A STUDY ON HOW TEACHERS USE LEARNING MANAGEMENT SYSTEMS TO ENGAGE STUDENTS AND SUPPORT THEIR LEARNING IN MIDDLE SCHOOLS IN CENTRAL PENNSYLVANIA

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DEDICATION PAGE

I wish to dedicate this dissertation to my wife DeAnna Marie Hain, and our daughter Vitora Marie Hain. You spent countless hours taking on household duties and family responsibilities as I sat in class, or behind a desk researching and writing. I love you both with all of my heart and will never forget the sacrifices that you made to make this all possible. One main reason for my success in this program and on the dissertation is the memory of my son Joel Jeffrey Hain. Your bravery and examples set forth in your time with us motivates me in all that I do. I love and miss you. I dedicate this research to my children and my wife. Thank you for everything. Finally, I wish to thank my parents, Jeff and Dianne Hain, for a lifetime of support and motivation to succeed.

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Abstract

Learning Management Systems use in higher education and at the high school level has been studied, but with the onset of the COVID-19 pandemic, students in all levels of education began using the tool. Educators had limited time to prepare to use this tool, and research into how teachers used these tools to engage students and support their learning, how a teacher's demographic background could affect their use and what tools in Learning Management Systems were used was limited at the middle school and elementary levels. The Adolescent Community of Engagement is the theoretical framework used to explore how teachers can better engage their students and support their learning. This quantitative study was undertaken to explore how middle school teachers used this tool. Five middle schools in Central Pennsylvania were selected to participate in the study. A new survey focused on respondents demographic information, questions linked to the Adolescent Community of Engagement, and short answer questions inquiring about tools used in Learning Management Systems. This study found that the peer engagement pillar was lacking in these five school districts, and differences between grade levels and subject areas also emerged. The teachers shared what tools they use, and why these tools are selected. This research is beneficial as it shows districts where professional development needs occur at the middle school level and can help to determine what tools their teaching staff need to support their students.

Chapter One: Introduction

Technology and its role in education has become a focus in classrooms from Kindergarten to post-secondary education. "From the birth of the motion picture in 1922 to the advent of the computer in the mid-1970s, educators have been intrigued with the potential of technology to help transform education and improve student learning" (Hew & Brush, 2007, p. 224). The 1980s and 1990s brought the rise of the personal computer and the internet to the homes of America. Students were then able to use computers as tools to help them with their schoolwork while at home. Technology continues to advance and with this advance the type of student entering the classrooms change. Today's students have access to information at a rate never seen in the history of education. With the advances in technology and the access that students have to information, educational institutions are faced with the task of finding tools that help students succeed academically.

School districts have been working to stay on top of the changes in technology as they strive to meet the needs of the changing learners that are entering their classrooms. Earle (2002) points out "the promise is indeed real-as illustrated by recent studies showing that new technologies have indeed transformed classrooms for K-12 students and teachers" (p.5). This transformation has been rapid as technology continues to advance, and educators and students are advancing along with it. School districts adjusted their budgets to purchase educational technology, and train teachers on the proper way to use these technologies. The goal is to help the learners of today utilize these tools that will engage them and help them learn. Students have many more options today with cyber classes and blended learning opportunities. "Even in face-to-face courses, students are commonly provided with online learning activities, especially in school districts that have adopted one-to-one initiatives that provide each student with a laptop"

(Borup & Archambault, 2019, p. 17). Borup and Archambault continue, “One of the primary advantages of online technologies is that they allow students to have a learning experience that is more tailored to their needs” (2019, p. 17). Engaging students with technology is a topic that needs to be further studied.

One technological tool that high schools and higher education utilize is Learning Management Systems. "A Learning Management System is a software application or Web-based technology used to plan, implement, and assess a specific learning process" (Rouse, 2019). Educators can use LMS to deliver content, collect and assess assignments, communicate with students and more. Learning Management Systems, or LMS, are used at universities, high schools, middle schools and the elementary level. There are a wide variety of LMS options available with varying degrees of tools included. As the LMS continues to grow in use and implementation it is important to understand how teachers use them to engage students and support their learning. Many factors will influence the impact of the LMS including learner engagement, parental support, teachers' support and more. The use of LMS continues to increase in both virtual classrooms and as tools in face-to-face classrooms. While they grow in popularity in the education community, an examination of how teachers use them to engage students is needed.

Statement of the Perspective

Over the past few decades, educators are realizing the importance of incorporating new technology into classrooms and are tasked to determine if this technology’s use can complement a student’s engagement and support their learning in the classroom. One such tool is the learning management system. This study sought to understand how teachers use learning management systems to engage middle school students, how their demographical background could affect

how they use the LMS and what aspects of an LMS they find useful for this engagement, specifically of middle school students in Central Pennsylvania using the lens of the Adolescent Community of Engagement.

Theoretical Framework

With each passing generation, educators must tackle the question of how to make learning relevant to the students in their classrooms. Technology is changing and improving daily and has become a part of the lives of most individuals. This coincides with the continual change of the learners in classrooms. As technology and its availability increase, the type of learner entering classrooms changes. Teaching strategies that were effective with previous generations may not engage students in the same way today. Borup et al.(2014) state that "learner-content interaction, the foundation of any educational experience, occurs when students interact with learning materials" (p. 3). In many cases, these materials tend to be linked to technology, such as LMS. Implementing this technology in a meaningful and successful manner is a new challenge in education.

The realization that these changes in education could have numerous effects on teaching, student engagement and learning led researchers to examine how to make these tools more effective at supporting student learning. Led by Jered Borup from George Mason University, a group of researchers studied how engaging students online requires engaging others as well. They named their theory the Adolescent Community of Engagement (Borup et al., 2014, p. 110). The Adolescent Community of Engagement outlines how technology can be successfully implemented to ensure student engagement, and thus support the learning of students. The researchers behind this theory explain the framework as composed of “four main constructs: student engagement, teacher engagement, peer engagement, and parent engagement” (Borup et

al., 2014, p. 6). Each of the constructs is pivotal for the engagement of the learner. From their perspective engagement is integral for a student learning online.

Context

The school districts that are the focus of this dissertation remained anonymous for ethical considerations. Pseudonyms were used to protect the identity of the district. All participating districts are in south central Pennsylvania. During the 2019-2020 school year, the COVID-19 pandemic struck the nation and in March of 2020, all schools in Pennsylvania were ordered to close. This reality forced teachers across the Commonwealth to quickly adapt to online education and fostered an increase in LMS and blended learning in schools.

Middle School 1 is part of a semi-rural, midsized district. Middle School 1 contains grades six through eight and the majority of the population is white, with subgroups of Black, Hispanic, and students of two or more races. There are currently more than 500 students with around 40 teachers employed.

Middle School 2 is a midsized, suburban district located in south-central Pennsylvania. There are roughly 1000 students enrolled in Middle School 2 with about 60 teachers currently employed in the building. The majority of students are white, with subgroups of Asian, Hispanic, Black and two or more races. The district has grown significantly over the past ten to twenty years due to an influx of move-ins from the Baltimore, MD area.

Middle School 3 is in a rural small sized district located in south-central Pennsylvania. Middle School 3 contains grades six through eight and is ninety-two percent white. There are currently around 600 students enrolled in Butler Falls Middle School with around 50 teachers working in the building.

Middle School 4 is part of a suburban, midsized district, located just outside a small city in south-central Pennsylvania. The middle school contains students in grades six through eight and the majority of the population is white, with Black, Asian, Hispanic subgroups. There are currently around 700 students with about 50 teachers employed.

Middle School 5 is part of a small district located in a small town in eastern Pennsylvania. Middle School 5 houses students in grades five through seven and is primarily white, with a small subgroup of Hispanic students. There are close to 300 students along with around 20 teachers employed.

Statement of the Research Problem and Research Questions

As the use of learning management systems increase in classrooms across the globe, it is imperative that their use helps today's learners connect with their learning, and that the LMS assist in engaging students to support their learning. The purpose of this dissertation was to examine how teachers use LMS and is guided by three research questions.

- How do teachers use learning management systems to engage students and support their learning?
- How do teachers' demographic background (years of experience, content area, etc.) impact their use of LMS?
- What aspects of a learning management system do teachers find useful for engaging students?

The study focused on middle school teachers at five middle schools in South Central Pennsylvania. Teachers were provided with a survey based upon how they use LMS to engage students and support their learning along with aspects of LMS that engage students. This survey

drew upon the main focal points of the Adolescent Community of Engagement Theory (Borup et al., 2014). These focal points include student engagement, teacher engagement, peer engagement and parental engagement. The survey was shared electronically through Qualtrics, and the results were collected and analyzed by the researcher.

Research Significance/Purpose of the Study

As school districts seek to understand new technology and how it can engage students and support their learning, blended learning tools such as LMS need to be studied. Since the 1980s there has been a movement to utilize the personal computer as a tool to help improve education (Grimes & Warschauer, 2008). As technology has become more attainable and is used in most occupations in today's world, schools have recognized the importance of preparing students to become technology literate. One-to-one programs provide students with technology for teachers to begin delivering content in a blended learning approach. According to Singh (2003) "This combines multiple delivery media that are designed to complement each other and promote learning and application-learned behavior" (p. 52). LMS have quickly become a tool used in colleges and K-12 districts throughout the world. Malm and DeFranco (2012) suggest that "with the near-universal adoption of LMS platforms by colleges and universities, the time has come to shift the focus of conversation from whether faculty use the LMS to more difficult and important questions of how these systems' are impacting the student learning experience" (p. 10). This dissertation seeks to discover how teachers use LMS to engage students and support their learning along with aspects of the LMS that are useful in this endeavor.

Methodology and Subjects

This study used a survey provided to educators in five middle schools in Central Pennsylvania. Butin (2010) states “survey research is a very common tool in the social sciences for gathering data” (p. 91). He continues “if done right, surveys are extremely powerful tools to gather precise data” (p. 96). Creswell (2014) says that survey design “provides a quantitative or numeric description of trends, attitudes or opinions of a population by studying a sample of that population” (p. 155). Target population can be defined as “the group of elements for which the survey investigator wants to make inferences by using the sample statistics” (Groves et al., 2009, p. 69). For this dissertation, the target population specifically was the classroom teachers in the participating districts. The teaching staff at these middle school buildings were asked to complete a survey to gain insight into their perceptions of how they use learning management systems to engage students and support their learning. This population can provide an insight into a faculty who quickly transitioned to using the LMS and was able to monitor student progress.

The survey was created by examining the main pillars from the ACE framework. The questions explored how teachers use the LMS to support student learning to promote engagement. The questions also explored teacher perceptions of their students' views on the usefulness of LMS. Questions are linked to the four main pillars of the ACE framework; student, teacher, peer and parental engagement. Six questions are linked to demographic information detailing the backgrounds of the participating teachers. The survey responses sought to examine how the teachers use the LMS to engage and support students, along with the tools and aspects of the LMS that teachers find useful to support this engagement. Field experts were asked to test the construct validity of the survey. Salkind (2014) explains construct validity as being "based on some underlying construct, or idea, behind a test or measurement tool" (p. 123). For this survey,

the experts were looking to see if the questions connected with the corresponding pillar of the ACE framework and if the questions are worded in a way that is easy to understand. The researcher analyzed the survey questions linked to the ACE framework to test for construct validity of the tool.

Limitations of this Study

The largest limitation of this study is that it was limited to one geographic area in South Central Pennsylvania. The implementation of the technology could be limited to only five school districts, so the overall efficiency of technology was limited to teachers and students in these districts. In these school districts, the researcher was only looking at a small number of teachers and their perceptions on the effect of LMS on middle school students. The teacher's perceptions for blended learning, one-to-one and LMS could be affected or have bias due to a multitude of reasons including experience with this technology, number of years in the classroom, grade level taught and more. The researcher is an administrator in a local school district but does not immediately supervise any teacher completing the survey.

Definition of Terms

Learning Management Systems-A learning management system (LMS) is a software application or Web-based technology used to plan, implement, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance. A learning management system may also provide students with the ability to use interactive features such as threaded discussions, video conferencing and discussion forums (Rouse, 2019).

Technology-The practical application of knowledge especially in a particular area, or a capability given by the practical application of knowledge (Merriam-Webster.com, 2019).

Engagement-The time and energy students invest in educationally purposeful activities and the effort institutions devote to using effective educational practices (Kuh et al., 2008).

Chapter Two: Review of Literature

Introduction

The focus of this literature review is to examine how teachers use LMS to engage their students and support their learning, specifically at the middle school level. Student engagement is a key component to this success and is linked to Learning Management Systems (LMS) through the complementary theory of the Adolescent Community of Engagement (Borup, et al., 2014). This theoretical framework attempts to link “the adolescent online environment and the learner” (p. 110). Learning Management Systems handle all aspects of the learning process including delivering and managing content, identifying and assessing individual and organizational learning or training goals, tracking the progress towards meeting those goals and collecting and presenting data for supervising the learning of an organization as a whole (Szabo & Flesher, 2002). The successful implementation of an LMS includes a student's online learning readiness. According to Liu (2019), "online learning readiness is related to student motivation and academic achievement" (p. 44). Liu evaluated online orientation design with a readiness scale in her design-based research. Believing that a self-paced orientation prior to online learning would improve readiness, Liu studies what students needed to perform well academically using an LMS. The orientation course seemed to assist learners as they completed a course online. The researchers found that through the orientation course, students needed peer interaction along with interaction with the instructor. This research shows links to both peer interaction and interaction with the instructor as critical components to overall student engagement.

While peer interaction and teacher interaction are two factors that play a role in engagement, they are not the only factors. Axelson and Flick (2011) define student engagement as how “involved or interested students appear to be in their learning and how connected they are

to their classes, their institutions, and each other" (p. 38). Drawing on this prior work, researchers proposed an encompassing framework to describe the interrelated factors that impact student engagement. This framework was called ACE and it identifies student engagement, teacher engagement, peer engagement and the role of parents as the key components to ensure the academic success of adolescents in online learning (Borup et al., 2014). It is through this lens that student engagement with the LMS was examined.

Theoretical Framework

Adolescent Community of Engagement

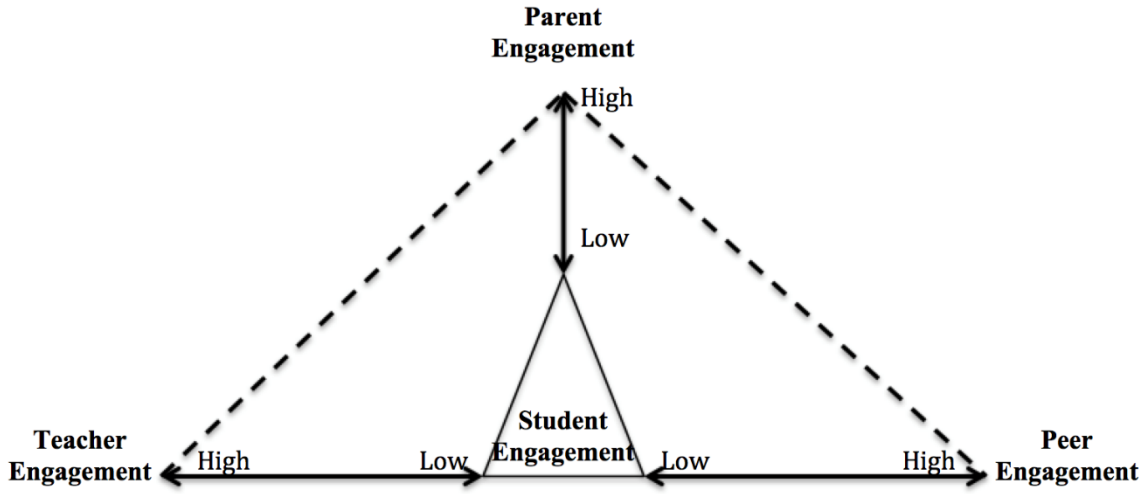
Today's learners have access to tools not available to learners throughout history. Regardless of the educational tool being used, certain factors must exist for these tools to be effective. The level of engagement is one such factor. How the educator can create this engagement is paramount in the classrooms of today. Along with engagement and support from their teacher, parents and peers also play a defining role in success. The LMS is but one technological tool used in classrooms of today, but factors linking its success can correspond to the factors that support student learning with any modern tool.

Borup et al., (2014) assert, "The primary hypothesis of the ACE framework is that student engagement is positively correlated with parent, teacher and peer engagement" (p. 22). The ACE framework has risen to serve as a guide for research and design regarding adolescents and online learning and will serve as the theoretical foundation for this dissertation. According to Borup et al., without all four factors being fully present, an adolescent's engagement could be negatively impacted. The researchers explain that while all four factors are important, they might not hold equal weight in the overall engagement of students. Figure 1 demonstrates the effects that all four pillars in the ACE framework have on engagement. The figure shows that having

low peer, teacher or parent engagement will lessen the possible amount of student engagement. The opposite is also true. If peer, teacher or parent engagement are high, there is a greater chance that student engagement will increase.

Figure 1

The Adolescent Community of Engagement



Note. This figure showcases the effects that teacher, peer and parental engagement have on student engagement.

