated, then used for statistical analyses in this study included the school year, grade level, 8-digit unique identifier, course name, semester term, course completion grades, and learning designation classifications associated with each participant. The school district assigned each participant a random 8-digit unique identifier. No other pertinent information relating to the participants’ identification was utilized for this study. The grade level was used to align a participant’s level of education with the appropriate school year required for this study. For example, to be included in the study population, a participant’s information must have aligned as being (a) a sixth-grader during the 2018-2019 school year, (b) a seventh-grader during the 2019-2020 school year, and (c) an eighth-grader during the 2020-2021 school year. All other participants that did not meet these criteria were extracted from the results to be analyzed. Next, the reporting of course subjects and semester terms that met the minimum requirement of the four core plus one elective course and Term 2 (T2) plus Term 4 (T4) criteria. If the criteria were missing or not reported, the corresponding participant data was removed from consideration for this study. Lastly, the mode of instruction each participant attended, per grade level and timeframe, aligned according to the criteria for the study. If students in the sixth grade did not attend in-person instruction, seventh-grade students did not attend online
instruction, and eighth-grade students did not attend online or hybrid instruction, the corresponding data was also removed from consideration.

This data was deemed the necessary criteria used in the study. Once this data was collected, the course grades were calculated to determine the GPA for each participant and the mode of instruction, during each timeframe. These two variables were classified as the independent (instruction) and dependent (GPA) variables. To determine the numerical value of these variables, the data were calculated or coded.

**GPA Calculations and Coding.** To calculate the final GPAs for each student within the overall sample (Groups 1 and 2), the GPAs for T2 and T4 were manually calculated, individually, within each timeframe. When calculating the GPAs, the following point allotment was assigned for each letter grade earned, per course:

- **Course Grade A**: 4 points.
- **Course Grade B**: 3 points.
- **Course Grade C**: 2 points.
- **Course Grade D**: 1 point.
- **Course Grade F**: 0 points.

Once the GPAs were determined for each term, the final GPAs were determined by calculating the average GPAs for T2 and T4.

Following the final mean GPA calculations, coding was used to convert the nominal data to numerical values for entry and analysis in SPSS. In Table 12 below, the categorization for students through descriptive labels from learning designations was assigned the corresponding numerical values:

**Table 12**
The three data analyses conducted included: (a) Paired t-test – an evaluation of Groups 1 and 2 within Time Periods 1 and 2; (b) One-Way Repeated Measures ANOVA – an evaluation of Group 2 during Time Periods 1, 2, and 3; and (c) Independent Samples t-test – an evaluation of Groups 1 and 2 in Time Period 3. The Paired t-test analysis was used to compare the final mean GPAs of the entire sample (Groups 1 and 2) across the same two modes of instruction (in-person and online), during the same timeframe (Time Periods 1 and 2). This analysis was used to determine if there were any significant differences between the two groups that attended the same instruction, at the same time. The One-Way Repeated Measures ANOVA was used to compare the final mean GPAs of the same group (Group 2) across all three modes of instruction (in-person, online, and hybrid) and timeframes (Time Periods 1, 2, and 3). This within-subjects analysis was necessary because any significant differences noted among the same group of students were then identified through comparisons between each mode of instruction. Lastly, the Independent Samples t-test was used to compare each group (Groups 1 and 2) during the same timeframe (Time Period 3). The purpose of this analysis was to determine if there were any significant differences in the final mean GPAs between the criterion that separated the two groups: instruction (online versus hybrid) at one point in time.
**Assumptions.** The underlying assumptions regarding how the data were distributed on a normal curve were met for the correct statistical calculation, for each of the three analyses, to be proven valid. For use of the Paired t-test to be valid, the following assumptions must be met:

- The *difference between the pairs* should be normally distributed.
- The data must be independent of one another.
- There should be no extreme outliers in the differences.

The assumptions that were met to determine the validity of the One-Way Repeated Measures ANOVA included variables that were: (a) continuous, (b) normally distributed, (c) derived from a random sample, (d) contained enough data from the overall sample, and (e) met sphericity guidelines (i.e., equality of variances of the differences between the levels of the same repeated factor) (Springhill, 2012). The assumptions for the Independent Samples t-test were the same as the Paired t-test data analysis except for an indication that the *difference between the pairs* (as opposed to the *difference in the variance of the pairs*) should be normally distributed (Springhill, 2012).

An examination of the tools used for the data analyses determined the efficacy of the research. The development and application of the instrument used to compile the data sought to measure the level of student engagement based on social interactions across the three timeframes. When quantifying these nominal variables, how the instrument was measured was explored to determine the validity and reliability.

**Data Analysis**

According to the *purpose of the study* and *research questions*, the following data analyses were conducted:
Research Question 1

A Paired t-test was conducted to compare the final mean GPAs for the overall sample \( (N = 600) \) in two modes of instruction: (a) in-person (before the pandemic - Time Period 1) and (b) in online instruction (at the onset of the pandemic - Time Period 2. Research Question 1 is indicated below:

RQ1: Are there any differences in the means of the students’ final GPAs when measured during in-person instruction (before the pandemic in Time Period 1) and during online instruction (at the onset of the pandemic in Time Period 2)?

The null hypothesis for this research question indicated that the final mean GPAs for the overall sample were equal. The equality of each group’s characteristics was based on the number of participants in each group \( (n = 300 \text{ students in Group 1 and } n = 300 \text{ students in Group 2}) \), grade level (Grades 6 and 7), type of instruction (in-person and online), and courses taken (four core plus one elective). The rejection of the null hypothesis indicated there was a statistically significant difference among the final mean GPAs for the overall sample between Time Periods 1 and 2. The difference inferred that the GPA means of Group 1 was larger than Group 2 or that the GPA means of Group 1 was smaller than Group 2. A significant difference among the final mean GPAs suggested that the level of student engagement, based on social interactions during specific instruction, did influence academic achievement between the groups analyzed. Such a conclusion from the test of the hypothesis would have revealed that the results are supported by the literature’s assumption that students’ final mean GPAs are impacted by the level of student engagement between in-person and online instruction.
Research Question 2

A One-Way Repeated Measures ANOVA was conducted to compare the final mean GPAs for Group 2 when measured in all three modes of instruction: in-person, online, and hybrid. The final mean GPAs of the 300 students in Group 2 were evaluated during Time Period 1 (before the pandemic), during Time Period 2 (at the onset of the pandemic), and during Time Period 3 (during the pandemic) was investigated. Research Question 2 is indicated below:

RQ2: Are there any differences in the final mean GPAs of Group 2 students when measured during in-person instruction (before the pandemic in Time Period 1), during online instruction (at the onset of the pandemic in Time Period 2), and during hybrid instruction (during the pandemic in Time Period 3)?

The statement of the null hypothesis for this research question indicated that the sample means for in-person, online, and hybrid modes of instruction were the same among the same students in Group 2. A rejection of the null hypothesis indicated there was a difference among the final mean GPAs, for Group 2, within in-person, online, and/or hybrid modes of instruction. For instance, the difference would have inferred that the final GPA means of Group 2 during in-person instruction was greater than online and/or hybrid instruction. The same inference could be made regarding online instruction in comparison to in-person and/or hybrid instruction, or hybrid instruction in comparison to in-person and/or online instruction.
Research Question 3

An Independent Samples t-test was conducted to compare the final mean GPAs for Group 1 and Group 2 during a single timeframe: during the pandemic. The final mean GPAs for the 300 students (Group 1) that attended online instruction during Time Period 3 and the 300 students (Group 2) that attended the hybrid instruction during Time Period 3 were analyzed. Research Question 3 is indicated below:

RQ3: Are there any differences in the means of the students’ final GPAs between Group 1 (online instruction) and Group 2 (hybrid instruction) when measured during the pandemic in Time Period 3?

The statement of the null hypothesis for this research question indicated that the sample means for Time Period 3 were the same among the students that attended online instruction (Group 1) and those that attended hybrid instruction (Group 2). A rejection of the null hypothesis indicated there was a statistically significant difference between the final mean GPAs in Time Period 3, for Group 1, during online instruction, or for Group 2, during hybrid instruction.

In summary, the research questions enhanced the investigative efforts by providing guidance when making informed decisions about the study’s data analyses and how the groups were tested according to the goals of the research questions and null hypotheses. Each analysis was conducted to determine if there was a relationship that could be influenced by student engagement. The comparison of the relationships, based on social interactions, was measured in terms of the mode of instruction that each group attended, within the study. The testing of the hypotheses analyzed the assumptions of a population which explored details of its overall sample (e.g., via measurement of the
students’ final GPA scores) (Surg, 2010). The results from the analyses were used to make generalizations about the students in ABC County School District.