Parent Engagement

To fully examine the ACE framework, a deeper look at the three pillars that help to support student engagement is needed. The first pillar that will be examined is parent engagement. Jensen and Minke (2017) reviewed literature on the effects that parent engagement had on a student's academic and social and emotional success. They point out that less focus had been given to the engagement of parents at this level of education but stress its role in the success of these students. They note that "there are still many questions related to factors influencing parent engagement at the secondary level" [and continue studies of this engagement will lead us to] "be better positioned to produce positive outcomes for all students" (p. 185). Educators

traditionally have recognized the link between parental involvement and engagement. “When parents are directly involved with children’s schooling, they not only bolster academic learning but also affirm the importance of education” (Bryce et al., 2019, p. 493). This involvement must also support the students’ direct and individual needs. “While there are negative outcomes for too little parent engagement, there also can be negative effects for parent engagement behaviors that do not support adolescents’ developing autonomy” (Jensen, & Minke, 2017, p. 185). Involving parents in a supportive way could vary with each parent and student based on the student's needs and the relationship between parent and student. Jensen and Minke point to the school as one responsible party to reach out to parents and provide them with the support that they would need for them to in turn support the students. This study examined the ability of parents to connect with their student’s education through interactions on the LMS. The survey tool explored teachers’ LMS use relating to parental communication and their ability to assist their learners through this medium.

Borup et al. (2019) researched 12 online teachers and 12 on-sight facilitators in their study on the importance of parent engagement at this level. They examined the role that parents will play in lowering online student attrition rates and note that more research is needed in the field of how parental engagement can affect student success in online learning environments. In the study, it is explained that the main types of parental interaction with online learning tends to focus on three main areas. The first area deals with “organizing and managing, meaning helping students organize their environments and managing their time” (Borup et al. 2019, p. 81). The second area relates to issues around instruction, namely “answering content-related questions, helping develop study skills, providing feedback and assisting with technology issues” (p. 81). The third area relates to facilitating interactions or “supporting students’ attempts to interact with

the content and others" (p. 81). The third area of this explanation of parental involvement links closely to the LMS and is explored through the survey instrument used in this dissertation. The study was conducted by surveying and interviewing educators. They found that "parents had important responsibilities in their students' effective online learning" (p. 13). It is important to understand how parents can interact with the LMS. Parental engagement is a key component to the engagement of students with a LMS.

Teacher Engagement

The second pillar of the ACE framework that will be examined is teacher engagement. Parents' perceptions of how teachers engage students was the focus of Borup et al. (2014) as they explored engagement at a cyber school. In this study, researchers conducted 22 interviews with half of the faculty of the Open High School of Utah, an online charter school. This research was one of the first to primarily examine the critical components of online schools for K-12 students. The researchers found that teachers use a wide variety of strategies to motivate their students towards success. They also found that teachers can be a key factor in a student's success in online learning but maintain that there remain several factors that can affect this.

The pillar of teacher engagement was also explored by Borup and Stevens (2016). They used their study to look at parents' perceptions of teacher support at a cyber charter high school. The study evaluated the degree to which a teacher's involvement and support can affect student engagement. The researchers conducted 19 interviews with nine parents at a cyber charter school and analyzed the results through the lens of the ACE framework. Parents mentioned that the lack of engagement by students to certain assignments could be remedied by more engaging activities (Borup, & Stevens, 2016). One interviewee stated, "it was best when teachers tailored the course content to 'what students' think is important.' In part, this was accomplished by providing

students with some level of choice in their learning activities" (p. 235). The tools that teachers use, and how they set up the learning process can have major effects on how engaged students will be in the class.

Wu and Huang (2007) demonstrated a link between teachers and student engagement in their study that focused on two classrooms of ninth grade science students studying science in Taiwan; 54 students were given computer simulations following a three-week course of study that was either teacher-centered or student-centered. The data showed several differences including the notion that a teacher's choice of activity greatly relates to the engagement of the student. Wu and Huang (2007) state "teachers should consider the question of 'what are desirable learning activities' when deciding the implementation of instructional approach" (p. 747). The findings go on to show that "instructional approaches shape students' learning experiences and allow them to engage" (p 746). Student emotional engagement can be enhanced through various methods and teaching strategies. These methods and strategies include "making reflections, holding a positive attitude toward learning, raising conceptual questions, and generating thoughtful discussions about the content learned" (p. 747). These examples link the researcher's findings to the ACE framework.

Peer Engagement

The final pillar of engagement outlined in the ACE framework focuses on the importance of peer engagement. In their study based upon online student perceptions of the need for a proximate community of engagement at an independent study program, Oviatt et al. (2016) point out that K-12 students "require interactions with teachers and other students" (p. 338). In this study, K-12 independent study students were surveyed regarding their perception of the need for interaction with a support community. The data showed that students realized that they needed

additional supports and would welcome them if available. Oviatt et al. (2018) continued their research on this topic by looking at connections to the ACE framework. Students' were surveyed upon completion of an online course in this study that seeks to examine the proximate community of engagement in independent online course work. "Peer engagement in the ACE framework is expressed through collaboration that provides instructional and motivational support" (p. 228). They theorized that the community of support would assist students toward success in their online learning (see Figure 1).

The benefits of peer engagement are a key component to the ACE framework, but the number of studies that look at how teachers perceive this importance are not as plentiful as those looking at teacher and parental engagement. Borup (2016) states "little is known regarding how teachers perceive or value learner-learner communication" (p. 232). In his study focusing on teacher perceptions of learner-to-learner engagement at a cyber school, he pointed out that the three main indicators of peer engagement are instructing, collaborating and motivating. All three of these indicators are transferable to LMS and can play a role in how teachers use this tool.

While the pillars have been examined as discrete entities, they interconnect to contribute to student's engagement within an online learning environment. The three influencers were summarized in a study on Adolescent Communities of Engagement and their influence on student engagement. In this study, Spring (2018) found that "students will likely retain support from these friends and family members as they enter fully online learning" (pg. 66). Spring wrote three articles for her study all focusing on relationships and their impact on engagement. The main ideas of relationships and engagement, the impact of ties in academic communities and the nature of supportive academic relationships and their influence on student engagement were the focus of her study. The articles offered strong support of the four main pillars of the ACE's

framework and how they connect to the engagement of students who learn under this learning environment. Spring states “in order to improve the education experience we must better understand the unseen aspects of both engagement and the human connections that can support it” (p. 23). Parent engagement, peer engagement and teacher engagement are these human connections and act as driving factors linked closely to the overall engagement of the student.

Learning Management Systems and Student Engagement

The LMS emerged in the early 2000s and was quickly adopted by colleges and universities as a platform to deliver content and better organize the teaching and learning process. Since this time, LMS use by elementary, middle and secondary schools has greatly increased. While elementary, middle and secondary schools began using LMS, the impact that they were having on student engagement was unknown. Students’ views on the usefulness of the LMS can assist researchers with their understanding of the impact a LMS can have on engagement and the support of their learning. Acknowledging the differences between students at the secondary and post-secondary levels is important when seeking to discover the impact of a technological tool in students’ education. Students’ attitudes towards education in general differ between those electing to further their education and those who are mandated by law to attend. For this reason, it is important to note the attitude of students towards learning with technology at the middle school level.

Learning Management Systems emerged as one of the most used tools as online learning in schools increased. Yapici and Akbayin (2012) examined high school students’ views on online learning and were able to question their perceptions on learning with technology. Their study specifically focused on ninth-grade students’ in a biology class. The students were interviewed following a lesson on living things and biodiversity. Interviews were conducted during the 2009-

2010 school year and the results were highly positive. Students' highlighted multiple areas of the lesson that were enhanced due to access to an LMS. They pointed to the anytime access, the access to practice tests and quizzes, the ability to work at their own pace, the number of visuals and the flexibility of time as areas that they viewed as positive. The impact of the LMS is apparent in this study linking the positive impact that this technology has on their experience in this class setting.

Students' views on technology in education are another area of research that connects to this study. Buckenmeyer et al. (2016) explored a sample population that was a microcosm of the mid-western university that they studied. Through their survey they were able to ascertain that 94% of students felt that technology would benefit learning, including 85% who went on to state that it was paramount to their engagement. Students want to learn with technology, such as an LMS, but to be successful they must be engaged in the process. "For learners that grew up surrounded by technologies and experiencing it from early years in school, the integration of technology in the learning process may be expected" (Greig, 2009, p. 34). The researchers reinforce this by stating "this method (of content delivery) is supported by technology that allows students to control the content and time allotted for their learning activity" (Buckenmeyer et al., 2016, p. 413). Their research led them to conclude that when teaching with technology, it is vital to communicate with learners to determine what technological tools provide some comfort during the learning process. As teachers seek to find what technological tools in LMS are useful for the engagement of students, this comfort could transfer to a better chance of engagement. They asked closed-ended questions that touched on multiple topics, including the benefits and possible barriers that do exist when educating in this manner. While their findings do point towards technology as a whole, their study did focus on students who learned with an LMS. This

research again strengthens the case for using this technology to engage students and leads to the conclusion that it will support their learning.

Segal et al. (2019) explored the use of technology in education through the lens of personalization. Their approach shifted the focus from not just acceptance and support of learning through technology, but also the ability and need for the personalization of education through this medium. In his article, Soroka (2019), states that digital learning

> provides for a differentiated approach based on the fact that different personalities have different experience and level of knowledge on a particular topic and each applicant learns the subject matter material according to this level of knowledge and depends on his or her individual type of perception and pace of learning (p. 79).

His examination of personalization through digital learning with an LMS solidifies the connections that Segal et al. (2019) examine with their study. Their study took place during the 2016-2017 school year with Israeli students. This quantitative study looked at the personalization of educational content, one of the features made possible by LMS. These university students answered questions that were differentiated based upon prior question responses. The findings of the study looked at the need to accommodate individual differences in e-learning. The delivery of content through an LMS, has the potential to engage each student if it is differentiated to meet the needs of each learner.

All the aforementioned research link engagement with LMS as a way to support student learning. The studies of Yapici, and Akbayin (2012), Buckenmeyer et al. (2016) and Segal et al. (2019) all show the positive achievements of students learning with an LMS. The reasons varied, but the positive generalization remained. The appeal of the LMS in these scenarios is the individualization and the flexibility that is provided. While there is a need to individualize for

students, and technology may offer these options, engagement is the key. The LMS provides this opportunity and further research on how to engage students through this medium is needed.

Student engagement takes many forms and is influenced by multiple factors. Fredricks et al. (2019) studied middle and high school students who had varying levels of engagement and disengagement in their school settings and further expanded this by adding the urban setting. This mixed-methods study examined what influenced urban students' engagement and disengagement in school. Researchers pointed to the fact that previous studies tended to focus mainly on white students living in middle-class homes. This does not encompass the reality of many schools and classrooms across the nation. The need for engagement is reflected heavily in their findings. "Increasing student engagement is a mechanism to both promote positive academic outcomes and reduce involvement in negative behaviors" (Fredricks et al., 2019, p. 492). They go on to remark "adolescence is the age when youth are particularly at risk of declines in engagement" (p.496). This points again to the potential differences between learners at the high school and university levels. Both interviews and larger surveys were used to collect data from the students. When discussing the students in the study, they found that "they were more disengaged when their teachers did not respect them, when their peers were off task, when the curriculum was boring and irrelevant, and when stringent disciplinary rules limited their autonomy" (p. 513). Their findings produce several realities, two of which include the importance of both peer and teacher involvement in a student's overall engagement, linking their findings closely with the ACE framework.

The examination of student engagement as a predictor of success is another area of research that connects to this study. Kwon et al. (2019) conducted a study focusing on students' taking online courses in the state of Michigan. Their study examined the 2015-2016 school year

and dealt with students' learning behavior as a key indicator of success. Their study looked at 788 students taking mainly core academic courses. The researchers note "consistently and persistently attempting to complete course assignments was predictive of success" (p. 220). This show of engagement from their study sample points to the importance of engagement to support student learning. The importance of both peers, and especially teachers shadow heavily on the notion that these relationships can continue to be realized through the use of an LMS.

The examination of student engagement was also studied by Pazzaglia et al. (2016) in their analysis of student engagement patterns and online course outcomes in Wisconsin. This quantitative study looked at data from 5,511 students enrolled in Advanced Placement (AP) high school courses during the fall of 2014. Their analysis looked for student engagement patterns in online courses. The study found that six patterns of student engagement emerged. The researchers examined the length and variability of their engagement with online content. It was clear that those who maintained a steady online presence and were consistently engaged in their learning performed better than those with less engagement. While examining students enrolled in a higher-level academic course, engagement was the focus and showed its importance. This study showed "learning providers with needed information about student engagement in online courses and how patterns of engagement are associated with course outcomes" (p. 5). Again, engagement is paramount to support student learning.

Additional factors exist linking LMS's success to student engagement. Finn and Zimmer (2012) suggest the relationship between students' engagement behavior and their academic performance is consistently statistically significant and repeatedly confirmed in empirical research. Zanjani et al. (2017) further explored this idea in their research focusing on LMS and its ability to engage students. They looked closely at the design of the tool and interviewed

seventy-four students with a variety of perceptions. They applied a thematic analysis approach looking for keywords and identifying common themes found throughout the interviews. Again, the study focused on students and educators at the post-secondary level, thus leaving out secondary students who may not be as motivated with their learning. Participants noted that the tools and links were not always helpful and could be better customized to meet the learners' needs. The researchers stated that "more user control over the LMS environment is an important factor in acceptance" (p. 27). The findings also revealed that "user-friendly structure, avoiding too many tools and links, supporting privacy and posting anonymously, and more customizable student-centered tools, were identified as LMS design factors that affect user engagement" (p. 25). They found that while many opportunities do exist for the engagement of students, this tool fell short of attaining full student engagement. The LMS design is important to the successful engagement of students, and this study found that the LMS Blackboard was not viewed positively by those interviewed.

Effectiveness of LMS in Engaging Students and Supporting Their Learning

The importance of student engagement is clear. This connectedness and engagement can be linked to the use of LMS with the learners of today. The increased use of technology like the LMS is not necessarily a new topic. Alshorman and Bawaneh (2018) point to studies done at Duke University in 2004 and Bowdoin College in 2005, but do not spend much time elaborating on the success of students who are in programs where they are being used. In 2011, Nasser, Cherif and Romanowski (2011) outlined the history of how LMS's were used in school dating back to the mid-1990s, but much of their research examined Middle Eastern nations such as Qatar and Jordan. Research is available from the onset of LMS use in education, but as the

technology changes and improves, so must the research increase to determine the strength of the tool for student engagement, leading to increased academic support of the student.

In Pawade's (2019) study on the engagement level of the learner, it is pointed out that online learning management systems platforms can better engage and improve the learning process. The bachelor of engineering students were examined along with their use of an LMS for the engagement level and their performance overall. The work points to LMS's being an effective tool for today's students but focused on students at the collegiate level. Holmes and Prieto-Rodriguez (2018) examined the validity of their research based on 46 staff members and 470 college students who are studying in Australia. Participants responded to a survey, interviews and focus groups and shared that students will accept and prefer alternatives to the traditional face-to-face teaching strategies. The results of the survey, interview and focus groups support the overall potency of the LMS with the students of today but focuses on institutions where they have been used for years. While research has focused primarily on collegiate settings, the connection of engagement and its potential to support the learning for secondary students needs to be addressed further.

Numerous studies exist that examine the effects of the LMS on the engagement and support of students in areas where the tool is relatively new, such as colleges and universities in other areas of the world. Damnjanovic, Jednak, and Mijatovic (2013) studied 255 students from various universities in the Balkins and Baltic states. These students completed questionnaires surrounding their satisfaction with Moodle™. They did express positive experiences with the LMS, but also cited the need for the educator to be well versed in how to deliver content in this style. This study examining LMS use in other parts of the educational world mirrors the situation of secondary schools as they begin to use this technology tool with more frequency. While

connections can be made, they are not specific to LMS use at the secondary level, namely middle school students.

Virtual or cyber schools are other examples that have been researched. Liu and Cavanaugh (2011) examined virtual high school students and their success with an LMS during the 2007-2008 school year. They found that the largest contributing factor for student engagement and student support was related to the amount of time that students logged into the LMS. They state, "even after more than 10 years of extraordinary growth in K-12 online learning, little research has been done as compared to post-secondary education" (p. 399). They recognize the gap in research on students, their engagement, and their success at the high school and entire K-12 level. Their study examined students from a Midwestern state virtual high school and focused on the main variables that could affect this engagement and success. They listed this as the time students spent in the LMS, the number of times they logged in, teachers' comments, participation in free or reduced lunch programs, race and ethnicity and grade level as factors for success. They point to the real need to expand research in this age group to determine the tool's success.

Marineo and Shi (2018) studied a similar age group as they examined students who were transitioning from high school into college. While focused through the lens of a library's effect on successful transformation, their findings point that those who use the LMS perform better than those who did not use the tool. Their study calls for additional research to explore the effects on this age group. Pretorius (2010) used a survey tool in Moodle to show a possible method to determine student preferences and to measure the extent to which it was linked to engagement and improved academic achievement. The data from the survey dates prior to 2010 but shows a clear link to improved achievement.

Research exists since the early days of LMS use in education, but additional studies are needed to continue to gauge the usefulness of the tool for student engagement. Linking the studies from universities and secondary schools in the United States, along with universities throughout the global education community lay the foundation for a better understanding of the success of this tool both at the post-secondary and K-12 levels. Research exists linking the importance of student engagement along with other factors to make educational technology tools a positive factor in the goal to support the learning of students.

Conclusion

The study of student engagement and its importance towards supporting student learning is a topic that many researchers have examined through multiple lenses in hopes to improve the methods of content delivery. Engagement continuously plays a role in this success. The examination of an LMS and its ability to provide students what is needed to achieve this engagement is not different. Student engagement continues to be a major factor, and studies listed in the literature review reinforce this. Additional factors that emerge as important for the success of today's learners have also been studied, and these studies range from our youngest learners to those who continue to learn into adulthood. Student engagement remains a major factor for student learning at all levels.

Studies between students from different age groups, socio-economic backgrounds and numerous other differences exist, and the ACE presents multiple reasons for a student's engagement with the LMS. What the research is showing is a potential gap in studies focusing on how teachers are using LMS to successfully engage students at the middle school level. The research suggests that while the use of LMS's does continue to expand into younger age groups, gaps do exist in their ability to engage and support students at the secondary level. The ACE

framework outlines key factors that assist student's engagement while learning with an LMS. The data collected in this dissertation looks to use the ACE framework to examine its role in the engagement of students in a middle school in central Pennsylvania. The results of the study will add to the research that does exist at the secondary level but will look to combine the ACE framework with teachers' perceptions of achieving successful student engagement while learning with an LMS at the middle school level. The need for additional research is clear.

Chapter Three Methodology

This study examined how teachers use LMS to engage students and support their learning. It sought to find what aspects of the LMS that teachers find useful in assisting to achieve this goal. Input from multiple teachers was collected and analyzed in the form of a survey, and results were studied in detail. Finally, open-ended questions were asked which provided the opportunity for additional analysis.

Statement of the Problem and Research Questions

This study attempted to answer the following research questions:

- How do teachers use learning management systems to engage students and support their learning?
- How do teachers' demographic background impact their use of LMS?
- What aspects of a learning management system do teachers find useful for engaging students?

Research Setting and Context

This study took place in five middle schools in Central Pennsylvania, specifically with teachers. LMS have been available for use at each middle school. Some teachers use learning management systems daily, while others use them with less frequency. In March of 2020, the COVID-19 pandemic struck, instantaneously transforming how learning could take place. Teachers and students throughout the world quickly adapted to online learning and LMS became commonplace throughout classrooms. With all teachers now using this tool, a better sample existed for the study. Educators with varying levels of experience and comfort with LMS now

have some experience and the data collected could have a greater impact on these middle schools and similar schools throughout the nation and world.

Middle School 1 is part of a semi-rural, midsized district. Middle School 1 contains grades six through eight and the majority of the population is white, with subgroups of Black, Hispanic, and students of two or more races. There are currently more than 500 students with around 40 teachers employed.

Middle School 2 is part of a midsized, suburban district located in south-central Pennsylvania. There are roughly 1000 students enrolled in Middle School 2 with about 60 teachers currently employed in the building. The demographics are predominately white, with Asian, Hispanic and Black subgroups. The district has grown significantly over the past ten to twenty years due to an influx of move-ins from the Baltimore, MD area.

District 3 is a rural small-sized district located in south-central Pennsylvania. Middle School 3 contains grades six through eight and is ninety-two percent white. There are currently around 600 students enrolled in Butler Falls Middle School with around 50 teachers working in the building.

Middle School 4 is part of a suburban, midsized district, located just outside a small city in south-central Pennsylvania. The middle school contains students in grades six through eight and the majority of the population is white, with Black, Asian, Hispanic subgroups. There are currently around 700 students with about 50 teachers employed.

Middle School 5 is part of a small district located in a small town in eastern Pennsylvania. Mountain Side West Middle School houses students in grades five through seven

and is primarily white, with a small subgroup of Hispanic students. There are close to 300 students along with around 20 teachers employed.

Defining the Methodology

This dissertation utilized teacher surveys to better understand how they use LMS to engage students and their role in supporting students' learning. Butin (2010) states that "if done right, surveys are extremely powerful tools to gather precise data" (p. 96). In this case, the data will highlight the perceptions of middle school educators on LMS and their helpfulness in assisting middle school students to achieve engagement in the classroom. Creswell (2014) describes surveys as having a particular purpose. "This purpose is to generalize from a sample to a population so that inferences can be made about some characteristic, attitude, or behavior of this population" (p. 157). In this case, the sample will be the middle school teachers at five middle schools in Central Pennsylvania.

Established surveys focusing on using LMS to engage students through the lens of the ACE were not found. This suggested a need for additional work in this area. A survey tool was created using the four pillars of engagement documented in the ACE framework (Appendix A). Questions were created based upon each pillar and their connection to LMS, along with demographic questions and short answer questions detailing the LMS tools teachers found to be helpful. Following the demographic questions, a series of statements were provided followed by a Likert scale designed to allow the middle school teachers to rate their perception based upon the statement. These questions focused on one of the four main pillars of the ACE framework. Finally, the short answer questions were all based on the tools that the middle school teachers find useful to engage their students. The survey was sent to the middle school teachers

electronically through Qualtrics™ and results were collected electronically through Qualtrics. The figure below details which pillar of the ACE framework is linked to each question.

Table 1

Survey Questions Linked to ACE Pillars

Pillar	Student Engagement	Teacher Engagement	Peer Engagement	Parent Engagement
Question #	7	10	13	9
	8	11	14	18
	15	12	17	19
	16	20		

Note: The survey questions linked to each ACE pillar are listed below

Validity can be defined as "the property of an assessment tool that indicates that the tool does what it says it does" (Salkind, 2014, p. 121). As this survey is new, it was important to test the construct validity of the tool before distribution to the middle school faculty. Salkind points out that content and construct validity may be difficult to fully establish as it "is based on some underlying construct, or idea, behind a test or measurement tool" (p. 123). This dissertation sought to establish the connection of the survey to the four main pillars of the ACE framework. As the main researcher behind the ACE framework, Jered Borup is one of the experts in this field. The survey was shared with Borup with a focus on the questions tied to engagement. Additional researchers were contacted based upon feedback received from Borup on the survey instrument. Since the researchers behind the development of the ACE framework were contacted

and included, the content validity of the survey is strong. Each question focusing on engagement was assessed by these experts further validating the tool. The completion responses of the survey by the middle school teachers also were used to test the reliability of the tool.

Brown (2000) noted that "the construct validity of a test should be demonstrated by an accumulation of evidence" (p. 10). He continued by stating “smart test developers will stop when they feel they have provided a convincing set of validity arguments” (p. 10). A factor analysis was also conducted to demonstrate both the convergent and discriminant validity of the survey, or in other words, construct validity. "Factor analysis is a technique based on how well various items are related to one another and form clusters of factors" (Salkind, 2014, p. 317). In this study, the factors examined were determined by the demographic questions in the survey. "Convergent validity reflects the extent to which two measures capture a common construct" (Carlson & Herdman, 2010, p. 2). For example, if the demographic information provides the opportunity to sort through the survey responses based upon the grade level taught, there could be similarities based upon what tools eighth-grade teachers find helpful in engaging students through the LMS. "Discriminant validity assumes that items should correlate higher among them than they correlate with other items from other constructs that are theoretically supposed not to correlate" (Zait & Bertea, 1996, p. 217). The discriminant validity of this research helped to distinguish differences and similarities between the groups determined through the demographic questions. An example could be that teachers who have used the LMS regularly in the past might be more comfortable providing choice to students as opposed to those who only began to regularly use them in the past year. The factor analysis provided useful information to the study and district, along with providing stronger validity to the survey.

Participants and Setting

The participants of this study were teachers in five middle schools in Central Pennsylvania. A survey was sent to teachers at these middle schools regarding how they use learning management systems and their impact on student engagement and student support. The participants ranged from fifth grade teachers to eighth grade teachers.

Ethical Considerations

The collection of the data occurred through a voluntary survey focused on middle school teachers. The survey was vetted through the IRB process at Millersville University. All teachers received the voluntary survey. The surveys were taken individually, and the results were shared with the researcher. The survey results were recorded and analyzed.

The sampling for this dissertation was middle school teachers and their perceptions on the effectiveness of LMS to help middle school students engage in their learning. The information was collected during the 2020-2021 school year, a time period when students and teachers needed to use LMS due to periods of remote and hybrid learning. This was due to a global pandemic when political leaders were made to adjust the traditional model of K-12 education. Teachers who did not already use blended learning tools like the LMS prior to the pandemic had to adjust to their use in a timely manner.

All information collected by the voluntary surveys remained confidential throughout the course of this dissertation. No personal information was collected. As the researcher is an administrator in one of the sampled districts, it was determined to focus the study on teachers not under their direct supervision. Since the researcher is the principal of a high school, middle schools were chosen as the focus of this study. The middle school teachers should have been able

to answer the survey questions in a non-biased fashion as the researcher does not hold any supervisory position on them. The fact that the researcher is an administrator in one of the districts, despite not being assigned to the middle school, did need to be considered as having an ethical impact. Middle school teachers may have chosen to not participate in the survey as it was coming from an administrator in a local district. Some may question the motives of the survey and their answers could be skewed as a result. The researcher attempted to alleviate these concerns by thoroughly explaining the purpose of the survey and its ties to the study.

Procedures

In this study, a proposal and newly created survey was vetted through the IRB process at Millersville University. The researcher distributed the survey to all middle school teachers in the five participating districts, focusing on how they use LMS to promote student engagement and what LMS tools assist in this endeavor. These surveys were voluntary. The surveys were shared electronically, and the results were returned in the same format. The results of the surveys were analyzed. This was accomplished by using Qualtrics and SPSS. All data were interpreted, and the researcher reported on the comparison. The results of the data analysis are available for teachers, middle school administrators and district administrators if desired.

Data Analysis

The goal of this approach was to collect data that examines how teachers use LMS to engage students and support their learning. Data inquiring what aspects of LMS teachers find useful in this endeavor were also collected. The survey included questions about demographic information, along with questions examining the four main focal points of the ACE framework. While the same survey was given to all middle school teachers in the district, the collected

demographic information allowed the researcher to examine a variety of groups compared to their survey results. The results were compared relating to the highest level of educational degree earned, gender, length of career, grade level taught, content area and experience with LMS prior to the COVID-19 pandemic.

An analysis of variance (ANOVA) was used to study the results as "more than two groups were being compared" (Salkind, 2014, p. 233). The groups in this study were determined by the demographic data that were collected. The survey sought to explore differences between groups of one or more variables, resulting in more than two groups, thus a simple analysis of variance was used. The simple analysis of variance is used when "one factor or one treatment variable is being explored and this factor has more than two levels" (p. 234). The factor in this circumstance was the middle school teachers. The levels being explored are determined by the answers provided to the demographic questions.

The results were displayed and discussed to determine differences between the different demographic groups and their use of LMS to engage students and support their learning, along with the aspects of the LMS that they find useful in doing so. For example, this research could help to identify whether teachers from different content areas use the LMS differently to engage their students. It could also show differences in LMS use between teachers based on their amount of experience, or due to their level of comfort with LMS before the COVID-19 pandemic. This information can provide valuable information regarding the needs of certain educators, the ability of experienced LMS users to assist their peers and more.

The open-ended questions were compiled and similarities between responses were grouped and discussed. This was accomplished by using the text ID features of Qualtrics. The results of these questions can point to patterns of what tools teachers are using in their LMS.

Again, the demographic information was analyzed regarding the open-ended questions to compare and contrast teachers of different educational levels, experience, content areas and more. This information will be useful to future researchers, along with district leadership as continued use of LMS moves forward.

Summary

The literature showed the need for a study on the effects of LMS on the engagement and achievement of students. The lives of students today are different from all previous generations who traveled through the public school system of the United States. Technology is advancing at a rate never seen with students possessing instantaneous access to information. School districts have spent much of the past few decades attempting to determine which technological tools best provide students what they need to succeed. The recent global pandemic has dramatically increased the use of LMS at the middle school level. While many high schools and universities have been one-to-one in a blended learning model for years, middle schools and elementary schools are not as familiar with this technology. The relative newness of the LMS usage will provide data from both teachers with extensive experience using this medium along with those who are just beginning to use it daily.

The ACE framework provides a map that can link this technology to student engagement. This study sought to use this framework to examine the usefulness of LMS at other levels to ascertain if they are effective for the students in middle schools in central Pennsylvania. The survey tool allows the researcher to break down the teaching staff into groups based on answers in the demographic section of the survey allowing for deeper analysis based upon the teachers. The findings will fill gaps in the current research and will add to the school district's analysis of LMS tools and their impact.

Chapter Four: Findings

This study sought to understand how teachers use LMS to engage middle school students, how the backgrounds of participating teachers could impact their use of the LMS, and what aspects of an LMS they find useful for this engagement. The study specifically looked at teachers of middle school students in Central Pennsylvania using the lens of the ACE. A survey was used to collect data for the research questions listed below. The survey created for this study examined the four pillars of the ACE concerning the use of LMS to engage students and support their learning. The researcher contacted field experts in an attempt to test the validity of the survey. This was accomplished by reaching out to Dr. Jered Borup, the creator of the ACE framework, and a large sampling of field experts through online social media sites. Validity can be defined as "the property of an assessment tool that indicates that the tool does what it says it does" (Salkind, 2014, p. 121). Following the examination of validity, this study moved to answer the research questions highlighted below. This chapter will break down the survey as the research questions are answered.

Research Questions

- How do teachers use learning management systems to engage students and support their learning?
- How do teachers' demographic background impact their use of LMS?
- What aspects of a learning management system do teachers find useful for engaging students?

Validation of the Survey

Content Validity

The underlying content validity behind this tool is provided through the expert perceptions of primary researchers in the field. Salkind (2014) defines content validity as "the property of a test such that the test items sample the universe of items for which the test is designed" (p. 122). The survey was sent to Dr. Jered Borup and others, and eight responded. This tool looked at the demographic information of the respondents and asked two major questions. The first asked if each question on the main survey used was linked to the correct pillars of the ACE framework. The second question asked if each of the questions was worded in a way that was easily understood. The eight field experts who replied to the survey provided needed information on their background, and the role that they play at their institutions. Finally, they provided their thoughts on whether the questions asked were linked to the four pillars of the ACE framework, and if these questions were worded in a way that was easy to understand.

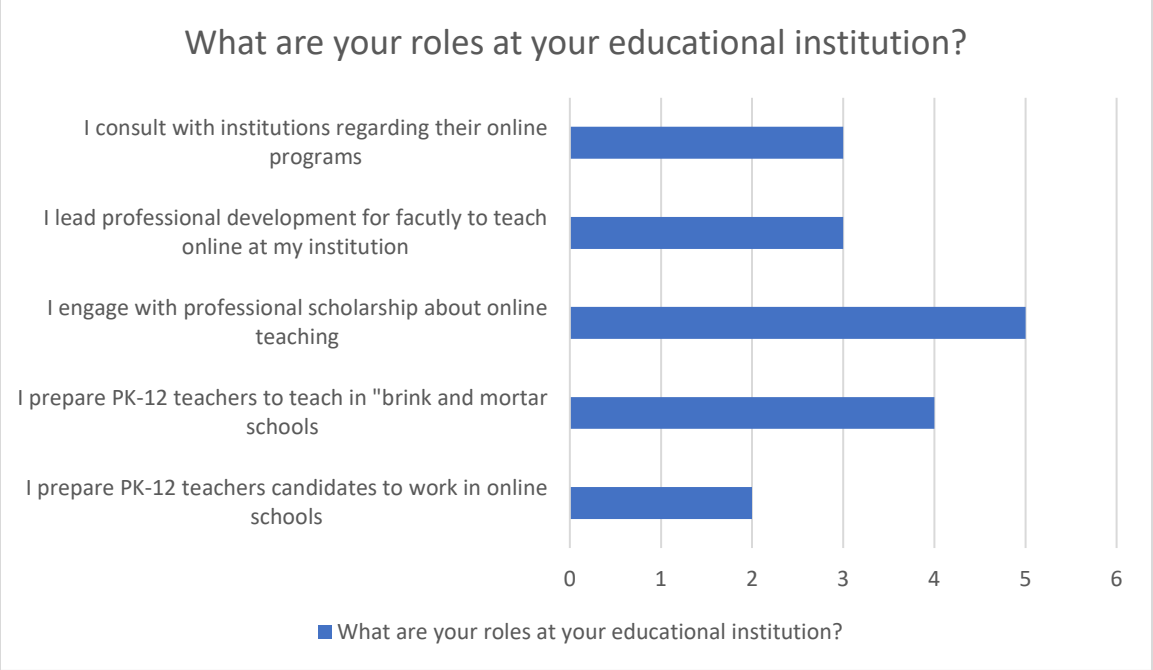
The responses to the validation of the survey were positive. Salkind (2014) points out that "establishing content validity is actually very easy, all you need to do is locate your local content expert" (p. 122). As the majority of the responses to the validation study were positive, content validity has been established and the survey results therefore have merit and provide a look into how middle school teachers in five districts in Central Pennsylvania use LMS to engage their students and how their demographic breakdown can provide insight into how they use them.

Demographic Data

The three demographic questions poised to the field experts dealt with their roles at their educational institutions, how long they have been in those roles and how familiar they are with the ACE framework. The expert responses are outlined in the figures below.