**Chapter Summary**

In Chapter III: Methodology, the research questions and data analyses were introduced and discussed. The development of the research questions and hypotheses served as theoretical reasoning for investigating certain samples of the study’s population. The three data analyses (Paired t-test, One-Way Repeated Measures ANOVA, and Independent Samples t-test) were used to conduct analyses for determining if there were any statistically significant differences between the final mean GPAs and varying modes of instruction. The final mean GPAs served as the instrument of assessment for measuring performance associated with the students’ academic achievement.

The chapter then proceeded with explaining the process for identifying the overall population and then determining the subsets of the overall sample used for the comparisons. Beginning with the total population of approximately 64,400 students within the school district, the target population and study population were established based on the datasets meeting specific standards. The standards consisted of information provided by the school district that included course completion grades for the four core plus one elective course criteria. Once the study population was determined, the GPower analysis was used to determine the minimal number of participants needed for the medium effect size for the study. The sample size \( N = 600 \) was composed of Group 1 (300 students that attended online instruction during Time Period 3) and Group 2 (300
students that attended hybrid instruction during Time Period 3). Each group attended the same instruction during Time Period 1 (in-person) and Time Period 2 (online).

Lastly, a discussion of the procedures used to collect the data and assess the instrument measurements used in the data analysis provided insight into how the findings contributed to the research. How the assessment (final mean GPAs for each student) was tested for the instrument’s validity and reliability was discussed. Ensuring the instrument measured what it was intended to measure, with continuous efficacy, was essential in proving or disproving the research was based on generalizable assumptions that aligned with real-world occurrences.
CHAPTER IV: DATA ANALYSES AND RESULTS

This chapter presented the data analyses and results from the comparative analyses that explored how middle school students’ learning outcomes could be influenced by student engagement in different modes of instruction, across different timeframes. The comparative analyses of the data described the relation between the possible differences in the level of student engagement, based on social interactions, within each mode of learning. Each analysis began with a description of each research question followed by the presentation of the results based on each of the following statistical analyses: (a) Paired t-test, (b) One-Way Repeated Measures ANOVA, and (c) Independent Samples t-test.

Data Analysis and Results for Research Question 1

The statistical analysis of the data was conducted in SPSS and included descriptive statistics, paired differences and significance, and simple bar means. The first measure of the study included the entire sample size of 600 middle school students, during Time Period 1 (sixth grade) and Time Period 2 (seventh grade). A Paired t-test was conducted to determine whether a statistically significant difference existed in the means of the middle school students’ final GPAs when measured during in-person instruction before the pandemic and during online instruction at the onset of the pandemic. The dependent variable measured was the final mean GPAs whereas the independent variable was the mode of instruction at the following two time periods:

- **In-person** instruction during Time Period 1 – sixth grade (2018-2019), and
The descriptive statistics were computed and are presented in Table 13, below, illustrating the values for the population, means, and standard deviations. The paired differences and significance were computed and are presented in Table 14, illustrating the difference within the means, significance, and the upper and lower range.

**Table 13**

*Paired t-test Descriptive Statistics*

<table>
<thead>
<tr>
<th>Measure</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Person (2018 - 2019)</td>
<td>600</td>
<td>3.2135</td>
<td>.75566</td>
</tr>
<tr>
<td>Online (2019 - 2020)</td>
<td>600</td>
<td>3.2252</td>
<td>.75228</td>
</tr>
</tbody>
</table>

**Table 14**

*Paired Differences and Significance*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Two-Sided p</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Person (2018-2019) -</td>
<td>.01173</td>
<td>Lower: -.03072, Upper: .05419</td>
<td>.543</td>
<td>599</td>
<td>.587</td>
</tr>
<tr>
<td>Online (2019-2020)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There was no statistically significant difference in the final mean GPAs between *in-person* instruction (*N* = 600, *M* = 3.21, *SD* = .76) and *online* instruction (*N* = 600, *M* = 3.23, *SD* = .75). The results of the Paired t-test were not significant (*t*(599) = .543, *p* = .587). The effect size of this Paired t-test, Cohen’s *d* equals 0.022, which was considered a small effect size based on Cohen’s (1988) conventions (e.g., 0.2 = small effect; 0.5 = medium effect; and 0.8 = large effect). The mean increase was 0.011 with the 95% confidence interval for the mean difference between the two modes of instruction being [0.031 to 0.054]. The researcher failed to reject the null hypothesis (*p*
=.587), indicating there was no significant difference in the students’ final mean GPAs between the two modes of instruction.

Below, Figure 11 displays the difference in the means between in-person instruction (sixth grade) and online instruction (seventh grade).

**Figure 11**

**Paired t-test – Simple Bar Means**

![Simple Bar Mean of InPerson_Transition, Mean of Online_Transition by INDEX](image)

The diagram depicted an overlap in the 4.0 GPA scale during in-person and online instruction in the sixth and seventh grades. Again, there was *no significant difference in the means of the students’ final GPAs when measured during in-person instruction before the pandemic and during online instruction at the onset of the pandemic.*

**Data Analysis and Results for Research Question 2**

The statistical analysis of the data was conducted in SPSS and included descriptive statistics, Mauchly’s test of sphericity, multivariate tests, pairwise comparisons, and tests within-subjects contrasts. The second measure of the study included Group 2 (300 middle school students), during all three modes of instruction. A
One-Way Repeated Measures ANOVA was conducted to determine whether a statistically significant difference existed in the final mean GPAs for Group 2 when measured during in-person instruction before the pandemic, during online instruction at the onset of the pandemic, and during hybrid instruction during the pandemic. The dependent variable measured was the final mean GPAs whereas the independent variable was the mode of instruction at the following three time periods as illustrated in Table 15, below:

**Table 15**

*One-Way repeated Measures ANOVA Design Chart for Related Groups*

<table>
<thead>
<tr>
<th>Subject (Group 2 GPAs)</th>
<th>Modes of Instruction (Levels)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In-Person (Grade 6: 2018 – 2019)</td>
</tr>
<tr>
<td>GPA1</td>
<td>GPA1</td>
</tr>
<tr>
<td>GPA2</td>
<td>GPA2</td>
</tr>
<tr>
<td>GPA3</td>
<td>GPA3</td>
</tr>
<tr>
<td>GPA4</td>
<td>GPA4</td>
</tr>
<tr>
<td>GPA5</td>
<td>GPA5</td>
</tr>
<tr>
<td>GPA6</td>
<td>GPA6</td>
</tr>
<tr>
<td>GPA7</td>
<td>GPA7</td>
</tr>
<tr>
<td>GPA8</td>
<td>GPA8</td>
</tr>
<tr>
<td>GPA9</td>
<td>GPA9</td>
</tr>
<tr>
<td>GPA10</td>
<td>GPA10</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

The students’ final mean GPAs (dependent variable) were measured from the three different modes of instruction:

- *In-person instruction* during Time Period 1 – sixth grade (2018-2019),
- *Online instruction* during Time Period 2 – seventh grade (2019-2020),
The descriptive statistics were computed and are presented in Table 16, below, illustrating the values for the population, means, and standard deviations.

**Table 16**

*One-Way Repeated Measure ANOVA Descriptive Statistics*

<table>
<thead>
<tr>
<th>Measure</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Person (2018 - 2019)</td>
<td>300</td>
<td>3.2037</td>
<td>.76330</td>
</tr>
<tr>
<td>Online (2019 - 2020)</td>
<td>300</td>
<td>3.2491</td>
<td>.75214</td>
</tr>
<tr>
<td>Hybrid (2020 - 2021)</td>
<td>300</td>
<td>2.9346</td>
<td>.93263</td>
</tr>
</tbody>
</table>

There was a statistically significant difference in the final mean GPAs between at least one pairwise comparison of *in-person* instruction \((n = 300, M = 3.20, SD = .76)\), *online* instruction \((n = 300, M = 3.25, SD = .75)\), and *hybrid* instruction \((n = 300, M = 2.93, SD = .93)\). Below, Table 17 illustrates the results from the Mauchly’s test of sphericity.