Figure 2

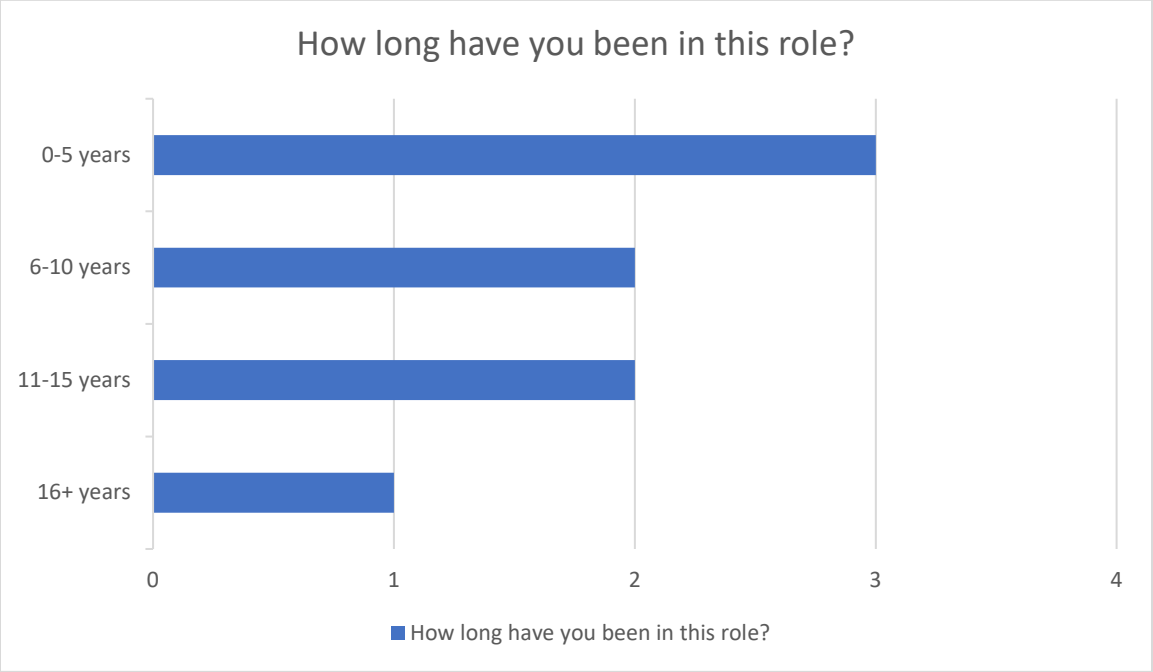
Demographic Question 1



Note. This demographic question dealt with the role that the expert played at their educational institution. They were asked to select all that apply.

Figure 3

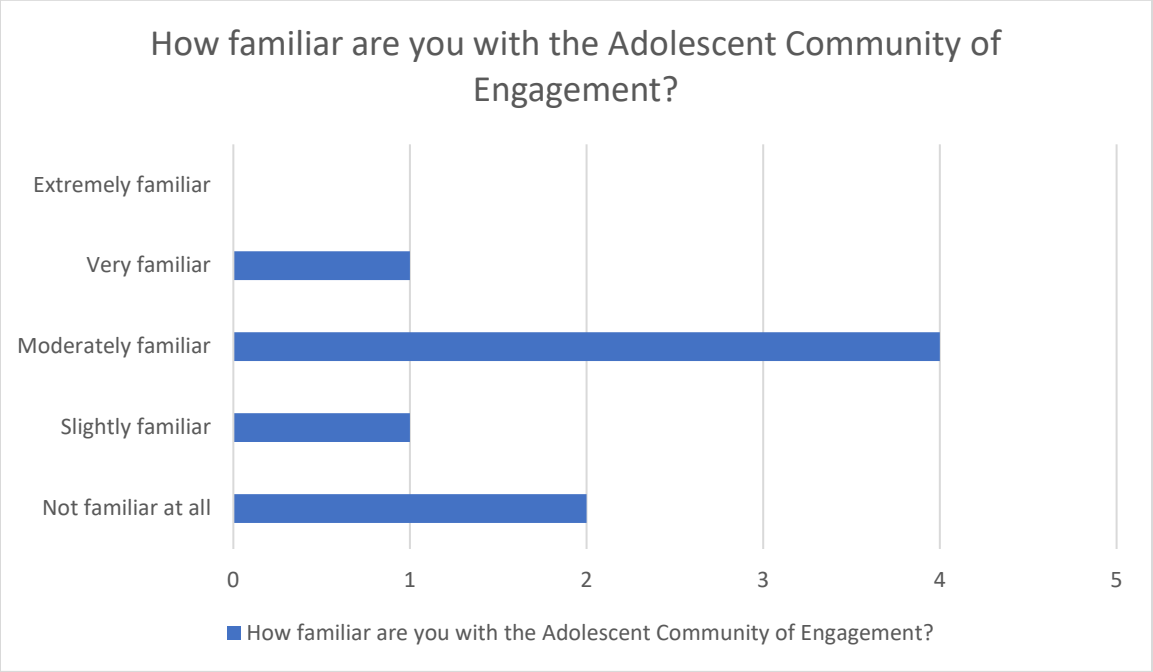
Demographic Question 2



Note. This demographic question dealt with how long the experts had been in this role.

Figure 4

Demographic Question 3



Note. This demographic question dealt with how familiar the experts were with the Adolescent Community of Engagement.

The demographic questions sent to the field experts dealt with their roles at their educational institutions, the length of time in these roles, and their familiarity with the ACE framework. Their responses showed a diverse group of experts who could provide their expertise and perspectives on the survey design. They work with professional development, online teachers, brick and mortar teachers and dealing with professional scholarship. The responses also showed that professionals in all stages of their careers answered the questions. Most of the experts had some knowledge of the ACE framework. While this was a small sampling of field experts, it does cover all of the ranges and experience levels that the researcher hoped to cover. This provides the wide analysis needed to provide content validity.

The two main questions from the expert survey deal with how well the questions of the main survey link to the pillars of the ACE framework, and whether the question is worded in a way that is easy to understand. The results of these questions are shown below.

Table 2

The question connects with the corresponding pillar of the ACE framework

Question	Yes		Somewhat		No		Total
	#	%	#	%	#	%	
1. I communicate with students through the LMS (student engagement)	7	87.50%	1	12.50%	0	0.00%	8
2. My students are able to submit assignments through the LMS. (student engagement)	6	75.00%	2	25.00%	0	0.00%	8
3. I provide opportunities for choice in assignments on the LMS (student engagement)	4	50.00%	4	50.00%	0	0.00%	8
4. My students complete assignments on the LMS at a rate equal to assignments given without using a LMS prior to the COVID 19 pandemic. (student engagement)	5	62.50%	1	12.50%	2	25.00%	8
5. I post grades on the LMS. (teacher engagement)	6	75.00%	1	12.50%	1	12.50%	8
6. My students can use the LMS to seek help. (teacher engagement)	5	62.50%	3	37.50%	0	0.00%	8
7. I believe I organize content, so it is easy for students to find assignments in the LMS. (teacher engagement)	6	75.00%	2	25.00%	0	0.00%	8
8. I assign students to work as partners in the LMS. (peer engagement)	4	50.00%	2	25.00%	2	25.00%	8
9. I assign students to complete work in groups of three or more through the LMS. (peer engagement)	4	50.00%	3	37.50%	1	12.50%	8
10. My students use the chat feature in the LMS to communicate with each other remotely. (peer engagement)	4	50.00%	2	25.00%	2	25.00%	8
11. Parents of my students can contact me through the LMS. (parent engagement)	3	37.50%	2	25.00%	3	37.50%	8

12. I communicate with parents through the LMS. (parent engagement)	2	25.00%	2	25.00%	4	50.00%	8
13. I believe that parents of my students can find student assignments on the LMS. (parent engagement)	2	25.00%	4	50.00%	2	25.00%	8
14. I believe that parents are able to see their child's academic performance in my class by using the LMS. (parent engagement)	4	50.00%	1	12.50%	3	37.50%	8

Table 2 details the results of the first main question asked to the experts in the field. Eight experts responded overall. When the topic of whether or not the question links to the corresponding pillar of the ACE framework, the responses appear to fall predominately on the somewhat to yes side of the scale. Out of the 14 questions asked in the survey, three resulted in a no response from three or four of the survey field experts. Out of the 14 questions asked in the survey, 11 resulted in a yes response from four experts or higher. Four questions were answered yes by six or more experts. Only two of the questions were either split evenly with yes and no responses or favored the negative side of the scale. This demonstrates that the eight field experts tended to agree that the questions did link to the ACE framework.

Table 3

The question is worded in a way that is easy to understand

Question	Yes		Somewhat		No		Total
1. I communicate with students through the LMS (student engagement)	8	100.00%	0	0.0%	0	0.00%	8
2. My students are able to submit assignments through the LMS. (student engagement)	7	87.50%	1	12.50%	0	0.00%	8
3. I provide opportunities for choice in assignments on the LMS (student engagement)	4	50.00%	4	50.00%	0	0.00%	8
4. My students complete assignments on the LMS at a rate equal to assignments given without using a LMS prior to the COVID 19 pandemic. (student engagement)	5	62.50%	1	12.50%	2	25.00%	8
5. I post grades on the LMS. (teacher engagement)	6	75.00%	1	12.50%	1	12.50%	8
6. My students can use the LMS to seek help. (teacher engagement)	5	62.50%	3	37.50%	0	0.00%	8
7. I believe I organize content, so it is easy for students to find assignments in the LMS. (teacher engagement)	6	75.00%	2	25.00%	0	0.00%	8
8. I assign students to work as partners in the LMS. (peer engagement)	3	37.50%	3	37.50%	2	25.00%	8
9. I assign students to complete work in groups of three or more through the LMS. (peer engagement)	5	62.50%	1	12.50%	2	25.00%	8
10. My students use the chat feature in the LMS to communicate with each other remotely. (peer engagement)	5	62.50%	2	25.00%	1	12.50%	8
11. Parents of my students can contact me through the LMS. (parent engagement)	5	62.50%	1	12.50%	2	25.00%	8
12. I communicate with parents through the LMS. (parent engagement)	4	50.00%	1	12.50%	3	37.50%	8
13. I believe that parents of my students can find student assignments on the LMS. (parent engagement)	4	50.00%	3	37.50%	1	12.50%	8
14. I believe that parents are able to see their child's academic performance in my class by using the LMS. (parent engagement)	5	62.50%	1	12.50%	2	25.00%	8

Table 3 details the results of the second main question asked to the experts in the field. Eight experts responded overall. When the topic of whether or not the question is easy to understand, the responses appear to fall even more predominately on the somewhat to yes side of the scale. Out of the 14 questions asked in the survey, only one resulted in a no response from three or four of the survey field experts. Out of the 14 questions asked in the survey, 12 resulted in a yes response from four experts or higher. Four questions were answered yes by six or more experts. When the somewhat responses are added to the response, this question was answered in an overwhelmingly positive fashion.

While only eight field experts responded to the questions about the survey, their participation can provide content validity to the ACE framework questions. Their responses highlight both the clarity of the questions and their link to the pillars of the ACE framework. The responses were more to the positive side of the Likert scale showing that the survey does provide questions that are linked to the theoretical framework. The content validity allows the results of the survey to provide data that can be examined to determine how the survey participants in these middle schools use the LMS with their students.

Construct Validity

As the survey created for this dissertation was new, the construct validity of the survey had to be determined. Construct validity is "the most interesting and the most difficult of all the validities to establish because it is based on some underlying construct, or idea, behind a test or measurement tool" (Salkind, 2014, p. 123). One of the focuses of this study is the validity of this new survey instrument. To test this, a factor analysis was conducted on the survey questions linked to the ACE framework. This was done to check the reliability of the instrument.

Construct validity is the best way to demonstrate the connectivity and reliability of a survey tool to the study that is being conducted. An exploratory factor analysis was run on the survey instrument. Salkind (2014) describes factor analysis as "a technique based on how well various items are related to one another and form clusters or factors" (p. 317). For this study, the survey data was collected in Qualtrics™ and exported to SPSS™ for analysis. The data was scrubbed to include only the survey questions that were answered using the Likert scale and were related to the four pillars of the ACE framework. The data was again reviewed, and all incomplete responses were removed, leaving fourteen questions to be analyzed. This left eighty-two responses (n=82) to be studied. SPSS was utilized to run a total variance on the ACE questions from the survey. Variance looks to determine how far a set of numbers is dispersed from the mean. In this case, the numbers would be based upon the Likert scale responses. Table 4 below details the total variance explained.

Table 4

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.783	34.162	34.162	4.783	34.162	34.162
2	1.938	13.844	48.006	1.938	13.844	48.006
3	1.709	12.204	60.210	1.709	12.204	60.210
4	.943	6.734	66.944			
5	.768	5.484	72.428			
6	.757	5.409	77.837			
7	.642	4.582	82.419			
8	.591	4.220	86.639			
9	.504	3.603	90.242			
10	.441	3.151	93.393			
11	.333	2.375	95.769			
12	.243	1.733	97.502			
13	.205	1.463	98.964			
14	.145	1.036	100.000			

Note. *Extraction Method: Principal Component Analysis*

All fourteen of the survey questions related to the ACE framework were examined to explore factor analysis. The Kaiser-Meyer-Olkin measure and Bartlett's sampling adequacy were used in the SPSS analysis. These tests were used to ensure that the variables measure the concept that they are supposed to be measuring. Specifically, the Kaiser-Meyer-Olkin measure determines the appropriateness of using factor analysis on a data set. Anastasiadou (2011) mentions that using this test can "indicate that the sample data are suitable for undergoing factor analysis" (p. 5). The Bartlett test looks to see if there is a difference in the variables. If this statistic (for the KMO test) is greater than .05 there is a significant difference, if it is below .05 (for the Bartlett test) there is no significance. The KMO measure was .744 and Bartlett's test showed at approximate Chi-Square of 479.117 with a df equal to 91. The KMO and Bartlett's sampling showed a significance factor of .000. The test also included an examination of the Component Matrix and Rotated Component Matrix. Taken all together, these tests will determine the standards for which a factor analysis should be conducted. This will show whether the Likert questions of the survey do connect to the ACE framework. The final results of this test are detailed in Table 5 below.

Table 5

Component Transformation Matrix

Component	1	2	3	4
1	.646	.526	.456	.313
2	.280	-.688	.600	-.297
3	-.709	.183	.647	.213
4	-.037	.466	.117	-.876

Note. Extraction Method: Principal Component Analysis. Rotation Methods: Varimax with Kaiser Normalization Level 3

Overall, the only survey question that stood alone with only one component in the rotated component matrix dealt with teachers communicating with parents regarding assignments, grades, missing work and other parental concerns with the LMS. The rotated component matrix deals with what the components of a test represent. The benchmarks for the comparison would be the four pillars of the ACE framework. The importance of linking to these framework pillars relates directly to the ACE framework being a main factor in student engagement and academic success with the LMS.

The final analysis completed to test for reliability dealt with the testing to understand if the questions assigned to each of the four pillars reliably connect to all others who are under the corresponding pillar. This will ensure internal consistency. A Cronbach's Alpha reliability test was run on each pillar to determine if the assigned questions were reliable. This test shows relatable items are as a group. According to Tavakol and Dennick (2011), this test provides a measure of the internal consistency of a test or scale. When there are less than 10 items that are studied, Cronbach's Alpha should be greater than 0.5 to be considered reliable. The figures below detail each of the four pillars. Through this statistical analysis, all pillar questions are proven to be reliable.

Table 6

Reliability Statistic for the Student Engagement Pillar

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.516	.538	4

Note. The Vitality subscale, consisting of 4 items, was found to be highly reliable (a=.516)

Table 7

Reliability Statistic for the Parent Engagement Pillar

Cronbach's Alpha	N of Items
.793	3

Note. The Vitality subscale, consisting of 3 items, was found to be highly reliable (a=.793).

Table 8

Reliability Statistic for the Teacher Engagement Pillar

Cronbach's Alpha	N of Items
.559	4

Note. The Vitality subscale, consisting of 4 items, was found to be highly reliable (a=.559).

Table 9

Reliability Statistic for the Peer Engagement Pillar

Cronbach's Alpha	N of Items
.796	3

Note. The Vitality subscale, consisting of 3 items, was found to be highly reliable (a=.796).

Both content and construct validity were explored in an effort to legitimize the survey instrument. The results from the eight field experts provided mostly positive results regarding the wording of the questions and their connections to the four pillars of the ACE framework. This provided content validity to the survey. The 14 questions of the survey that were linked to the ACE pillars were examined to explore factor analysis. The Kaiser-Meyer-Olkin measure and

Bartlett's sampling adequacy were used to ensure that the variable was measuring the concept that they were supposed to be measuring. Finally, a Cronbach's Alpha reliability test was run to determine if the assigned questions were reliable. All four pillars of the survey questions scored above a .5 which is the measure needed to prove reliability when looking at items less than 10. In conclusion, the tests used imply that the survey questions are valid when looking at their connection to the ACE framework and provide construct validity.

Distribution of the Survey

Demographic Data

Middle school teachers from five school districts in Central to Eastern Pennsylvania were invited to take the survey. These districts ranged from suburban to rural, and participating teachers were asked several demographic questions to differentiate experience, highest degree earned, gender, subject matter, grade level taught and experience with using LMS in their teaching practice. Ninety-four teachers completed portions of the survey, and 83 completed the majority of the questions asked. Their responses varied based upon the demographic information about them. Of the 94 respondents, 17 had their Bachelor's Degree, 67 had their Master's Degree and two had their Doctoral Degree. The survey was answered by 19 males, 66 females, and one respondent preferred not to share their gender. Thirty teachers had between one and five years of teaching experience, 13 had between six and 10 years of experience, and 43 had more than 11 years of middle school teaching experience. One fifth grade teacher responded, along with 15 sixth grade teachers, 26 seventh grade teachers, 19 eighth grade teachers and 25 participants listed themselves as teachers of a combination of grade levels.