**Table 17**

*One-Way Repeated Measures ANOVA – Mauchly’s Test of Sphericity*

<table>
<thead>
<tr>
<th>Within Subjects Effect</th>
<th>Mauchly’s W</th>
<th>Approx. Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>.834</td>
<td>54.111</td>
<td>2</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

The assumption testing indicated a violation of Sphericity based on the results from *Mauchly’s Test of Sphericity*. Mauchly’s = .83, \(X^2 = 54.11\), and \(df = 2, p < .001\), which indicated that the difference between each of the paired comparisons was not equal (e.g., in-person and online, in-person and hybrid, or online and hybrid). Therefore, the *Multivariate Tests* results were checked to determine if there was a difference in the final mean GPAs. Below, Table 18 illustrates the results from the multivariate tests.

**Table 18**

*One-Way Repeated Measures ANOVA – Multivariate Tests Results*
A significant effect for a mode of instruction was indicated within at least one group pairing as depicted in Table 18. The results of the Multivariate Tests indicated Wilks’ Lambda = .79, $F(2, 298) = 38.84$, $p < .001$, and multivariate $\eta^2 = .21$ with a large effect size. Based on these results, there was significant evidence to reject the null hypothesis.

The One-Way Repeated Measures Pairwise Comparisons Tests, in Table 19 below, illustrates the pairwise comparisons where 1 = in-person instruction, 2 = online instruction, and 3 = hybrid instruction:

**Table 19**

One-Way Repeated Measures ANOVA – Pairwise Comparisons Results

<table>
<thead>
<tr>
<th>(I) Instruction</th>
<th>(J) Instruction</th>
<th>Mean Difference (I – J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>-.045</td>
<td>.030</td>
<td>.409</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.269*</td>
<td>.043</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>.045</td>
<td>.030</td>
<td>.409</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.315*</td>
<td>.036</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>-.269*</td>
<td>.043</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-.315*</td>
<td>.036</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

There were three unique follow up pairwise comparisons conducted with the corresponding significant levels:

- Instruction 1 – 2, $p = .409$
- Instruction 1 – 3, $p < .001$
- Instruction 2 – 3, $p < .001$
These results indicated that two pairwise comparisons were significant \((p < .001)\): (a) in-person and hybrid modes of instruction, and (b) online and hybrid modes of instruction. These results concluded there was a significant increase in the middle school students’ final mean GPAs from (a) before the pandemic (Time Period 1, sixth grade) to during the pandemic (Time Period 3, eighth grade), and (b) at the onset of the pandemic (Time Period 2, seventh grade) to during the pandemic (Time Period 3, eighth grade). These pairwise comparisons were set for Holm’s Sequential Bonferroni correction at alpha \((\alpha)\) level (.05) for each of the three tests. The linear trend is illustrated in Table 20 below:

**Table 20**

*One-Way Repeated Measures ANOVA – Tests of Within-Subjects Contrasts (Polynomial Contrasts Results)*

<table>
<thead>
<tr>
<th>Source</th>
<th>Instruction</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>Linear</td>
<td>1</td>
<td>38.796</td>
<td>&lt;.001</td>
<td>.115</td>
</tr>
<tr>
<td>Error(Instruction)</td>
<td>Linear</td>
<td>299</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The *Tests of Within-Subjects Contrasts* indicated that a linear trend existed over the three time periods through the three modes of instruction \(F(1, 299) = 38.80, p < .001\), with a large effect as partial \(\eta^2 = .12\).

**Data Analysis and Results for Research Question 3**

The statistical analysis of the data was conducted in SPSS and included descriptive statistics and Levene’s test. The third measure of the study included the evaluation of the entire sample size \((N = 600\) middle school students) during Time Period 3 (eighth grade). An Independent Samples t-test was conducted to determine whether a
A statistically significant difference existed in the means of the middle school students’ final mean GPAs when measured in online instruction (Group 1) during the pandemic and in hybrid instruction (Group 2) during the pandemic. The dependent variable measured was the final mean GPAs where the independent variable was the mode of instruction with two levels in the same time period: online instruction during Time Period 3 – eighth grade (2020-2021), and hybrid instruction during Time Period 3 – eighth grade (2020-2021).

Below, Table 21, illustrates the statistical group analysis (population, mean, and standard deviations) for Group 1 (online instruction) and Group 2 (hybrid instruction):

**Table 21**

**Independent Samples Descriptive Statistics**

<table>
<thead>
<tr>
<th>Measure</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online (2020 - 2021)</td>
<td>300</td>
<td>2.3492</td>
<td>1.24872</td>
</tr>
<tr>
<td>Hybrid (2020 - 2021)</td>
<td>299</td>
<td>2.9338</td>
<td>.93807</td>
</tr>
</tbody>
</table>

There was a statistically significant difference between the final mean GPAs of online instruction for Group 1 \( (n = 300, M = 2.35, SD = 1.25) \) and hybrid instruction for Group 2 \( (n = 299, M = 2.93, SD = .94) \). To evaluate the assumption that the population variances for Groups 1 and 2 were equal, the Levene’s test, in Table 22 below, was used:

**Table 22**

**Independent Samples – Levene’s Test Results**

<table>
<thead>
<tr>
<th>Levene’s Test for Equality of Variance</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>40.257</td>
<td>&lt;.001</td>
<td>-6.476</td>
<td>597</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td></td>
<td></td>
<td>-6.476</td>
<td>554.947</td>
</tr>
</tbody>
</table>
Because Levene’s test was significant, the equal variance assumption was violated (F = 40.26), $p < .001$; therefore, the results for “equal variances were not assumed” were checked. Results showed that $t(555) = -6.48$, $p < .001$, with a moderate effect size ($d = .53$). The 95% confidence interval of the mean difference between the two groups was from [.37 to .69]. The researcher rejected the null hypothesis, which indicated that a difference was found in the final mean GPAs between online and hybrid instruction (during the pandemic in Time Period 3). The final mean GPAs from hybrid mode of instruction ($M = 2.93$, $SD = .94$) was significantly higher than that from the online mode of instruction ($M = 2.35$, $SD = 1.25$).

**Chapter Summary**

In Chapter IV: Data Analyses and Results, the results of the three data analyses (Paired t-test, One-Way Repeated Measures ANOVA, and Independent Samples t-test) indicated the following:

(a) For Research Question 1, the results of the Paired t-test analysis showed that there was no statistically significant difference in the final mean GPAs of the entire sample during in-person (sixth grade) and online instruction (seventh grade);

(b) For Research Question 2, the results of the One-Way Repeated Measures ANOVA analysis showed that there was a statistically significant difference between the final mean GPAs of Group 2 during in-person (sixth grade) and hybrid instruction (eighth grade), and online (seventh grade) and hybrid instruction (eighth grade); and
(c) For Research Question 3, the results of the Independent Samples t-test analysis showed that there was a statistically significant difference in the final mean GPAs between online instruction (Group 1, eighth grade) and hybrid instruction (Group 2, eighth grade).

In the first analysis, the researcher failed to reject the null hypothesis because there was a significant difference in the means of the students’ final GPAs during in-person instruction before the pandemic (in the sixth grade) and online instruction at the onset of the pandemic (in the seventh grade). In the second analysis, there was significant evidence to reject the null hypothesis as the analysis revealed there was a significant increase in the final mean GPAs between in-person instruction (before the pandemic, sixth grade) and during hybrid instruction (during the pandemic, eighth grade); and between online instruction (at the onset of the pandemic, seventh grade) and hybrid instruction (during the pandemic, eighth grade). And finally, in the third analysis (during the pandemic, eighth grade) there was also significant evidence to reject the null hypothesis as the analysis revealed there was a significant difference in the mean GPAs of the students in Group 1, during online instruction; and the students in Group 2, during hybrid instruction. Chapter V discussed the results of the analyses, presented the implications of the study that must be considered, and provided recommendations for future research.
CHAPTER V: DISCUSSION, CONCLUSION, AND RECOMMENDATION

This chapter reintroduced the purpose of the study and discussed the results from the data analyses while connecting the findings to current and previous research. Next, based on the results, inferences were concluded with a discussion of the limitations that potentially impacted the study. Lastly, the investigative methods of the study led to recommendations for current practice and future research.

With the abrupt change in instruction due to the COVID-19 pandemic, many studies have been conducted regarding its impact on education (Bond, 2020; Malkus & American Enterprise Institute, 2020; Stelitano et al. 2020; & Tinubu Ali & Herrera, 2020). The immediate transition from in-person to online, then to hybrid instruction (due to the federal mandates for nonessential business closures), has potentially impacted students’ learning outcomes (i.e., academic performance and achievement). The need for understanding how students engaged in distance learning environments became the focal point for improving education (Asio & Bayucca, 2020; Birch & Lewis, 2020; Data Quality Campaign, 2020; Davis et al., 2021; Jimenez & Center for American Progress, 2020; Kamble et al., 2021; & Tinubu Ali & Herrera, 2020).