Twenty-two respondents listed math as their area of focus, while 11 taught science, 13 taught social studies, 14 taught English and 26 selected "other" as their response. Finally, when gauging their experience with LMS before COVID 19, 39 claimed to be a frequent user of LMS, 16 used them daily, 15 used them three to four times per week, 10 were new to using LMS, and finally, six did not use them at all prior to the pandemic. This demographic breakdown points to a wide variety of teaching professionals with varied experience, different subject backgrounds, different grade levels taught and more. The graphs below break this data down into easier to understand tables.

Table 10

Demographic Variables

Demographic Variable	N	Percentage
Highest Level of Degree Earned		
Bachelors	17	19.77
Masters	67	77.91
Doctorate	2	2.33
Gender		
Male	19	22.09
Female	66	76.74
Prefer not to say	1	1.16
Middle School Classroom Experience		
1-5	30	34.88
6-10	13	15.12
11+	43	50.00
Grade Level Taught		
5	1	1.16
6	15	17.44
7	26	30.23
8	19	22.09
9	0	0.00
Content Area		
Math	22	25.58
Science	11	12.79
Social Studies	13	15.12
English/Language Arts	14	16.28
Other	26	30.23
LMS Experience prior to COVID 19		
Frequent	39	45.35
Daily	16	18.60
3-4 times per week	15	17.44
1-2 times per week	10	11.63
Did not use	6	6.98

Survey Data

With this breakdown of the demographics in mind, some interesting findings emerged in the survey data. The survey questions were divided into categories including the participant's demographic data, along with questions linked to the pillars of the ACE framework. All pillars are integral in the engagement of middle school students through the use of LMS. By examining the demographic data compared to the survey responses highlights how participating teachers in these five middle schools in Central Pennsylvania use this tool to support student learning. Table 11 below details the overview of the responses to the questions linked to the ACE framework.

Table 11

Overview of the ACE framework questions

	Very Strongly Agree (N, %)	Strongly Agree (N, %)	Agree (N, %)	Disagree (N, %)	Strongly Disagree (N, %)	Very Strongly Disagree (N, %)	Total
Student Engagement							
I communicate with students through the LMS	29, 34.9%	26, 31.3%	21,25.3%	5, 6%	1, 1.2%	1, 1.2%	83
My students are able to submit assignments through the LMS	63, 75.9%	11, 13.3%	7, 8.4%	0, 0%	0, 0%	2, 2.4%	83
I provide opportunities for choice in assignments on the LMS	12, 14.5%	16, 19.3%	37, 44.6%	8, 9.6%	5, 6.0%	5, 6.0%	83
My students' complete assignments on the LMS at a rated equal to assignments given without using a LMS prior to the COVID 19 Pandemic.	15, 18.1%	14, 16.9%	22, 26.5%	12, 14.5%	11, 13.3%	9, 10.8%	83
Teacher Engagement							
I post grades on the LMS.	11, 13.3%	12, 14.5%	11, 13.3%	21, 25.3%	9, 10.8%	19, 22.9%	83
My students can use the LMS to seek help	36, 43.4%	21, 25.3%	16, 19.3%	5, 6.0%	2, 2.4%	3, 3.6%	83
I believe I organize content so it's easy for students to find assignments in the LMS	40, 48.2%	32, 38.6%	8, 9.6%	1, 1.2%	0, 0.0%	2, 2.4%	83
Peer Engagement							
I assign students to work as partners in the LMS.	12,14.5%	5, 6.0%	26, 31.3%	12, 14.5%	13, 15.7%	15, 18.1%	83
I assign students to complete work in groups of three or more through the LMS.	11, 13.3%	4, 4.8%	19, 22.9%	15, 18.1%	13, 15.7%	21, 25.3%	83
My students use the chat feature in the LMS to communicate with each other remotely.	6, 7.2%	7, 8.4%	18, 21.7%	18, 21.7%	13, 15.7%	21, 25.3%	83

Parent Engagement							
Parents of my students can contact me through the LMS.	5, 6.0%	7, 8.4%	17, 20.5%	20, 24.1%	6, 7.2%	28, 33.7%	83
I communicate with parents through the LMS.	4, 4.8%	5, 6.0%	18, 21.7%	23, 27.7%	12, 14.5%	21, 25.3%	83
I believe that parents of my students can find student assignments on the LMS.	18, 21.7%	19, 22.9%	30, 36.1%	8, 9.6%	2, 2.4%	6, 7.2%	83
I believe that parents are able to see their child's academic performance in my class by using the LMS.	10, 12.0%	32, 38.6%	8, 9.6%	1, 1.2%	0, 0.0%	2, 2.4%	83

When looking at the survey responses, the majority of answers landed in the Very Strongly Agree to Agree side of the Likert Scale, or were answered in a positive manner. These answers point to a trend that most of the survey responders, despite demographic differences, felt that the LMS generally was positive in an overall comparison. The following sections break the differences down by each research questions.

Survey Data Summary for Research Question 1: How Do Teachers Use LMS to Engage Students and Support Their Learning?

To examine the data from the survey and how it relates to the ACE framework, it is important to discuss the significant findings in greater detail. Borup et. al (2014) "identified four types of engagement (student engagement, teacher engagement, parent engagement, and peer engagement) and explains how teachers, parents, and peers might influence students' affective, behavioral, and cognitive engagement" (p. 21). These findings will then showcase how teachers use the LMS to engage students and support their learning. The findings were discovered by comparing the demographic information with the survey questions as they relate to the four

pillars of engagement. The top results in each pillar combine to better explain how the four pillars come together to increase the chance of engagement. To best organize the significant findings, the data is organized in Table 12 and under the headings of the four main pillars of the ACE framework.

The survey Likert scale responses of Very Strongly Agree to Very Strongly Disagree detailed the respondents views of the questions linked to the ACE framework. To analyze the data efficiently, the responses were substituted with the numbers one through six. One was equal to Very Strongly Agree, and six was equal to Very Strongly Disagree. When the mean of a particular demographic or subgroup is explored, the lower the average mean shows responses closer to the positive or agree side of the scale. Those with higher means would land closer to the negative or disagree side of the scale. Comparing the average means between groups will show where major differences emerge. Table 12 details the average responses for each question. The questions are not in order, rather they are divided under the four pillars of the ACE framework.

Table 12

Average Response by ACE Pillar

	Minimum	Maximum	Mean	Std. Deviation	Variance	Count
Student Engagement						
I communicate with students through the LMS	1	6	2.11	1.06	1.13	83
I communicate with parents regarding assignments, grades, missing work and other concerns through the LMS.	1	6	4.17	1.42	2.02	83
I provide opportunities for choice in assignments on the LMS	1	6	2.92	1.28	1.64	83
My students' complete assignments on the LMS at a rated equal to assignments given without using a LMS prior to the COVID 19 Pandemic.	1	6	3.2	1.58	2.5	83
Teacher Engagement						
I post grades on the LMS.	1	6	3.75	1.69	2.86	83
My students are able to submit assignments through the LMS	1	6	1.42	0.95	0.89	83
My students can use the LMS to seek help	1	6	2.1	1.29	1.65	83
I believe I organize content so it's easy for students to find assignments in the LMS	1	6	1.73	0.97	0.94	83
Peer Engagement						
I assign students to work as partners in the LMS.	1	6	3.65	1.62	2.61	83
I assign students to complete work in groups of three or more through the LMS.	1	6	3.94	1.67	2.78	83
My students use the chat feature in the	1	6	4.06	1.54	2.37	83

LMS to communicate with each other remotely.						
Parent Engagement						
Parents of my students can contact me through the LMS.	1	6	4.19	1.57	2.47	83
I believe that parents of my students can find student assignments on the LMS.	1	6	2.7	1.36	1.85	83
I believe that parents are able to see their child's academic performance in my class by using the LMS.	1	6	3.34	1.43	2.05	83

Note. Table 12 highlights the survey responses broken down into summaries of each pillar of the ACE framework. The minimum number of one coincides with the response Very Strongly Agree on the survey. The maximum number of six coincides with the response Very Strongly Disagree. The mean then shows the average of the responses, pointing out where the majority of survey responders answered.

The survey asked 14 questions using a six-point Likert scale. The Likert scale ranged from Very Strongly Agree, to Very Strongly Disagree. The data was changed to numeric values in Qualtrics and in SPSS with one being equal to Very Strongly Agree and six being equal to Very Strongly Disagree. The minimum, maximum, mean, standard deviation and variance are all based upon these numeric values. By shifting the Likert responses to numerical responses, it became easier to fine what the minimum, maximum and mean responses were. This allowed the researcher to use the survey responses to directly examine which tools are used to promote student engagement and to support their learning. Survey questions that averaged responses closer to the number one, felt positively regarding that particular LMS tool. Those who saw responses closer to the number six showed tools that were not viewed positively by the survey responders.

Student Engagement

The mean of the average scores for each of the questions in this section is 3.1 showing that the overall majority of the responses leaned toward the agree side of the Likert scale. Question number one, dealing with communicating with students through the LMS yielded a mean of 2.11, landing very close to strongly agree, noting that the majority of survey responders use the LMS to communicate with their students. The mean response for providing choice through assignment in the LMS also lands very close to agree, and also points to a method used by teachers towards the student engagement pillar of the ACE framework. The mean responses for completing assignments at a rate equal to assignments given prior to using a LMS lies very close to agree at 3.2, but trending toward the 3.5 mid-point. This would signify that while close to being at the mid-point, a slightly higher average of students are turning in work through the LMS. This again is showing that in three of the four student engagement questions, the methods used are assisting with student engagement and provide an answer to how teachers use LMS to engage students. The mean of the final student engagement questions is 4.17, on the disagree option on the Likert scale. Despite this, the average shows three of the four options to be methods used by teachers to engage students and support their learning.

These results help to answer the first research question under the umbrella of student engagement through communication with the device, and the level of work completion, with significant findings for both. It is interesting to note that teachers did report that students were completing their assignments at a rate equal to their work completed before the beginning of LMS use.

Parent Engagement

A majority of studies done on online engagement have been conducted at the college or university level. Borup et. al note that three of the pillars of engagement mentioned in the ACE framework are present in many of these studies. “The ACE framework additionally recognizes the role of parents in their children’s learning and introduces a fourth construct, parent engagement” (Borup et. al, 2014, p. 2). The mean average for the three teacher engagement questions is 3.41, registering towards neutral side of the Likert scale. Again, this is positive for survey responders’ feelings regarding engaging parents, a second piece to the ACE framework for engagement. The question looking at parents’ ability to find student assignments on the LMS has a mean of 2.7, landing between strongly agree and agree, showing that this tool helps teachers connect parents and therefore assists with the overall student engagement through the ACE framework. The mean for teachers believing that parents are able to see their children’s’ academic performance has a mean of 3.34, trending toward the neutral or disagree side of the Likert scale and again being a tool that teachers use to engage and therefore offering a response to research question one. The final question under parent engagement deals with parents being able to contact teachers through the LMS. The mean response was 4.19, leaning towards disagree, and therefore the LMS not being a tool that teachers feel is used to engage parents and students overall.

Peer Engagement

The average mean of the peer engagement question settled in as the least positive at 3.88. The question looking at assigning students to work as partners had a mean of 3.65, leaning towards disagree on the Likert scale. Assigning students to work in groups of three or more had a mean of 3.94, almost having a 4 or disagree on the Likert scale. Finally, having the student use

the chat feature had a mean of 4.06, scoring over disagree on the Likert scale. These responses all point toward these three tools as not being an asset towards peer engagement, and potentially student engagement overall. The concepts of partner work, group work and chat features may lend themselves to higher grade levels where learners have more independence. When looking at middle school students, this pillar may have different responses based upon these differences in grade level, thus affecting the individual responses to research question one. Taking the survey responses as a whole would point to these three areas as not working towards overall student engagement.

Teacher Engagement

The final pillar examined is the Teacher Engagement Pillar. The average mean for the Teacher Engagement Pillar is 2.25, scoring the most positive results out of the four pillars. The first question relating to teachers posting grades on the LMS scored a 3.75 mean, landing closer to disagree than agree. One potential reason for this response could be the nature of some districts to use multiple LMS to hold course content and house student information. Oftentimes classroom teachers use LMS like Canvas™ or Google Classroom™ for their classroom needs, while data warehouses such as Sapphire™, MMS™ or other are used for student and family information. In some cases, these tools can communicate with one another, but other times they cannot. The second question deals with students being able to submit assignments on the LMS. This had the lowest mean of all questions with a 1.42. Most teachers selected this as a positive and agree that it is a tool that helps them to engage themselves in the process of engaging students with a LMS, providing a response to research question one. The question looking at students using the LMS to seek help had a mean of 2.1, or strongly agree. Again, the majority of teachers see this tool as an asset in working towards student engagement. Finally, the question

dealing with organizing content, so it is easy for students to find assignments in the LMS had a mean of 1.73, landing between Very Strongly Agree and Strongly Agree. Again, this shows this tool as an asset to the teacher engagement pillar and a piece towards over all student engagement.

Due to the reliability of each pillar being moderate to high, I combined the items within each pillar to create one variable associated with each of the four pillars. Then in order to answer research question one, I ran a one-way ANOVA to demonstrate differences in responses among demographic categories and combined responses in each pillar. A Bonferroni Post Hoc Analysis was then run if a statistically significant difference emerged with the group means. Armstrong (2014) points out that this should be used "after a post-hoc procedure following analysis of variance" (p. 502).

Table 13

Descriptive Statistics: Teacher Pillar Questions compared with Grade Level

					95% Confidence for Mean Interval			
Grade Level	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
6	15	8.2000	2.51282	.64881	6.8084	9.5916	4.00	12.00
7	24	7.8750	2.45503	.50113	6.8383	8.9117	4.00	12.00
8	19	8.7895	2.85927	.65596	7.4113	10.1676	4.00	14.00
Combination	24	10.9583	4.09113	.83510	9.2308	12.6859	4.00	24.00
Total	82	9.0488	3.31812	.36643	8.3197	9.7779	4.00	21.00

Table 14

ANOVA: Teacher Pillar Questions compared with Grade Level

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	132.664	3	44.221	4.544	.005**
Within Groups	759.141	78	9.733		
Total	891.805	81			

Note. This ANOVA shows the significance at a rate of .005, lower than the significance level of .05.

**p<.01

Table 15

Bonferroni Post Hoc Analysis: Teacher Pillar Questions compared with Grade Level

What grade level do you currently teach?	What grade level do you currently teach?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
6	7	.32500	1.02682	1.000	-2.4548	3.1048
	8	-.58947	1.07753	1.000	-3.5066	2.3276
	Combination of grade levels	-2.75833	1.02682	.053	-5.5382	.0215
7	6	-.32500	1.02682	1.000	-3.1048	2.4548
	8	-.91447	.95800	1.00	-3.5080	1.6790
	Combination of grade levels	-3.08333	.90058	.006*	-5.5214	-.6453
8	6	.58947	1.07753	1.000	-2.276	3.5066
	7	.91447	.95800	1.00	-3.5080	1.6790
	Combination of grade levels	-2.16886	.95800	.158	-4.7624	.4246
Combination of grade levels	6	2.75833	1.02682	.053	-.0215	5.5382
	7	3.08333	.90058	.006*	.6453	5.5214
	8	2.16886	.95800	.158	-.4246	4.7624

Note. *p<.01

When examining the comparisons of the teacher pillar questions and the four demographic questions from the survey, areas of statistically significant data did emerge. The

statistically significant data emerged in the teacher pillar when looking at the demographics of grade level, specifically when comparing the means of seventh grade teachers, and those who taught a variety of grade levels. It is important to note that $p<.01$, which is well under the .05 measure of significant data.

The examination of the mean of the survey responses helps to show how teachers use LMS to engage students and support their learning. The survey responses point towards the teacher engagement pillar as the ACE pillar most supported by the participants responses. The responses closest to Strongly Agree and Very Strongly agree detail that communicating with students, the ability of parents to find assignments online, students being able to submit assignments online, students using the LMS to seek help, and the fact that it is easy for students to find assignment on the LMS as the top selected responses by the survey participants.

Survey Data for Research Question 2: How Do Teachers' Demographic Background Impact Their Use of LMS?

To answer research question two, the teacher demographic information questions were compared to the survey questions related to the pillars of the ACE framework. This was accomplished by running an analysis of variance. This is "a test for the difference between two or more means, or differences between the means of more than two groups" (Salkind, 2014, p. 463). The analysis of variance, or ANOVA was run to determine if there was a significant difference between the means of the variables, in this case the demographic information collected in the survey. A post hoc test was then run in SPSS to determine if there are specific differences between group means in the ANOVA. The Bonferroni post hoc test was used, and the significance level was 0.05. This post hoc test is often used when examining large amounts of statistical data. According to Armstrong (2014), "In modern research, however, the procedure

(Bonferroni post hoc) is frequently used to adjust probability (p) values when making multiple statistical tests in any context" (p. 502). The Bonferroni test was used as it was more conservative than others and could capture the overall picture of where the significance of the data emerged.

The test examined four of the six demographic areas compared with the survey questions dealing with the four pillars of the ACE framework. The two demographic questions that were not examined dealt with gender and the highest degree earned by the survey responders. Due to the lack of variability across the participant population, this demographic information did not lend itself for rich analysis. The demographic areas of grade level, content taught, prior experience with a LMS and years of experience teaching at the middle school level are areas that could affect the use of the LMS.

Grade Level

The survey choice for grade level included grades five, six, seven, eight, nine and a combination of the grade levels. Only one survey responded selected grade five, and no survey respondent selected grade nine, therefore a large enough sample size does not exist for these grade levels to be included in the analysis. Significant findings did emerge in this area, the first of which looks at the survey question "I communicate with students through the LMS." Additional findings emerged in the questions about submitting assignments through the LMS, the assignment completion rate, parents' ability to find assignments on the LMS, and I organize content so that it is easy to find on the LMS.

Communication with Students based on Grade Level Taught

Table 16 below details the descriptive statistics of the grade level demographic questions. The information is broken down by grade level. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance.

Table 16

I communicate with students and grade level taught

					95% Confidence Interval for Mean			
Grade Level	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
6	15	2.20	.775	.200	1.77	2.63	1	3
7	24	1.58	.974	.199	1.17	1.99	1	4
8	19	2.16	1.119	.257	1.62	2.70	1	4
Combination	24	2.54	1.141	.233	2.06	3.02	1	6
Total	83	3.90	1.511	.163	3.57	4.22	1	6

Note. The average score in this demographic group is 3.90. This would lie between the options of teaching seventh and eighth grade.

Table 17

ANOVA: Communication with Students by Grade Level Taught

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.294	3	3.765	3.550	.018*
Within Groups	82.718	78	1.060		
Total	94.012	81			

Note. This ANOVA shows the significance at a rate of .018, less than the significance level of .05.

*p<.05

In Table 17 the demographic of grade level was specifically compared to the survey question that states *I communicate with students through the LMS*. The p-value in this ANOVA is .018 which is less than the significance level of 0.05. This rejects the null hypothesis. According to this test there is statistically significant evidence that there is a difference is communication based upon the grade level taught.

Table 18

Bonferroni Post Hoc Analysis: Communication with Students by Grade Level Taught

What grade level do you currently teach?	What grade level do you currently teach?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
6	7	.617	.339	.436	-.30	1.53
	8	.042	.356	1.000	-.92	1.01
	Combination of grade levels	-.342	.339	1.000	-1.26	.58
7	6	-.617	.339	.436	-1.53	.30
	8	-.575	.316	.438	-1.43	.28
	Combination of grade levels	-.958	.297	.011*	-1.76	-.15
8	6	-.042	.356	1.000	-1.01	.92
	7	.575	.316	.438	-.28	1.43
	Combination of grade levels	-.384	.316	1.000	-1.24	.47
Combination of grade levels	6	.342	.339	1.000	-.58	1.26
	7	.958	.297	.011*	.15	1.76
	8	.384	.316	1.000	-.47	1.24

Note. *p<.05

Table 18 details the Bonferroni post hoc test that reinforces the ANOVA test stating that there is statistically significant data present. The differences between means are showcased in

Table 18 and p=.011. The major differences lie between teachers of grade seven, and those who teach a combination of grade levels. A possible explanation for this difference would be the continuity of teaching a class full of similar students. All seventh-grade students would have similar experiences with learning through technology, specifically a LMS. Teachers may feel more comfortable communicating with them through the tool, as opposed to other communication methods. Those who teach a combination of grade levels may not have groups of students who are prepared to use the LMS regularly. If those that teach a combination of grade levels have students of varying levels, history and abilities, they may be less able to count on students looking at the LMS for most or all communications.

Submitting Assignments through the LMS based on Grade Level Taught

Table 19 below details the descriptive statistics of the grade level demographic question compared to the survey question dealing with the ability to submit assignments through the LMS. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance.

Table 19

Descriptive Statistics: Submitting Assignments through the LMS based on Grade Level Taught

					95% Confidence Interval for Mean			
Grade Level	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
6	15	1.40	.632	.163	1.05	1.75	1	3
7	24	1.04	.204	.042	.96	1.13	1	2
8	19	1.21	.535	.123	.95	1.47	1	3
Combination	24	2.00	1.474	.301	1.38	2.62	1	6
Total	83	1.42	.952	.104	1.21	1.63	1	6

Table 20

ANOVA: Submitting Assignments through the LMS by Grade Level Taught

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.525	4	3.131	3.957	.006**
Within Groups	61.716	78	.791		
Total	74.241	81			

Note. This ANOVA shows the significance at a rate of .003, less than the significance level of .05.

**p<.01

In Table 20 the demographic of grade level was specifically compared to the survey question that states *My students are able to submit assignments through the LMS*. The p-value in this ANOVA is .006 which is less than the significance level of 0.05. This rejects the null

hypothesis. According to this test there is statistically significant evidence that there is a difference with students being able to submit assignments through the LMS based upon the grade level taught by the teacher.

Table 21

Bonferroni Post Hoc Analysis: Submitting Assignments through the LMS by Grade Level Taught

What grade level do you currently teach?	What grade level do you currently teach?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
6	7	.358	.293	1.000	-.43	1.15
	8	.189	.307	1.000	-.64	1.02
	Combination of grade levels	-.600	.293	.263	-1.39	.19
7	6	-.358	.293	1.000	-1.15	.43
	8	-.169	.273	1.000	-.91	.57
	Combination of grade levels	-.958	.257	.002**	-1.65	-.26
8	6	-.189	.307	1.000	-1.02	.64
	7	.169	.273	1.000	-.57	.91
	Combination of grade levels	-.789	.273	.030*	-1.53	-.05
Combination of grade levels	6	.600	.293	.263	-.19	1.39
	7	.958	.257	.002**	.26	1.65
	8	.789	.273	.030*	.05	1.53

Note. *p<.05 and **p<.01

Table 21 highlights significant differences between teachers of seventh grade, and those who teach a combination of grade levels when looking at the ability of students to submit assignments through the LMS. The p value was equal to .002. Differences also emerged between the eighth-grade teachers and those who teach a combination of grade levels with p=.03. This could again be directly related to similarly trained students, like a group of all eighth-grade students with similar backgrounds. This would differ greatly with those teachers who may have fifth, sixth and eighth grade students, all of which come with differences in the LMS experiences.

Assignment Completion Rate by Grade Level Taught

Table 22 below details the descriptive statistics of the grade level demographic question compared to the survey question dealing with completion rate of assignments through the LMS compared with the submission of assignments without a LMS prior to the COVID 19 pandemic. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance.

Table 22

Descriptive Statistics: Assignment Completion Rate by Grade Level Taught

					95% Confidence Interval for Mean			
Grade Level	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
6	15	3.20	1.373	.355	2.44	3.96	1	5
7	24	3.42	1.666	.340	2.71	4.12	1	6
8	19	2.21	1.357	.311	1.56	2.86	1	5
Combination	24	3.83	1.523	.311	3.19	4.48	1	6
Total	83	3.20	1.591	.175	2.86	3.55	1	6

Table 23

ANOVA: Assignment Completion Rate by Grade Level Taught

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30.794	4	7.698	3.398	.013*
Within Groups	176.725	78	2.266		
Total	207.518	82			

Note. This ANOVA shows the significance at a rate of .007, less than the significance level of .05.

*p<.05

In Table 23 the demographic of grade level was specifically compared to the survey question that states *My students' complete assignments on the LMS at a rate equal to assignments given without using a LMS prior to the COVID 19 pandemic*. The p-value in this

ANOVA is .013 which is less than the significance level of 0.05. This rejects the null hypothesis. According to this test there is statistically significant evidence that there is a difference in the completion rate of work completion on the LMS at a rate equal to assignments given without using a LMS prior to the COVID 19 pandemic based upon the grade level taught.

Table 24

Bonferroni Post Hoc Analysis: Assignment Completion Rate by Grade Level Taught

What grade level do you currently teach?	What grade level do you currently teach?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
6	7	-.217	.495	1.000	-1.56	1.12
	8	.989	.520	.364	-.42	2.40
	Combination of grade levels	-.633	.495	1.000	-1.97	.71
7	6	.217	.495	1.000	-1.97	.71
	8	1.206	.462	.065	-.05	2.46
	Combination of grade levels	-.417	.435	1.000	-1.59	.76
8	6	-.989	.520	.364	-2.40	.42
	7	-1.206	.462	.065	-2.46	.05
	Combination of grade levels	-1.623	.462	.004**	-2.87	-.37
Combination of grade levels	6	.633	.495	1.000	-.71	1.97
	7	.417	.435	1.000	-.76	1.59
	8	1.623	.462	.004**	.37	2.87

Note. **p<.01

Table 24 details the differences between the eighth-grade teachers and those who teach a combination of grade levels with p=.004. Again, more experienced students may be able to self-monitor and complete the work on a LMS at a rate close to their completion prior to COVID and the regular LMS use. The variety of students at different levels would most likely not be able to keep the work completion rate up. Some of the combined teachers grade levels could include elementary aged students (grade six) which could also explain the major differences.

Parents Can Find My Assignments by Grade Level Taught

Table 25 below details the descriptive statistics of the grade level demographic question compared to the survey question dealing with the ability of parents to find assignments on the LMS. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance. As the data explains, major differences are emerging between the upper middle school levels, and the teachers of a variety of grade levels.

Table 25

Descriptive Statistics: Parents Can Find My Assignments by Grade Level Taught

					95% Confidence Interval for Mean			
Grade Level	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
6	15	2.27	1.100	.284	1.66	2.88	1	5
7	24	2.25	1.073	.219	1.80	2.70	1	4
8	19	2.79	1.437	.330	2.10	3.48	1	6
Combination	24	3.33	1.551	.317	2.68	3.99	1	6
Total	83	2.70	1.368	.150	2.40	3.00	1	6

Table 26

ANOVA: Parents can find my assignments by Grade Level Taught

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.545	4	4.386	2.517	.048*
Within Groups	135.925	78	1.743		
Total	153.470	82			

Note. This ANOVA shows the significance at a rate of .024, less than the significance level of .05.

*p<.05

In Table 26 the demographic of grade level was specifically compared to the survey question that states *I believe that parents of my students can find student assignments on the LMS*. The p-value in this ANOVA is .048 which is less than the significance level of 0.05. This rejects the null hypothesis. According to this test there is statistically significant evidence that there is a difference in the belief that parents of their students can find student assignments on the LMS based upon the grade level taught.

Table 27

Bonferroni Post Hoc Analysis Parents can find my assignments by Grade Level Taught

What grade level do you currently teach?	What grade level do you currently teach?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
6	7	.017	.434	1.000	-1.16	1.19
	8	-.523	.456	1.000	-1.76	.71
	Combination of grade levels	-1.067	.434	.098	-2.24	.11
7	6	-.017	.434	1.000	-1.19	1.16
	8	-.539	.405	1.000	-1.64	.56
	Combination of grade levels	-1.083	.381	.034*	-2.11	-.05
8	6	.523	.456	1.000	-.71	1.76
	7	.539	.405	1.000	-.56	1.64
	Combination of grade levels	-.544	.405	1.000	-.56	1.64
Combination of grade levels	6	1.067	.434	.098	-.11	2.24
	7	1.083	.381	.034*	.05	2.11
	8	.544	.405	1.000	-.55	1.64

Note. *p<.05

When looking at the belief that parents of their students can find student assignments through the LMS, differences were confirmed between seventh grade teachers, and those who taught a combination of grade levels with p=.034. The major differences between the seventh-grade teachers and those with a combination of grade levels could exist due to the teaching schedules and number of preparations held by each teacher. The teachers who selected a combination of grade levels most certainly includes teachers of elective subjects, and therefore the possibility of a number of courses to prepare for is present. If a music teacher, for example, is teaching grades five, six, seven and eight, there are multiple plans needed for each day. The seventh-grade teacher is most likely subject specific, and therefore would not have as much of a variety to plan for.

Organize Content, so it is Easy by Grade Level

Table 28 below details the descriptive statistics of the grade level demographic question compared to the survey question dealing with the ability of the teacher to organize content so that it is easy to find on the LMS. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance. Again, the research shows a divide between the upper grades and those who have a variety of levels.

Table 28

Descriptive Statistics: Organize Content, so it is Easy by Grade Level

					95% Confidence Interval for Mean			
Grade Level	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
6	15	1.67	.724	.187	1.27	2.07	1	3
7	24	1.54	.588	.120	1.29	1.79	1	3
8	19	1.26	.562	.129	.99	1.53	1	3
Combination	24	2.33	1.373	.280	1.75	2.91	1	6
Total	83	1.73	.976	.107	1.52	1.95	1	6

Table 29

ANOVA: Organize Content, so it is Easy by Grade Level

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.859	4	3.465	4.203	.004**
Within Groups	64.309	78	.824		
Total	78.169	82			

Note. This ANOVA shows the significance at a rate of .004, less than the significance level of .05.

**p<.01

In Table 29 the demographic of grade level was specifically compared to the survey question that states *I believe I organize content so it's easy for students to find assignments in the LMS.* The p-value in this ANOVA is .004 which is less than the significance level of 0.05. This

rejects the null hypothesis. According to this test there is statistically significant evidence that there is a difference in teachers' belief that they organize content so it's easy for students to find assignments in the LMS based upon the grade level taught.

Table 30

Bonferroni Post Hoc Analysis Organize Content, so it is Easy by Grade Level

What grade level do you currently teach?	What grade level do you currently teach?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
6	7	.125	.299	1.00	-.68	.93
	8	.404	.314	1.000	-.45	1.25
	Combination of grade levels	-.667	.299	.171	-1.48	.14
7	6	-.125	.299	1.000	-.93	.68
	8	.279	.279	1.000	-.48	1.03
	Combination of grade levels	-.792	.262	.020*	-1.50	-.08
8	6	-.404	.314	1.000	-1.25	.45
	7	-.279	.279	1.000	-1.03	.48
	Combination of grade levels	-1.070	.279	.002**	-1.83	-.32
Combination of grade levels	6	.667	.299	.171	-.14	1.48
	7	.792	.262	.020*	.08	1.50
	8	1.070	.279	.002**	.32	1.83

Note. *p<.05 and **p<.01

The information detailed in Tables 28 through 30 examines the teachers' belief that they organize their content so that it is easy to navigate shows major difference between the older middle school grades, and the teachers who teach a combination of grade levels. The significant differences between the eighth-grade teachers and the combination of grade levels showed a significance of .002, less than .01. This show that eighth grade teachers are more comfortable and confident in how they arrange their LMS for ease of student use. The seventh-grade teachers fall below the .05 significance level, also showing differences, but not as sharp as their eighth-grade counterparts. The older students seem to be able to function with the LMS as an educational tool better than some of the younger students. This makes complete sense, as the transition between elementary education and secondary education often occurs between grades six and seven. Even in a school set up in the middle school format, there is often a difference between how classes are organized and run between the traditionally elementary and secondary classrooms. The teachers tend to be quite different as well, and the differences between state teaching certificates and teaching preparatory programs based upon these certificates shows this understanding as well.

The main differences discovered within the demographic of grade level taught include students being able to submit assignments in the LMS, the rate of work completion, the ability of parents being able to find student assignment based upon grade level taught, and the belief that teachers organize content so that it is easy for students to find assignments on the LMS. The older the student, coupled with teaching the higher grade level will allow more student engagement through the LMS. This is due to a number of reasons, including experience in learning with technology, differences in educational maturity between grade levels and even the training that secondary and elementary teachers receive.

Content Area

The demographic questions looking at content areas provided choices including math, science, social studies, English/language arts and other. Two areas emerged in the demographic area of content that produced statistically significant data. They included the pillar question "my students are able to submit assignments through the LMS," and "I assign students to work as partners." As these questions are compared with the survey responders content area, science and the category other showed differences. These differences are highlighted in the section below.

Students Are Able to Submit Assignments Through the LMS by Content Area

Table 31 below details the descriptive statistics of the content area demographic question compared to the survey question dealing with the ability to submit assignments through the LMS. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance.

Table 31

Descriptive Statistics: Students are able to submit assignments through the LMS by Content Area

					95% Interval	Confidence for Mean		
Content Area	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Math	21	1.24	.539	.118	.99	1.48	1	3
Science	10	1.00	.000	.000	1.00	1.00	1	1
Social Studies	13	1.23	.599	.166	.87	1.59	1	3
English/Lang Arts	14	1.29	.611	.163	.93	1.64	1	3
Other	25	1.92	1.441	.288	1.33	2.51	1	6
Total	83	1.42	.952	.104	1.21	1.63	1	6

Note. The average response is 3.13, landing between social studies and English/language arts.

Table 32

ANOVA: Students are able to submit assignments through the LMS by Content Area

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.427	4	2.357	2.836	.030*
Within Groups	64.814	78	.831		
Total	74.241	82			

Note. This ANOVA shows the significance at a rate of .030, less than the significance level of .05.

*p<.05

In Table 32 the content area taught was specifically compared to the survey question that states *My students are able to submit assignments through the LMS*. The p-value in this ANOVA is .030 which is less than the significance level of 0.05. This highlights statistically significant data. According to this test there is statistically significant evidence that there is a difference in teachers' belief that students are able to submit assignments through the LMS based upon the content area taught.