While many studies have highlighted the perceptions and experiences of instructors (e.g., K-12 teachers) and college students regarding OLEs (Birch & Lewis, 2020; Lee, 2021; Seward & Nguyen, 2019; & Yates et al., 2014), little research has evaluated the impact from the viewpoint of middle school students and their families (Scales et al., 2020; & Tinubu Ali & Herrera, 2020). The study of the experiences and perspectives of middle school students has been deemed necessary because the stage in the students’ education life cycle has indicated the significant dependency on social
interactions for assessing academic achievement (Bond, 2020; Gentle-Genitty, 2019; Scales et al., 2020; & Thijs & Fleischmann, 2015). Therefore, the purpose of this study was to explore how middle school students’ learning outcomes were potentially influenced by student engagement, based on social interactions, through the comparison of three modes of instruction implemented across three timeframes.

Previous research has also suggested that students who attended online instruction often earned lower course completion grades and overall GPAs than students who attended in-person instruction (Edwards & Rule, 2013; Furrer & Skinner, 2003; Kamble et al., 2021; & Yates et al., 2014). It was noted that the difference in academic achievement was largely associated with the lack of opportunities students had to interact with their instructor, the course content, other students, the completion of activities, and access to technology during learning (Edwards & Rule, 2013; Furrer & Skinner, 2003; & Kamble et al., 2021). Therefore, this study aimed to evaluate the three modes of instruction, through comparative analyses, to determine if there were any significant differences in the final mean GPAs of a selected group of middle school students.

Statistically significant differences among the different data analyses have implied that the change in instruction has affected students’ learning outcomes. The measure of the academic achievement for each mode of instruction was depicted in the students’ final mean GPAs.

Despite the claims from previous research, the three data analysis methods did not prove any statistical differences in the final mean GPAs between in-person and online instruction. However, the results among the three analyses indicated there were statistical differences between in-person and hybrid as well as online and hybrid modes of
An interesting consideration was how hybrid instruction (i.e., the combination of in-person and online instruction) yielded a significant decrease in final mean GPAs when compared to in-person and online instruction before and at the onset of the pandemic. An assumption could be made that if there were no differences in final GPAs between in-person and online modes of instruction, then there should be no statistically significant difference in comparison to the hybrid instruction. However, based on the results from each data analysis, further investigation into the change in instruction as a potential contributing factor in the students’ overall academic achievement should be explored.

Again, a note of contention was though the assessment criteria may have varied across the three Time Periods (Time Periods 1, 2, and 3), the assessment criteria was the same for all student participants within each Time Period. In this study, the students’ GPAs were used for comparing the assessment criteria across the three time periods.

**Discussion: Summary of Research Question 1 Findings**

Previous research has suggested that middle school students’ overall academic achievement (within OLEs) has been impacted by student engagement, thus influenced by social interactions. However, the data analysis from RQ1 failed to reveal any clear indication regarding the impact on academic achievement when in-person and online modes of instruction were compared. Based on the final mean GPAs, students appeared to be equally engaged in the learning as depicted in their relatively equal course completion grades. The RQ1 compared the final mean GPAs during in-person and online modes of instruction to determine; *were there any differences in the means of the*
students’ final GPAs when measured in in-person instruction (before the pandemic in Time Period 1) and in online instruction (at the onset of the pandemic in Time Period 2)?

The Paired t-test was used to conduct the data analysis where the modes of instruction (in-person and online) served as the independent variable and the final mean GPAs served as the dependent variable. Here, the entire sample group (N = 600 students) was used to compare the final mean GPAs of in-person instruction (sixth grade, Time Period 1) and online instruction (seventh grade, Time Period 2). Because there was no significant difference in the final mean GPAs, one could have surmised that the transition from in-person (M = 3.21) to online instruction (M = 3.23) did not affect student learning outcomes (p = .587). It would have appeared as though student engagement did not impact academic achievement when compared during the timeframes before the pandemic and at the onset of the pandemic.

Discussion: Summary of Research Question 2 Findings

The data analysis from RQ2 suggested that student engagement may have impacted the final mean GPAs when the hybrid instruction was compared to in-person and online instruction for students in Group 2. Based on the final mean GPAs, students appeared to be less engaged during hybrid instruction as depicted in the significantly lower course completion grades. The RQ2 compared the final mean GPAs during in-person, online, and hybrid modes of instruction to determine; were there any differences in the final mean GPAs of Group 2 students when measured during in-person instruction (before the pandemic in Time Period 1), during online instruction (at the onset of the pandemic in Time Period 2), and during hybrid instruction (during the pandemic in Time Period 3)?
The One-Way Repeated Measures ANOVA was used to conduct the data analysis where the modes of instruction (in-person, online, and hybrid) served as the independent variable and the final mean GPAs served as the dependent variable. Here, Group 2 (n = 300 students) was used to compare the final mean GPAs between the sixth grade (Time Period 1), seventh grade (Time Period 2), and eighth grade (Time Period 3). After the data analyses between Groups 1 and 2, a presumed effect on learning outcomes came from the change in the mode of instruction. When reviewing the same group of students during in-person (M = 3.20), online (M = 3.25), and hybrid (M = 2.93) modes of instruction, it could be presumed that the change in instruction affected student learning outcomes while the students attended hybrid instruction. Because there was a significant difference in the final mean GPAs between at least one pairwise comparison, Mauchly’s Test of Sphericity was conducted to determine if the sphericity assumption was significant.

The sphericity assumption was tested to determine if the variances of the difference between the pairs of within-subject conditions (i.e., in-person and online, in-person and hybrid, or online and hybrid modes of instruction) were equal. Based on the results from Mauchly’s Test of Sphericity, the assumption testing indicated a violation of sphericity. The result from this test showed that sphericity was not assumed as Mauchly’s $W = .83, \chi^2 = 54.11, df = 2, p < .001$, which indicated a significance among the final mean GPAs. The results indicated that at least one pairwise comparison was significant. Because of the significance revealed in Mauchly’s W, the Multivariate Tests results were checked to determine if the null hypothesis should be rejected. Because of the significance found in the Multivariate Tests results ($p < .001$), the Pairwise Comparisons
Tests were conducted to confirm the significance levels for each of the matched pairs (see Table 19). The follow-up within-subjects contrasts (as depicted in Table 20) indicated a significant linear effect with means and standard deviations that slightly increased then decreased over time.

While there were no significant differences found within the final mean GPAs between in-person and online modes of instruction (Time Periods 1 and 2), there were significant differences revealed in the final mean GPAs between in-person and hybrid (Time Periods 1 and 3) as well as online and hybrid instruction (Time Periods 2 and 3). The significant trend, found during hybrid instruction, was the result of a combination of in-person and online instruction that occurred during the pandemic (in the eighth grade). These results suggested that with the transition to hybrid instruction, the learning outcomes were negatively impacted during the pandemic.

**Discussion: Summary of Research Question 3 Findings**

The data analysis from RQ3 suggested that student engagement may have impacted the final mean GPAs during the online and hybrid modes of instruction, for students in Groups 1 and 2, during the pandemic. Based on the final mean GPAs, the students appeared to be less engaged during online instruction when compared to hybrid instruction as depicted in the significantly lower means of the GPAs. The RQ3 compared the final mean GPAs during online and hybrid modes of instruction to determine; *were there any differences in the means of the students’ final GPAs between Group 1 (online instruction) and Group 2 (hybrid instruction) when measured during the pandemic in Time Period 3?*
The Independent Samples t-test was used to conduct the data analysis where the modes of instruction (online and hybrid) served as the independent variable and the final mean GPAs served as the dependent variable. Here, during the pandemic in Time Period 3, the final mean GPAs of Group 1 \( (n = 300 \text{ students}) \) who attended online instruction were used in comparison to the final mean GPAs of Group 2 \( (n = 300 \text{ students}) \) who attended hybrid instruction. Because there was a statistically significant difference between the mean GPAs \( (p < .001) \) for each group, it could be presumed that the students in Group 1 were less engaged during online instruction \( (M = 2.35) \) than the students in Group 2 who attended hybrid instruction \( (M = 2.93) \), during the pandemic.