Table 33

Bonferroni Post Hoc Analysis: Students are able to submit assignments through the LMS by Content Area

What is your content area?	What is your content area?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Math	Science	.238	.350	1.000	-.77	1.25
	Social Studies	.007	.322	1.000	-.92	.94
	English/Language Arts	-.048	.314	1.000	-.96	.86
	Other	-.720	.272	.099	-1.51	.07
Science	Math	-.238	.350	1.000	-1.25	.77
	Social Studies	-.231	.383	1.000	-1.34	.88
	English/Language Arts	-.286	.377	1.000	-1.38	.80
	Other	-.958	.343	.066	-1.95	.03
Social Studies	Math	-.007	.322	1.000	-.94	.92
	Science	.231	.383	1.000	-.88	1.34
	English/Language Arts	-.055	.351	1.000	-1.07	.96
	Other	-.728	.314	.231	-1.63	.18
English/Language Arts	Math	.048	.314	1.000	-.86	.96
	Science	.286	.377	1.000	-.80	1.38
	Social Studies	.055	.351	1.000	-.96	1.07

	Other	-.673	.306	.312	-1.56	.21
Other	Math	.720	.272	.099	-.07	1.51
	Science	.958	.343	.066	-.03	1.95
	Social Studies	.728	.314	.231	-.18	1.63
	English/Language Arts	.673	.306	.312	-.21	1.56

While the comparison between students being able to submit an assignment through the LMS and a survey responders content area did show the p value to be less than .05, it did not show any areas of significance through the post hoc test. It is important to note the p level, but no content areas have emerges through this test with any reportable results.

Assign Students to Work as Partners by Content Area Taught

Table 34 below details the descriptive statistics of the content area demographic question compared to the survey question dealing with the ability of students to work as partners on the LMS. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance.

Table 34

Descriptive Statistics: Assign Students to Work as Partners by Content Area Taught

					95% Confidence Interval for Mean			
Content Area	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Math	21	4.29	1.617	.353	3.55	5.02	1	6
Science	10	2.20	1.317	.416	1.26	3.14	1	5
Social Studies	13	3.31	1.932	.536	2.14	4.47	1	6
English/ Lang. Arts	14	3.64	1.781	.476	2.61	4.67	1	6
Other	25	3.88	1.130	.226	3.41	4.35	2	6
Total	83	3.65	1.626	.179	3.30	4.01	1	6

Table 35

ANOVA: Assign Students to Work as Partners by Content Area Taught

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.250	4	8.062	3.365	.014*
Within Groups	184.494	77	2.396		
Total	216.744	81			

Note. This ANOVA shows the significance at a rate of .014, less than the significance level of .05.

*p<.05

In Table 35 the content area taught was specifically compared to the survey question that states *I assign students to work as partners in the LMS*. The p-value in this ANOVA is .014

which is less than the significance level of 0.05. This shows statistically significant data. According to this test there is statistically significant evidence that there is a difference in teachers' belief that they assign students to work as partners in the LMS based upon the content area taught.

Table 36

Bonferroni Post Hoc Analysis: Assign Students to Work as Partners by Content Area Taught

What is your content area?	What is your content area?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Math	Science	2.086	.595	.008**	.37	3.80
	Social Studies	.978	.546	.773	-.60	2.56
	English/Language Arts	.643	.534	1.000	-.90	2.19
	Other	.411	.463	1.000	-.93	1.75
Science	Math	-2.086	.595	.008**	-3.80	-.37
	Social Studies	-1.108	.651	.929	-2.99	.77
	English/Language Arts	-1.443	.641	.272	-3.30	.41
	Other	-1.675	.583	.052	-3.36	01
Social Studies	Math	-.978	.546	.7783	-2.56	.60
	Science	1.108	.651	.929	-.77	2.99
	English/Language Arts	-.335	.596	1.000	-2.06	1.39
	Other	-.567	.533	1.000	-2.11	.97
English/Language Arts	Math	-.643	.534	1.000	-2.19	.90
	Science	1.443	.641	.272	-.41	3.30
	Social Studies	.335	.596	1.000	-1.39	2.06
	Other	-.232	.521	1.000	-1.74	1.27

Other	Math	-.411	.463	1.000	-1.75	.93
	Science	1.675	.583	.052	-.01	3.36
	Social Studies	.567	.533	1.000	-.97	2.11
	English/Language Arts	.232	.521	1.00	-1.27	1.74

Note. **p<.01

In the Bonferroni Post Hoc tests above an area of significant data emerges. This statistically significant data points highlight the pillar question and demographic information where an ANOVA test was run. In this case the data showed major differences between those who taught math and those who taught science, with a p value of .008. The two content areas that differ on assigning students to work in partners are math and science. It is important to note that while 21 survey responders selected math as their content area, only 10 selected science. If the majority of the science teachers selected that they did not allow this when compared to their math teaching counterparts, such a statistically significant difference can emerge, in this case p falls well below the .01 significance level.

My Students Can Use the LMS to Seek Help and Content Area

Table 37 below details the descriptive statistics of the content area demographic question compared to the survey question dealing with the ability of students to use the LMS to seek help. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance.

Table 37

Descriptive Statistics: My Students can use the LMS to see help and Content Area

					95% Confidence for Mean			
Content Area	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Math	21	1.24	.539	.118	.99	1.48	1	3
Science	10	1.00	.000	.000	1.00	1.00	1	1
Social Studies	13	1.23	.599	.166	.87	1.59	1	3
English/Lang. Arts	14	1.29	.611	.163	.93	1.64	1	3
Other	25	1.92	1.441	.288	1.33	2.51	1	6
Total	83	1.42	.952	.104	1.21	1.63	1	6

Note. The average response is 2.16, landing between daily use and using LMS 3-4 times per week.

Table 38

ANOVA: My Students can use the LMS to see help and Content Area

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.427	4	2.357	2.836	.030*
Within Groups	64.814	78	.831		
Total	74.241	82			

Note. p<.05

An ANOVA was run with the demographic information looking at survey responders prior experience with a LMS compared to the pillar questions from the survey. Statistically significant data appeared to arise in the test, with p=.030.

Table 39

Bonferronni Post Hoc Analysis: My Students can use the LMS to seek help and Content Area

What is your content area?	What is your content area?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Math	Science	.238	.350	1.00	-.77	1.25
	Social Studies	.007	.322	1.000	-.92	.94
	English/Language Arts	-.048	.315	1.000	-.96	.86
	Other	-.682	.270	.135	-1.46	.10
Science	Math	-.238	.350	1.000	-1.25	.77
	Social Studies	-.231	.383	1.000	-1.25	.77
	English/Language Arts	-.286	.377	1.000	-1.38	.80
	Other	-.920	.341	.086	-1.91	.07
Social Studies	Math	-.007	.322	1.000	-.94	.92
	Science	.231	.383	1.000	-.88	1.34
	English/Language Arts	-.055	.351	1.000	-1.07	.96
	Other	-.689	.312	.300	-1.59	.21
English/Language Arts	Math	.048	.315	1.000	-.86	.96
	Science	.286	.377	1.000	-.80	1.38
	Social Studies	.055	.351	1.000	-.96	1.07
	Other	-.634	.304	.4.4	-1.51	.24

Other	Math	.682	.270	.135	-.10	1.46
	Science	.920	.341	.086	-.07	1.91
	Social Studies	.689	.312	.300	-.21	1.59
	English/Language Arts	.634	.304	.404	-.04	1.51

The post hoc analysis shows that no significant differences emerge between any of the content areas despite the ANOVA reporting a p value of .03. In summary, when looking at the demographic question looking at survey responders content area taught, two specific areas emerged where statistically significant data was found. These areas are the ability of students to submit assignments through the LMS, and the teacher's tendency to assign students to work in partners. This points to the fact that teachers of different content areas interpret the success of LMS to engage students in these areas differently. This could be related to the types of assignments given in the content areas, and how the student work is collected and interpreted. For example, in many math classes teachers require students to show work, and this is not easy to accomplish with the controls of a typical student computer. Often math assignments are designed for individual completion and mastery and the need or desire to have students work in pairs or partners is limited. Non-math related science work could include reading and short answer assignments that lend themselves to working well with LMS submission. Virtual labs for science classes are becoming prevalent and will work well with LMS. These advancements will only continue, and the differences between content areas and the ability of students to submit assignments online will lessen. The use of pairs and groups will also improve with the technology. As options for online tools increase and improve, these disparities should reduce.

Prior Experience with a LMS

Prior experience with teaching with a LMS such as Google Classroom or Canvas prior to the COVID-19 pandemic was given five choices for response. I was a frequent user of learning management systems (multiple times daily) was the first option. I was a daily user of learning management systems (daily use) was the second. I used learning management systems 3-4 times per week was the third. I was new to teaching with a learning management system (1-2 times per week) was the fourth. Finally, I did not use a learning management system prior to the COVID-19 pandemic was the last choice.

This demographic choice was measured against the 14 survey questions relating to the four main pillars of the ACE framework. One way ANOVA's were run, and no statistically significant data emerged.

Years of Experience Teaching

The choices for the question dealing with how many years have you been a middle school classroom teacher was 1-5 years, 6-10 years, and 11+ years. Half of the survey responders replied that they had 11+ years of experience, compared with 28 for 1-5 years and 13 for 6-10 years. This larger amount of survey responders with more experience can certainly shift the survey replies and may affect the data. ANOVA's were run to search for any major findings, and Bonferroni post hoc analysis's were run to examine these findings. Tables 40, 41 and 42 show these tests and the areas of significance. The survey question that showed a significant data point when examined against the teachers' years of experience teaching dealt specifically with the ability to communicate with students through the LMS.

Communication With Students by Number of Years as a Middle School Teacher

Table 40 below details the descriptive statistics of the number of years as a middle school teacher demographic question compared to the survey question dealing with the ability to communicate with students through the LMS. This is followed by both an ANOVA and a Bonferroni Post Hoc analysis on this data to determine this significance.

Table 40

Descriptive Statistics: Communication with Students by Number of Years as a Middle School Teacher

					95% Confidence Interval for Mean			
Year of Experience Teaching	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1-5	28	1.96	.962	.182	1.59	2.34	1	4
6-10	13	2.77	1.235	.343	2.02	3.52	1	6
11+	42	2.00	1.036	.160	1.68	2.32	1	5
Total	83	2.11	1.071	.118	1.87	2.34	1	6

Notes. The average response is 2.15, landing between 6-10 and 11+ years teaching.

Table 41

ANOVA: Communication with Students by Number of Years as a Middle School Teacher

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.752	2	3.376	3.095	.051
Within Groups	87.272	80	1.091		
Total	94.024	82			

Note. This ANOVA shows the significance at a rate of .051, slightly higher than the significance level of .05.

In table 41 the teacher's years of experience in teaching middle school was specifically compared to the survey question that states "I communicate with students." The p-value in this ANOVA is .051 which is just higher than the significance level of 0.05. While this is slightly over the .05 threshold, it is close enough to do further evaluation. According to this test there is statistically significant evidence that there is a difference in teachers' belief that communicate with students through the LMS based upon their years of experience in teaching middle school.

Table 42

Bonferroni Post Hoc Analysis: Communication with Students by Number of Years as a Middle School Teacher

(I)How many years have you been a middle school classroom teacher?	(J)How many years have you been a middle school classroom teacher?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
1-5	6-10	-.805	.351	.073	-1.66	.05
	11+	-.036	.255	1.000	-.66	.59
6-10	1-5	.805	.351	.073	-.05	1.66
	11+	.769	.331	.069	-.04	1.58
11+	1-5	.036	.255	1.000	-.59	.66
	6-10	-.769	.331	.069	-1.58	.04

Note. In the Multiple Comparisons above an area of significant data does not emerge.

In the demographic question relating to the length of time that a survey respondent has been a middle school teacher, the area of statistically significant data did not emerge. Despite the fact that younger teachers have more experience with LMS as they likely used them when they were students and therefore have the background knowledge that experienced teachers may lack, it is not enough to produce significant results.

Table 43 highlights the significant findings of the comparisons of the demographic data and the survey questions related to the ACE pillars.

Table 43

Significant findings

Demographic	Finding	Pillar Questions
Grade Level Taught	Grade Seven versus Combination of Grade Levels	Communication with Students
		Submitting Assignments Through the LMS
		Assignment Completion
		Parents Can Find My Assignments
		I Organize Content so it is Easy
Content Area	Math Versus Science	Students are able to Submit Assignments
		Assign Students to Work as Partners
		My Students can use the LMS to Seek Help
Number of Years as a Middle School Teacher	6-10 Years versus 11+ Years	Communication with Students

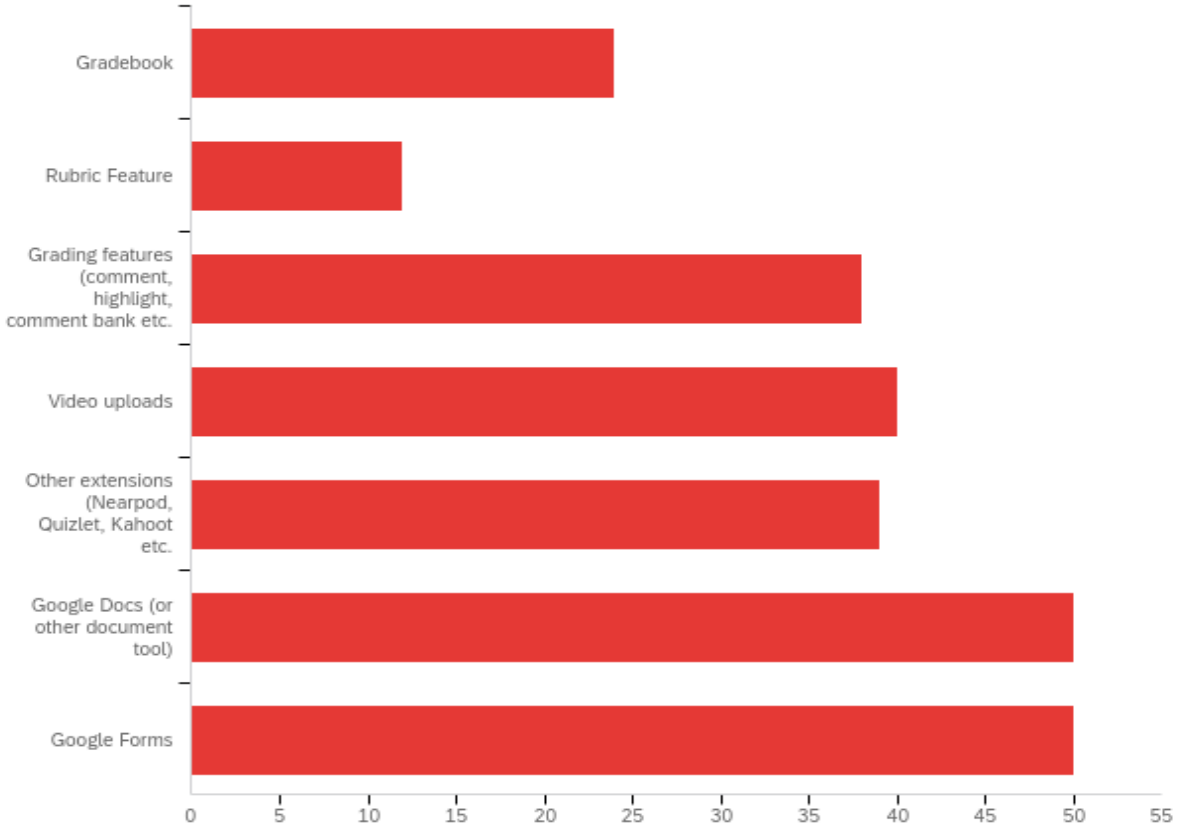
Survey Data for Research Question 3: What Aspects of a Learning Management System Do Teachers Find Useful for Engaging Students?

The open-ended questions on the survey dealt primarily with research question three, which focuses on which aspects of a LMS do teachers find useful for engaging students. The first survey question asked which of the tools of your LMS you use to support student learning. The second survey question asks how often the selected tools are used. The third and fourth survey questions were open-ended and ask when selecting tools what guides the decision-making process, and how does their LMS help struggling students. Qualtrics was used to analyze the data from the survey responses. The first two questions were analyzed using the crosstabs feature of Qualtrics. The text IQ tool was used to analyze the short answer responses.

The first question in the short answer questions section of the survey asked which of the following tools of your LMS you use to support student learning. See Figure 5 for the details of the response breakdown.

Figure 5

Q8-Which of the following tools of your LMS do you use to support student learning?