Because Levene’s Test for Equality of Variances was significant, the equal variance was violated (see Table 22). The violation indicated that the equal variances were not assumed; therefore, the null hypothesis indicating that Group 2 was more negatively affected than Group 1 was rejected. The results could have implied that the level of student engagement may have negatively impacted Group 1 (students that attended online instruction) more than Group 2 (students that attended hybrid instruction) during the pandemic (in Time Period 3).

Though far from definitive, these results offered some insight into subjective reasoning based on the intrinsic and extrinsic factors that could have potentially impacted the final mean GPAs. A discussion regarding the inferences that potentially affected learning outcomes that resulted from the change in the modes of instruction (e.g., online instruction at the onset of the pandemic to hybrid instruction during the pandemic) was necessary to explore strategies needed for improving academic achievement. To obtain a
more realistic understanding of the possible threats to the validity of this study, the next section presented the implications that must be considered.

**Implications of the Study**

The results from the three data analyses indicated that there was no statistically significant difference in the final mean GPAs when the mode of instruction transitioned from in-person to online instruction, from Time Period 1 (before the pandemic) to Time Period 2 (at the onset of the pandemic). However, the results revealed a significant decline in final mean GPAs in Time Period 3 (during the pandemic). The Independent Samples t-test analysis indicated that the final mean GPAs of the students in Group 1 that attended online instruction were significantly lower than the final mean GPAs of the students in Group 2 that attended hybrid instruction during the same timeframe. A notation was also made that indicated there was a significant decline in the final mean GPAs when Group 1 students remained in the same mode of instruction, over two school years. In this instance, Group 1 students attended online instruction during Time Period 2 (at the onset of the pandemic) and during Time Period 3 (during the pandemic). Because there were two instances of significant declines in academic achievement when Groups 1 and 2 transitioned from learning at the *onset of the pandemic* to *during the pandemic*, an understanding of the underlying reasons for significant differences occurred must be further investigated.

While specific qualitative data based on students’ experiences and K-12 teachers’ perceptions during this timeframe could not be obtained for analysis, a review of student engagement in conjunction with the effects of the pandemic from current studies was used as a suggestive measure for the analyses. To ensure students achieve the learning
outcomes set by local, state, and federal education standards, the entire community of learning must work as a cohesive support system to provide students with the necessary tools and assistance for learning. Therefore, policymakers, academic leaders within school districts, students’ families, and K-12 teachers must partner with one another to best serve the needs of students (Ishmael et al., 2020; Jimenez & Center for American Progress, 2020; Kuhfield et al., 2020; Stelitano et al., 2020; Tinubu Ali & Herrera, 2020; & Zhou et al., 2021).

**Policymakers and Academic Leadership.** One major finding that the COVID-19 pandemic revealed was the unpreparedness many school districts faced regarding education contingency planning for distance learning. When the federal government mandated nonessential business closures at the onset of the pandemic, the procedures for online learning within most school districts were not readily available or effectively implemented to accommodate an entire student population. When attempting to mitigate these issues, school districts faced challenges associated with new costs to accommodate the greater needs of students, teachers, and staff (Ishmael et al., 2020; Tinubu Ali & Herrera, 2020; & Zhou et al., 2021). The new costs incurred by school districts included the demand for providing multiple modes of instruction (i.e., online and hybrid) and meeting the students’ increased academic and social-emotional needs. These additional costs were compounded on an already strained state budget due to ongoing declining revenues (Ishmael et al., 2020; Tinubu Ali & Herrera, 2020; & Zhou et al., 2021).

With the declining revenues reported since the Great Recession of 2008, most school districts were simply unable to acquire the additional funding needed to purchase the technological connectivity, digital tools and resources, and technology-based training
required for students and teachers to commence learning, simultaneously, in online and hybrid learning environments (Zhou et al., 2021). And because of the health risks associated with the pandemic, school districts were required to provide sanitation supplies and healthcare resources (e.g., personal protective equipment (PPE), hand sanitizers, cleaning wipes and sprays, additional custodial staff and nurses, etc.) to ensure there was a safe and healthy learning environment (i.e., socially distance measures exhibited) for students, teachers, and staff that were present on school grounds for an unspecified amount of time. According to a recent CDC national report, these unforeseen new costs accredited to the COVID-19 mitigation strategies added a 0.3% to 7.1% increase to school districts’ current operating budgets. This increase equated to 6% to 8% (i.e., $750-$1,000 per student) of a school district’s annual operating budget. However, school districts that were better able to absorb these costs were the districts that already had a functioning, robust technology learning platform for distance learning in place (Zhou et al., 2021).

The ABC County School District (the source of the data used in this study) made a concerted effort to alleviate students’ inability to connect to technology during distance learning immediately following the onset of the pandemic. Once the Western state’s Board of Education was informed that nearly 24% of the state’s 500,000 K-12 student population did not have access to technology and/or the digital tools needed for distance learning, to provide tools needed for digital learning, the Western State Department of Education implemented a digital access accountability program that provided each K-12 student with the required access to technology and utilization of digital tools and resources necessary for distance learning (Western State Department of Education, 2021).
This digital program (*Connecting Kids*) was established by the Governor’s COVID-19 Task Force to close the existing gap in educational inequalities associated with the lack of access to technology caused by families that could not afford (e.g., lower socioeconomic status background) or access (e.g., located in rural areas could not physically access the network) technology. The statewide effort called upon the community of learning, private and public businesses, government agencies, non-profit organizations as well as other local partners to donate resources and funding to mitigate this immediate need for technology access.

In August 2020 (beginning of Time Period 3, during the pandemic), the *Connecting Kids* program was created in response to the Western State’s Department of Education (2021) focus on the following three key areas for accommodating distance learning for students and teachers by providing:

- Equitable access to learning,
- Digital tools and internet connectivity for students and their families, and
- High-quality professional learning and instructional materials for educators and/or staff.

The Western State Department of Education and ABC County School District played intricate roles in delivering the essential tools and resources for each student and teacher (Western State Department of Education, 2021). Statewide efforts consisted of daily progress reports sent to over 500 state leaders; accountability measures confirmed every K-12 public and charter school student had working access to technology and possessed a digital tool (e.g., Chromebook). There were weekly progress reports that confirmed the number of students connected to technology and resources versus the number of students
that still needed access. The execution of the connection to technology was made possible with the *Western* State Department of Education negotiation with a major network provider that distributed over 18,000 hotspots throughout the state.

The *ABC* County School District's efforts included streamlined support services that assisted students and families with connecting to the internet (*Western* State Department of Education, 2021). A virtual family support center was available for students and their families six days a week to assist with connecting to the internet. Additional resources (e.g., professional support staff and volunteer guest teachers) were utilized to accommodate the overwhelming call volume to minimize the time students and their families had to wait. The federally funded Coronavirus Aid, Relief, and Economic Security (CARES) Act was used to supplement the outstanding costs associated with funding the *ConnectingKids* program. Hence, once every K-12 student acquired the necessary access to technology and digital tools, they were fully prepared to sign on to the OLE and effectively participate through active engagement for every online course, correct? Unfortunately, no.

Previous and current research has revealed that many students, themselves, either lacked the knowledge and skills to navigate and complete assignments in OLEs and/or did not have the support (at home or beyond the household) to access the technology forum once connected to the internet (Jimenez & Center for American Progress, 2020; Lake et al., 2021; Stelitano et al., 2020; & Tinubu Ali & Herrera, 2020). In other instances, students simply lacked the desire to engage in distance learning resulting from the initial educational setback experienced at the onset of the pandemic once schools closed (March 2020), then followed by the standard knowledge that is lost during
summer break (refer Figures 3 and 4) (Kuhfield et al., 2020). The need for school districts to attend to greater student needs revealed that student engagement is a much deeper, concerning issue than what has appeared at the surface, addressed as needing access to technology and digital tools. Consideration should be made regarding the experiences students and their families may have endured resulting from the pandemic that could have affected students’ well-being (Davis et al., 2021).

Students and Parents. Though the inherent costs attributed to the effects of the pandemic continued to be the driving force regarding policy implementation, policymakers and school districts must also focus on students’ academic loss and overall well-being. An emphasis should be placed on the potential loss of education that occurred at the onset of the pandemic as well as other socio-emotional contributing factors. Recent studies have highlighted these two focal points as impactful factors that stemmed from the effects of the pandemic and have contributed to a reduction in student engagement and academic achievement (Ishmael et al., 2020; Jimenez & Center for American Progress, 2020; Tinubu Ali & Herrera, 2020; & Zhou et al., 2021).

Students’ Academic Loss. The academic loss has been reportedly more impactful in math versus reading/language arts for students in the second through twelfth grades. For example, a national study by Northwest Evaluation Association (NWEA) estimated that students earned 5 to 10 percentile points less in math during the pandemic (fall of 2020) than what was earned at the onset of the pandemic (fall of 2019). The decline in percentile ranking was equated to a two to three months loss of knowledge expectation in math. Though the evaluation of reading scores was slightly higher than math at this time, on average, students still experienced a one-and-a-half months loss of reading. One note
to mention was that students attended in-person instruction during the fall of 2019, which was the semester before the mode of instruction changed due to the pandemic. Nonetheless, students experienced a significant decline in knowledge retention once the mode of instruction transitioned to online or hybrid.

The NWEA also indicated that a rate of education loss in math was expected to exceed seven months if the duration of learning loss continued for the remainder of that school year (spring 2021). This prediction signified that immediate action needed to be taken for education recovery to ensue (Tinubu Ali & Herrera, 2020; & Zhou et al., 2021). Options for implementing methods for education recovery included extending the school day or year, and offering tutoring resources to incorporate the missed instruction and/or reintroduce learning content that students, collectively, struggled to retain. The suggested amount of time appended to class instruction would be dependent on a school district’s perception of total learning lost and the factors that influenced the amount and duration of extended learning time (e.g., group sizes, quality of instruction, and the number and type of courses to be covered) (Tinubu Ali & Herrera, 2020; & Zhou et al., 2021).

When comparing this purposeful strategy for education recovery to the ABC County School District’s implemented plan for distance learning, the following modifications were applied to the online and hybrid modes of instruction:

- The daily schedule was reflective of a typical 5.5-hour in-person day of instruction,
- Established synchronous and asynchronous learning forums were supported by a teacher,
• Prerecorded or streamlined instructional videos for each online course session were readily available to students, and
• Individual schools determine which courses were offered during distance learning.

The ABC County School District strived to maintain a school calendar that was as close to the traditional, in-person instructional model as possible (Western State Department of Education, 2021). Here, the established roles and set expectations were assigned to students, parents, teachers, schools, and the school district as a measure of good faith for accountability. However, the loss of education did not appear to be the factor for the decline in students’ final mean GPAs when students transitioned from online to hybrid or remained in online instruction.

The results from this study indicated that the final mean GPAs of students in Group 1 significantly decreased when attending online instruction during the pandemic (in Time Period 3) when compared to the final mean GPAs of the same group of students who attended online instruction at the onset of the pandemic (in Time Period 2). The same observation was made for students in Group 2. Here, the final mean GPAs of students in Group 2 significantly decreased when attending hybrid instruction during the pandemic (in Time Period 3) when compared to the final mean GPAs of the same group of students when attending online instruction at the onset of the pandemic (in Time Period 2). With an entire school year of experience attending online instruction; access to technology, digital tools and resources; available technical support, and an increased academic achievement should have been reflected in the final mean GPAs. Based on assumptions of student engagement and academic performance, middle school students
should have exceeded academic achievement from the previous school year. To gain a complete understanding of why GPAs did not increase, a review of how grading practices may have been modified for each school year would be a great starting place in determining what, if any factor, has changed across the two years of distance learning. Current research has noted that many of these metrics were set by individual schools or per classroom, by teachers. For example, in this study, *ABC* County School District waived the attendance policy at the onset of the pandemic (Time Period 2) as students and teachers navigated the transition from in-person to online instruction while dealing with temporary school closures. In the following year, during the pandemic in Time Period 3, those attendance policies were reinstated, thus, affecting the academic performance and overall achievement of students that did not regularly participate in OLEs and/or complete assignments. The middle school students that had not participated in OLEs during the pandemic were penalized.

Another factor that showed changes through the onset of the pandemic was teachers’ grading of completed coursework may have been more lenient at the onset of the pandemic than compared during the pandemic. Here, teachers may have exhibited more compassion towards students that made an effort to complete assignments as a measure of good faith for attempting to participate during such an unprecedented time. Yet, with the second year of experience attending distance learning, schools and/or teachers may have decided to reinstate previous coursework completion guidelines that resulted in stricter grading scales for assignments. Unfortunately, data supporting these claims were not obtained for this study; therefore, collecting this type of data will be a recommendation for future research. While students’ behavior was observed through
performative measures of work output (e.g., attendance, participation, and coursework grades), an exploration of why students, more or less, did or did not engage in distance learning throughout the pandemic was essential in understanding student behavior and academic performance.

**Students’ Well-Being.** The National Association of School Psychologists (NASP) has projected students who experienced an increase in socio-emotional or behavioral concerns could be shown as a double or triple incident since the pandemic (Zhou et al., 2021). The exponential increase in emotional distress has been found to have a negative impact on student engagement, resulting in a decline in academic achievement. Therefore, to minimize this anticipated impact on students’ well-being, the dedicated mental health and behavioral support staff needed assistance from teachers to identify potential casualties, in real-time. Teachers were considered the front-line operators for monitoring student behavior because their roles were designed to be in direct contact with students (e.g., in-person, virtual, or via written communication) on each school day. Because teachers are the gatekeepers of student interactions, they must be granted ongoing training in trauma-informed practices to assist students and their families facing a crisis in silence.

In addition to barriers experienced by students attempting to access online learning, most students were affected by the pandemic personally. Whether there were noted feelings of isolation, illness suffered by students or family members that contracted the virus, the loss of loved ones who succumbed to the viral infection, food scarcities, families’ loss of wages and housing, and/or influential political ideology; most students contended with these daily realities for over two years (Davis et al., 2021; Lake et al.,
Children that were forced to deal with these escalating realities were more likely to have endured psychological stress that no person should be made to withstand. These sentiments, coupled with typical ongoing concerns with distance learning, only added to feelings of loneliness when students were physically separated from friends and extended family. When students were unable to form sustainable partnerships that reinforced positive bonds of companionship, their sense of belonging began to dissipate (Davis et al., 2021; Lake et al., 2021; & Tinubu Ali & Herrera, 2020). Therefore, it was important for there to be an increase in student engagement, specifically within OLEs, to improve overall academic achievement.

As the full scope of understanding students’ needs during distance learning continued to evolve, defining the role of parents and their impact on student learning was essential in determining the best methods for enhancing student engagement to improve overall student engagement (Zhou et al., 2021). Research has concluded there was a developmental connection between students’ sense of relatedness to parents with that of students’ level of engagement in academic achievement (Furrer & Skinner, 2003). Therefore, it was necessary to explore the needs of parents as a benefactor for enhancing social interactions that potentially shaped motivational student engagement that, expectantly, improved academic achievement.

**Supporting Parents’ Needs.** The primary role of parents is to be the life-preserving support system for their children. Parents have fostered the development of cognitive learning theories initiated in the home environment. The sociocultural, social constructivism, and social control theories reviewed in Chapter II: Literature Review, addressed how students’ cognitive development was based on learning foundations
established at home that were then harnessed through bonded relationships depicted at school. The establishment of these theories of belief systems has evoked primal indications of social interactions and a sense of relatedness in which children have constructed generalized expectations regarding the nature of oneself in relationships (Furrer & Skinner, 2003). It was through these early developmental stages of cognitive learning, associated with social interactions, which established children’s ideas of self-autonomy and motivation needed for learning. Such reports based on the sense of relatedness and belonging have indicated that children who generally felt more confident tended to work harder, cope more adaptively, display a more positive desire for learning, and performed better in school. Therefore, because engagement is aligned with interactions that are active, constructive, goal-oriented, flexible, and persistent, a review of this link to social interactions and student engagement within OLEs was necessary when seeking to improve academic achievement (Furrer & Skinner, 2003; & Ishmael et al., 2020).

As families continued to navigate the personal effects of the pandemic, their secondary role became that of a proxy educator. The role of proxy educators instantly became the lifeline for connection to distance learning for many middle school students and their teachers (Davis et al., 2021; & Ewing & Cooper, 2021). Although most middle school-aged students were familiar with technology through social media outlets and platforms (e.g., the use of smartphones to access TikTok, Twitter, Instagram, etc.), many have not experienced the use of technology and digital tools in an OLE. As a result, many parents took on the responsibility of ensuring their students had the access needed for
online instruction throughout the pandemic (Ishmael et al., 2020; & Tinubu Ali & Herrera, 2020).

Because most parents were not knowledgeable about the use of technology in OLEs, policymakers, school districts, and teachers needed to find a way to get parents the resources needed for executing this endeavor. In this study, the Western State Department of Education and ABC County School District partnered with local and national organizations, agencies, and groups to provide the necessary tools, resources, and support systems needed for proxy educators to assist with connecting to the OLEs. The Governor’s COVID-19 task force-sponsored ConnectingKids program reported successfully providing at-home internet connectivity (e.g., 18,000 hotspots within the state) and digital tools (e.g., computer, Chromebook) to 100% of the K-12 student, public and charter school population (nearly 500,000 students) within the state. These results included a part of the student population whose families were homeless and/or lived in shelters (Western State Department of Education, 2021).

Parents were provided with training materials that aided the process of connecting to the internet as well as the virtual Family Support Center that offered assistance six days a week. However, the results from this study indicated that students’ final mean GPAs significantly declined as the pandemic continued. Though parents were equipped with the tools, resources, and information for connecting their students to online instruction, the final mean GPAs still significantly declined when students either transitioned from online to hybrid modes of instruction or remained in online instruction from the onset of the pandemic (Time Period 2) to during the pandemic (Time Period 3). Even though students and parents were equipped with the tools and resources for distance
learning and even had one year of experience attending online instruction, the root cause for the significant decline in final mean GPAs was not resolved.

Apparently, despite the necessary tools and resources being provided to parents that were required for distance learning, students’ academic achievement, as depicted in their final mean GPAs across three distinctive school years, continued to suffer through the pandemic. Perhaps the unresolved issue was overshadowed by unreported matters not addressed by school districts or policymakers. More insight from students and parents is needed to gain a better understanding of why students continued to struggle with aspects of distance learning. Obtaining more information to better understand this concept will be presented as a recommendation for further research.

**K-12 Teachers.** When it comes to the evaluation of student learning, most studies have focused on the perceptions and experiences of teachers because they maintained the gateway to student observations that no other school leader has been afforded. Admittedly, teachers’ perspectives on student learning continue to be the most sustainable pathway for capturing and conveying challenges students continue to face during distance learning to school district leaders (Furrer & Skinner, 2003; Seward & Nguyen, 2019; Stelitano et al., 2020; & Wang et al., 2014). So, if the information that teachers have collected and relayed was inherently vital, why have the changes to mitigate the noted challenges not been alleviated?

The overwhelming response for changes not being implemented has been due to a lack of funding. Many school districts do not have the necessary funds to address all concerns affecting student learning; therefore, addressing the most important or impactful obstacles tended to receive the most attention (Zhou et al., 2021). The effects of the
pandemic have only compounded this looming challenge many school districts continue
to manage. Therefore, teachers must seek creative ways to minimize academic
achievement gaps while increasing student engagement through social interaction.

Studies have shown that teachers have influenced student engagement by
monitoring students’ learning analytics and enhancing interactions with students and their
families throughout the pandemic (Hui et al., 2018; & Mansouri et al, 2021). As
discussed in Chapter II: Literature Review, learning analytics is a method for analyzing
student engagement within OLEs. Teachers can obtain data that reports students’ use of
digital tools throughout the school year. This useful information can instantly alert
teachers to student behaviors that can negatively affect student engagement (e.g., lack of
access to technology and/or learning content, or inability and/or lack of desire to
complete assignments). Also, when a teacher can connect with students and families
beyond the OLE, trusted relationships often develop. When students and families
entrusted teachers as advocates for student learning, teachers gained insight into
unforeseen challenges families endured that often go unreported. Teachers were then able
to provide resources or contact the appropriate resource representative (e.g., guidance
counselor, mental psychologist, social worker) that could better assist the students’ and/or
families’ needs.

Building rapport with students and their families can be an obstacle for many
teachers due to time limitations and/or lack of pertinent information. However, when
effectively executed, teachers that become a lifeline for students and their families can be
the greatest asset for increasing student engagement that can lead to improving academic
achievement. Unfortunately, data regarding how teachers potentially modified grading
practices throughout the pandemic were not collected. Obtaining this lack of information will be presented as a recommendation for further research.

**Conclusion**

This study aimed to explore how middle school students learning outcomes (i.e., academic performance and achievement) could be influenced by different modes of instruction (in-person, online, and/or hybrid instruction). The influences were assumed to be driven by student engagement based on middle school students’ social interactions during each mode of instruction. As a measure for evaluation, three comparative analyses (e.g., Paired t-test, One-Way Repeated Measures ANOVA, and Independent Samples t-test) were conducted that analyzed the final mean GPAs between two groups of students, during three timeframes (before, at the onset of, and during the pandemic).

There were four unique findings obtained from this study. The first finding taken from the Paired t-test data analysis indicated no statistically significant difference among the entire sample’s final mean GPAs between in-person and online modes of instruction. The data analyzed was collected at the timeframes before the pandemic (*in-person instruction* during the sixth-grade school year of 2018 to 2019) and at the onset of the pandemic (*online instruction* during the seventh-grade school year of 2019 to 2020). This finding suggested that when the middle school students abruptly transitioned from in-person to online instruction due to nonessential business closures throughout the nation, the students’ academic achievement did not change. The measurement of academic achievement was depicted in the students’ final mean GPAs which were manually calculated from data collected on the students’ course completion grades.
The second finding taken from the One-Way Repeated Measures ANOVA data analysis indicated no statistically significant difference between a subgroup’s (students from Group 2) final mean GPAs between in-person to online, then hybrid modes of instruction. The data analyzed was collected at the timeframes before the pandemic (in-person instruction during the sixth-grade school year of 2018 to 2019), at the onset of the pandemic (online instruction during the seventh-grade school year of 2019 to 2020), and during the pandemic (hybrid instruction during the eight-grade school year of 2020 to 2021). This finding suggested that when Group 2 abruptly transitioned from in-person to online instruction, students’ academic achievement did not change. However, when the same group of students transitioned from online to hybrid instruction, there was a statistically significant difference in the students’ final mean GPAs. The measurement of academic achievement was depicted in the students’ final mean GPAs which were manually calculated from data collected on the students’ course completion grades.

The third finding taken from the Independent Samples t-test data analysis indicated a statistically significant difference between the comparison of Groups 1 and 2 final mean GPAs in online and hybrid modes of instruction. The data analyzed was collected during the pandemic. Here, Group 1 attended online instruction during the eighth-grade school year of 2020 to 2021; while Group 2 attended hybrid instruction also during the eighth-grade school year of 2020 to 2021. The measurement of academic achievement was depicted in the students’ final mean GPAs which were manually calculated from data collected on the students’ course completion grades.

Lastly, the fourth finding was obtained after reviewing the results from all three data analyses. Here, an observation was made regarding the comparison of Group 1 final
mean GPAs when students remained in online instruction. This timeframe included the comparison of the measure of academic achievement at the onset of the pandemic with academic achievement during the pandemic. Then, a separate observation regarding the comparison of the means of Group 2 final GPAs when students transitioned from online to hybrid instruction. This timeframe also included the same comparison of the measure of academic achievement at the onset of the pandemic with academic achievement during the pandemic.

Collectively, these findings shared a unique story that seemed to partly confirm what most studies have indicated, students that attended online instruction earned lower course completion grades and overall GPAs than students that attended in-person instruction (Edwards & Rule, 2013; Furrer & Skinner, 2003; Kamble et al., 2021; & Yates et al., 2014). But, this finding was noted only when the pandemic continued, not at the onset. This confirmation was not solely based on the same apparent reasoning. Because each student in this study was provided with at-home internet connectivity and a computer to access the OLE, lack of access to technology and digital tools was not a factor. However, more research must be collected and/or provided regarding students’ ability to physically access the technology during the afforded timeframes. Based on these findings, more consideration must be given to the possibility of external factors, from the effects of the pandemic, having impacted academic achievement.

Policymakers, academic leadership (schools and school districts), parents, and teachers each play an intricate role in students achieving learning outcomes in distance learning, specifically during such an unprecedented time as the pandemic. More consideration must be given to students and their families’ needs when looking to
improve academic performance and achievement. Because student engagement, based on social interactions, has been shown to influence learning outcomes, the community of learning must ensure that challenges and grievances that inhibit learning are reported and dutifully resolved, as permitted. While teacher evaluations of their students will always be beneficial for assessing student behavior during learning, obtaining information regarding the perceptions and experiences of students and their families is essential for understanding many of the unforeseen challenges that impede student learning within any mode of instruction.

**Limitations of the Study**

There are multiple limitations to this study. The initial limitation involved the organization of the raw data collected from the ABC County School District’s Data Analytics Team. Having received over 518,000 lines of datasets, it was a very tedious task deciphering and grouping the individual descriptors (e.g., unique identifiers, grade levels, course names, terms, and instructional learning designation). One mistake in deciphering or grouping specific data would have yielded the incorrect correlation of student information. For example, if the term (T2 or T4) was aligned with the wrong course taken that specific semester, the incorrect grade would have been mistakenly calculated for that school year’s GPA. It was especially important to ensure the datasets were perfectly aligned with the correct terms to yield the student’s correct GPA.

Another limitation included the manual calculation of the students’ final mean GPAs. First, the students’ (600 students) GPAs were manually calculated for each term (two terms) of each course (five courses). Then, the mean GPAs were manually calculated for each school year (three school years). This was a very daunting task that
took over three months to complete. Each manual calculation was checked at least three
times to ensure the same GPA was computed. Whenever there was a difference in
computations, the GPAs were manually calculated twice more. Any incorrect calculation
would have resulted in incorrect data used for the analyses.

A third limitation was due to the lack of information that would have described
any modifications to the grading scale used at the onset of or during the pandemic. This
limitation did not allow for a full explanation of any factors that may have influenced the
independent variable (mode of instruction) or dependent variable (GPAs). The
explanation of these factors could have provided more insight into how the findings were
impacted and thus, could have provided clarification for potential cause-and-effect
relationships. For example, an explanation of the difference in grading scales teachers
used during online instruction at the onset of the pandemic could have been less rigorous
than what was used during the pandemic. If teachers expected students to have a better
understanding of how to access and navigate online instruction in the second year, during
the pandemic, the grading scale may have returned to a stricter evaluation of coursework
and assessments.

And lastly, the fourth limitation involved the researcher’s inability to connect
directly with students and their families. Due to ABC County School District’s guidelines,
external researchers could not interview students or their families to gain insight into
their experiences during the pandemic. For obvious reasons associated with anonymity
and potential HIPAA violations, obtaining such personable information relating to
students’ mental and physical well-being was prohibited.
Recommendations

Based on the findings of this study, several recommendations have been made for this area of practice and future research.

Recommendations for Practice and Future Research

While the unprecedented challenge of the transition from in-person to online instruction revealed the level of unpreparedness most K-12 school districts and teachers contended with, experience from this health and education crisis could be beneficial for planting seeds of opportunities for learning for current and future practices in student education. When it comes to improving academic achievement in distance learning, the focus must be placed on students’ needs and overall well-being. Policymakers, academic leaders, and teachers must be responsive to addressing these needs as student engagement has been shown to affect students’ acquisition of learning outcomes.

Based on the findings of this study, there are three recommendations for policymakers and academic leaders to consider as the effects of the pandemic continue to impact K-12 education. First, additional support from outside sources (e.g., public-, private-, and volunteer-based organizations, agencies, and local charitable partners) should be sought. Dedicated funds and resources from these partners can offset much of the cost associated with accommodating students’ academic and personal needs. Second, an evaluation of other sources of data should be made to gain insight from the collective community of learning. Adhering to this alternative process of assessment can allow for a more comprehensive overview of the challenges encountered during teaching and learning while implementing immediate changes that foster effective solutions. And lastly, allowing for changes to educational systems that are currently in place while
viewing the modifications as opportunities to build more sound, equitable, and resilient processes that support all students would be valuable. Adopting policies and strategies that not only set accountability standards, but also promote new pedagogical approaches for achieving learning outcomes is imperative for addressing students’ needs now and during a post-pandemic world.

Two recommendations for teachers to consider include first, creating a student-centered empathetic approach to learning that fosters the student-teacher interaction. Based on the findings from the study, it is apparent that students still needed the grace period that was granted during the transition from in-person to online instruction, at the onset of the pandemic. Because there was a significant decline in students’ final mean GPAs when students transitioned from online to online (Group 1) and online to hybrid (Group 2) modes of instruction during the pandemic, teachers should assess the modifications made to learning and the instructional effectiveness to determine the root cause for the decline. Then, teachers should conclude if the modifications should be applicable for ongoing education, post-pandemic. The premise for this evaluation is for teachers to maintain the creative approaches to learning that would be a proactive measure for improving academic achievement, in any mode of instruction, instead of reactionary methods that interrupt learning and contribute to education loss. Secondly, teachers should embrace the role as the conduit of knowledge and resources for academic leaders, students, and parents as well as an empathic analyst for interactions between students and parents. For example, teachers should readily transfer vital information to and from schools and school districts that enable the fastest track for resolve to noted challenges. When collaborating with students and parents, teachers must maintain a direct
line of communication to quickly address and/or report concerns and issues. For instance, teachers could assist students and/or parents with creating a home learning environment that is conducive to effective student learning. Teachers should focus on student engagement activities that improve academic achievement.

Recommendations for future research include the following:

- More studies regarding the perceptions and experiences of students and their parents by obtaining specific data (e.g., surveys, questionnaires, and short interviews via phone or video conferencing) regarding students’ needs and well-being throughout and post-pandemic;
- Collect data on the individual schools and teachers’ grading modification for attendance/participation and completed coursework throughout the pandemic;
- Evaluate how teachers delivered the learning content, throughout the pandemic, to determine what decision may have influenced student engagement and behaviors;
- Options for how schools can administer assessments (throughout the school year) that provide actionable data for policymakers to allocate the appropriate resources that support educational recovery and contingency planning; and
- Assess and submit more timely and actionable data to policymakers and academic leaders.

Because of the pandemic, the instant transition from in-person to online instruction has forced academic leaders and teachers to innovate new instructional methods to adapt to OLEs. These suggestive measures of academic achievement have offered some insight into how policymakers and academic leaders could minimize the
extensive costs that impeded online and hybrid learning environments during the pandemic. One key takeaway from this study was that policies and procedures must be put in place to accommodate student learning in a distance learning environment to be successful in creating attainable student learning outcomes.

Chapter Summary

In Chapter V: Discussion, Conclusion, and Recommendations, the findings from Research Questions 1, 2, and 3 were discussed. These discussions provided insight into what the findings may have implied based on the data and surrounding factors that may have influenced the outcomes. The story the data revealed also provided discoveries that should be further researched. For instance, the significant difference among the final mean GPAs for Group 1 and Group 2 during the pandemic suggested that students did not acquire academic achievement despite reportedly having access to technology and digital tools. Such discoveries indicated that other unforeseen factors must be considered when evaluating student engagement.

The discussion then led to the presentation of the implications of the study. With the lack of pertinent information that could describe the circumstances that affected the distance learning environment, this chapter concluded that the findings aligned with what previous research has indicated: students that attended online instruction earned lower course completion grades and overall GPAs than students that attended in-person instruction, but under specific circumstances. This consensus may not be based on the same assumptions. The review of the limitations of the study offered a glimpse of the lack of specific internal and external dynamics that could impact the study.
Then finally, recommendations for practice and future research presented options for policymakers, academic leaders, teachers, and parents to adhere to when seeking to improve students’ academic achievement. With a focus on social interactions that drive student engagement, the cohesive efforts from the community of learning can facilitate the necessary structures that address students’ needs and well-being. Each member must play an intricate part in overcoming barriers and supporting advances that enhance education. The evolution of societal factors indicates that the continuation of research based on student behaviors during education must coincide with the objectives set for achieving academic success.
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APPENDIX A

List of resources that support the six ELA Instructional Shifts and serve as the authorized learning guides (Common Core State Standards, 2002-2021):

- Northwest Regional Professional Development Program
- Florida Center for Reading Research
- ReadWriteThink™
- International Reading Association
- National Council of Teachers of English
APPENDIX B

List of resources that reinforce the initiative for setting mathematical and scientific standards (Common Core State Standards, 2002-2021):

- National Council of Teachers of Math
- Northern Nevada Math Council
- Mathematics Assessment Project
- Illustrative Mathematics Project
- Inside Mathematic
- The Teaching Channel
- Implementing the Mathematical Practice Standards
- Nevada Mathematics Project
- Yummy Math
- Youcubed at Stanford University
APPENDIX C

List of resources that reinforce the initiative for setting science and social studies standards (Common Core State Standards, 2002-2021):

- National Council for the Social Studies,
- Northern Nevada Council for the Social Studies,
- Nevada Department of Education Social Studies,
- Nevada Academic Content Standards Social Studies Standards,
- Common Core Standards
- Project Tahoe, and
- Washoe County School District Scope and Sequence