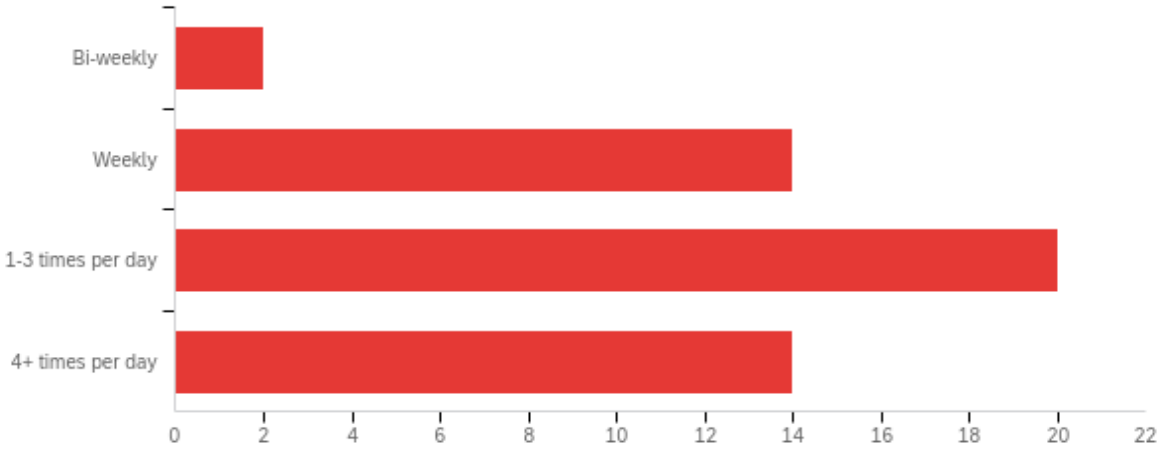


#	Answer	%	Count
1	Gradebook	9.49%	24
2	Rubric Feature	4.74%	12
3	Grading features (comment, highlight, comment bank, etc.	15.02%	38
4	Video uploads	15.81%	40
5	Other extensions (Nearpod, Quizlet, Kahoot, etc.	15.42%	39
6	Google Docs (or another document tool)	19.76%	50
7	Google Forms	19.76%	50
	Total	100%	253

The second question in the short answer section of the survey asked how often do you use the selected tools to support student learning? Figure 6 below details the responses.

Figure 6

Q9-How often do you use the selected tools to support student learning?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How often do you use the selected tools to support student learning?	1.00	4.00	2.92	0.84	0.71	50

#	Answer	%	Count
1	Bi-weekly	4.00%	2
2	Weekly	28.00%	14
3	1-3 times per day	40.00%	20
4	4+ times per day	28.00%	14
	Total	100%	50

Open-Ended Data Summary

To begin the analysis process for the short answer questions, the education topics feature of Qualtrics was uploaded to the text IQ comparison. This tool looks for patterns in the short answers related to the comparable topics. The main education topics for this comparison included educators/teachers, evaluations and content, school, and student life. These topics are present in the text IQ comparison and offer a way to evaluate the short answer question responses. Under each of these main topics, several sub-topics exist. When the short answer responses were analyzed through these main and sub-topics present in text IQ comparison, patterns emerged in a number of these topics while they did not in others.

The first short answer question asking *what guides a teachers decision-making when selecting tools in their LMS and why* was analyzed first. In the main education topic of educators/teachers listed in the text IQ comparison in Qualtrics, the subheadings of educator delivery methods, educator personal connections, overall teacher feedback, school/district leadership, supervision, teaching assistant effectively and technology and virtual learning emerged. In looking at this first topic as a whole, three of these subtopics had a large number of commonalities or responses. The first of these was educator personal connection. Eight responses are linked to this subsection. They included topics like they are easy to use for the students, how familiar the teachers are with the tools, the connections between in-person and remote learners and the ability to provide formative assessments. These topics directly apply to answering the third research question as they point to direct responses from survey participants' perceptions on how they select tools to use with their LMS. The second subsection of educators/teachers that linked with multiple responses was overall teacher feedback. Again, multiple answers dealt with ease of use for students and how easy the tools were to learn for the educators. Each answer in

this subsection mentioned the overall theme of ease of use. The final subsections under educators/teacher were technology and virtual learners. Slightly different patterns of responses emerged in this section. One response noted that the tool decided on by the district plays a major role in what tools are used. Another stated that LMS that allow links to Google products enabled them to transfer information that had already been created. One more noted that the ease to assess through the LMS was of great importance. The overall theme of ease of use for both teacher and student was very important.

The next main topic in the education category in Qualtrics was broken down into six subsections. The subsections for this main topic in text IQ in Qualtrics were class content, class size, class structure, learning outcomes and expectations, stem subjects and student engagement and involvement. Two of these subsections, class content and learning outcomes and expectations, were the areas where the majority of the questions fit. In looking at class content, one participating teacher commented that a wide variety of tools would be used based upon what the topic was. Another remarked that the ability to save and reuse content is paramount to what tools they select. One more remarked that the ability to recognize instant feedback is very important. The ease at which they can flip content for students to access outside of the classroom is important as well. When looking at learning outcomes, one teacher noted that when planning with backward design, the best tools based upon topic are selected. Another replied that the ease of grading assignments through a particular tool would play a major role in what was selected. One hinted that using tools repeatedly was important to them as it allowed students to work on assignments and projects with ease. The final two topics of school and student life did not relate to many of the answers and therefore are not a good representation of the answers. See Figure 7 and Figure 8 below to view this breakdown.

Figure 7

Response patterns for question regarding what guides decision making in LMS tool selection

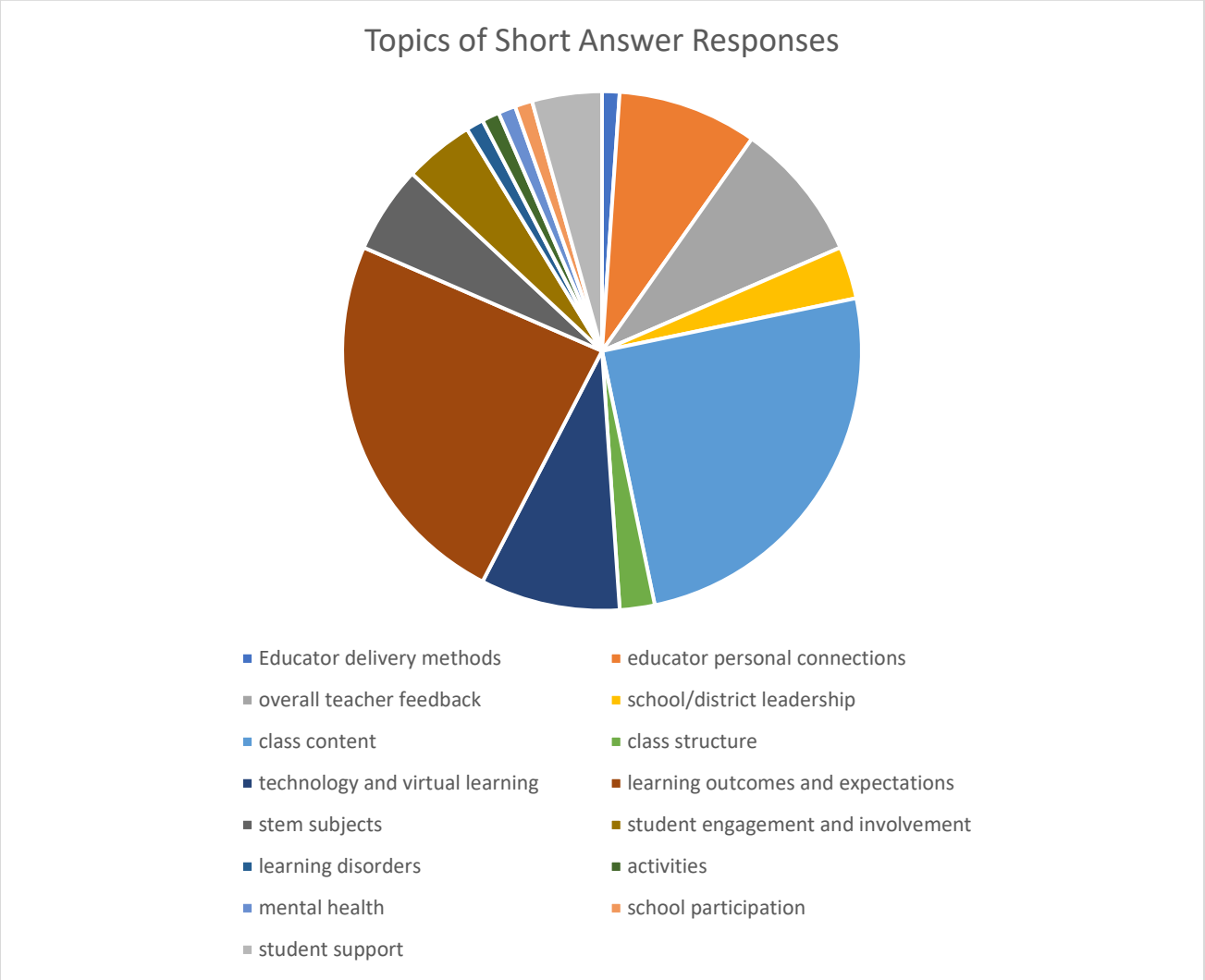
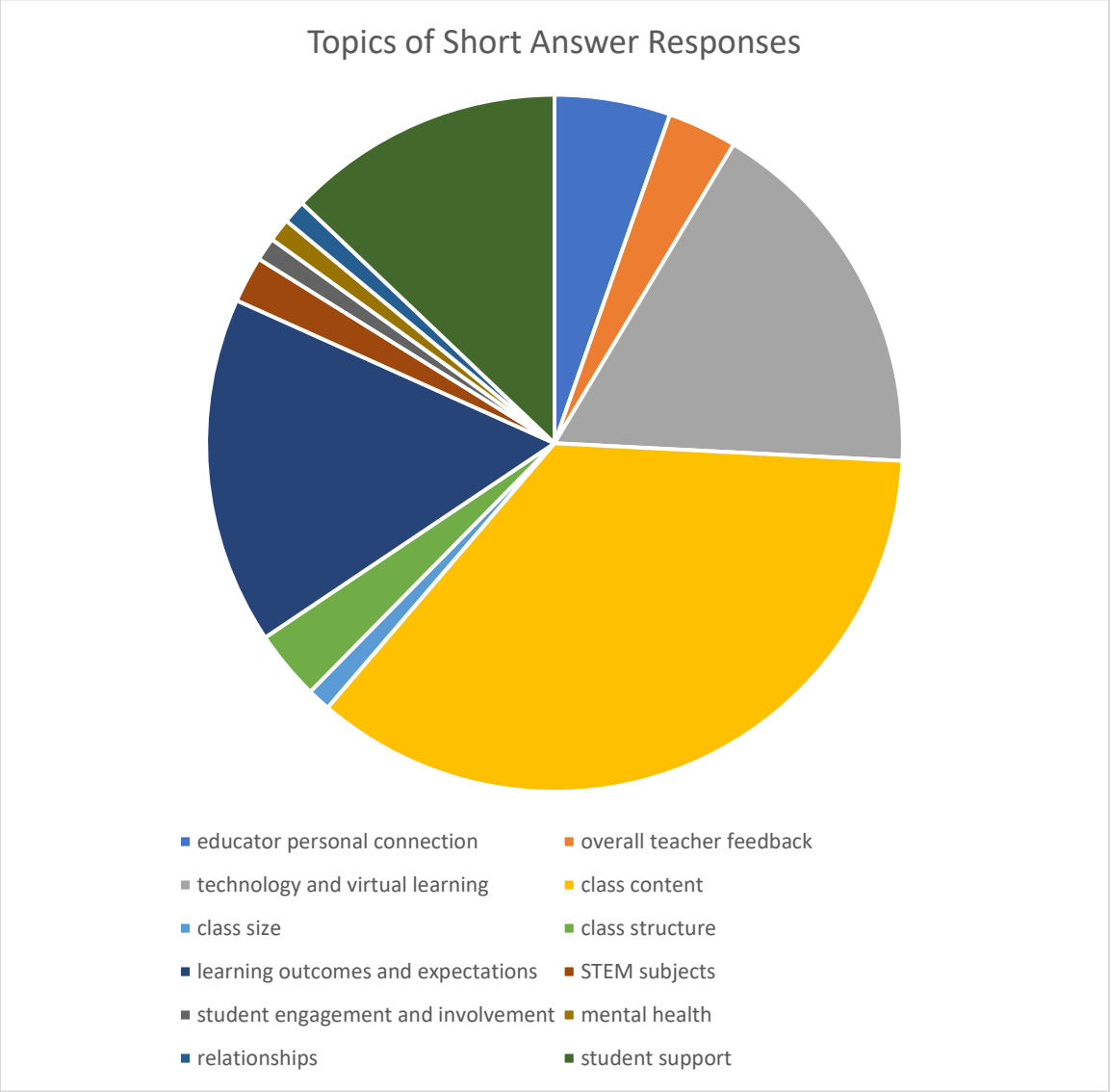


Figure 8

Response Patterns for question about how your LMS can assist with struggling students.



To summarize the short answer analysis, patterns did emerge in the responses received. These patterns emerged in the main topics of educators/teachers and evaluations and content that were pre-determined by Qualtrics in the text IQ evaluation tool. Numerous responses linked to subsections of these topics including educator personal connection, overall teacher feedback, and technology and virtual learners. The second main topic from Qualtrics had subsections as well,

and two main subsections emerged as closely connected with multiple responses. These were class content and learning outcomes and expectations.

When looking at these response patterns, answers to the third research question emerge. The patterns suggest that district decision-making can certainly lead teachers to what tools they can use. When they can select tools for lessons, ease of use for both the educator and student are driving factors for selection. The ability to assess and grade easily showed up multiple times, as did the use of various tools that were dependent on the topic being discussed in class. Finally, the ability to link other tools such as Google products was a large factor when deciding what would work best with students.

When teachers were questioned on which of the following tools that they used, it is important to note that the options were preselected. Each response did receive some responses, but a few received many more selections than some of the other options. Both Google Forms and Google Docs were selected 50 times and are tools and aspects of LMS that teachers find useful for engaging students, clear answers to research question three. Grading features, video uploads and other extensions were also selected a large number of times. This also points to tools or aspects of LMS that teachers find useful for engaging their students. The gradebook feature and rubric feature were selected far fewer times but cannot be disregarded as tools that some of these middle school teachers find useful for engaging their students.

Overall Data Summary

This study is based upon the survey that was sent to middle school teachers in five school districts in Central Pennsylvania. Ninety-four of the middle school teachers did complete the survey to a point, and 83 worked through to completion, providing a wide berth of educational

professionals who worked with LMS both before and during the COVID-19 pandemic. Three research questions were asked, and a validation of the survey was conducted by reaching out to experts in the field. In examining the survey data in Qualtrics, certain areas emerged as possibilities for statistically significant data. Following the overall evaluation of the data, each area that emerged in Qualtrics was taken and the data was analyzed in SPSS by comparing means through a One-Way ANOVA test.

Eight field experts did reply to the tool which tested the validity of the survey. The vast majority of the questions asked were answered positively, pointing to the strengths of the survey document. There were a small number of questions that split between a positive and negative response, which could lead to adjustments being made to improve this tool for further use. The next chapter will summarize the findings discussed here in greater detail and will provide suggestions for further research.

Several patterns began to emerge when examining the data. Differences became clear between the teachers of the older middle school students, and those who taught a combination of grade levels. This points to a number of possibilities. First, teachers of older middle school students tended to answer in a positive manner to questions relating to student usage of the LMS. For example, teachers of seventh-grade students felt that they could communicate with their students through the LMS, and many assignments could be submitted through the LMS by these older students. This could be for a number of reasons. One reason could be that these students have had more experience with using technology in their education. With that experience, they would have the knowledge base to use the LMS better than younger middle school students. The younger students may not have the experience coming out of elementary schools and would need some additional time to become proficient with them. The same is true when the work

completion rate was examined. With younger students, the need for additional teacher attention would be the norm when compared to students on the verge of high school. Experience certainly plays a role. Parents' comfort level with the LMS could also be tied into this experience. As students mature and grow educationally, they are able to take more ownership of their learning, and parents would become educated along the way. Teachers of older middle school students also seemed more confident in their ability to organize content in a meaningful way on the LMS. Again, the experience of students would play a major role in this success or confidence.

Content area also showed some major differences, most residing between science and math. Math teachers may have a more difficult time finding ways to make their subject matter work in this format. This will improve as time moves on and LMS and their tools continue to improve. Work submission for math problems looks very different with technology and the transition might be more difficult than some science assignments. The same is true with assigning students to work in partners. Math and science again differed in their responses and it could be the nature of traditional math and science assignments.

Years of experience as a middle school teacher and prior experience did not show the statistically significant data. This points to the possibility that success with the LMS in the classroom may have more to do with the background of the students then the differences of the teaching staff. This is a major finding of the study, as is moves possible solutions to the success of the LMS away from the staff, and onto the preparation of students. This means that to witness a total transformation to learning with LMS in a meaningful way, the work needs to begin at younger age groups so that students are familiar with these tools and how they work.

Three of the four demographic questions showed areas of statistically significant data, including the grade level taught, the content area taught and the years of experience in teaching

middle school. As the grade level taught varied, so did the responses based on students being able to submit assignments, the rate of work completion, the ability of students to find assignments on the LMS and the belief that teachers organize content so that it is easy for students find assignments on the LMS. When looking at the content area taught, survey responders differed on the ability of students to submit assignments and their likelihood to assign students to work in partners on the LMS. Finally, a teacher's years of experience caused differing responses relating to the communication with students through the LMS. The main differences arose between the seventh-grade teachers, eighth-grade teachers, and those who taught a variety of grade levels. When looking at content area, the main differences come from science and those who selected other as their content area.

Finally, the questions at the end of the survey dealt specifically with the tools that teachers used to engage students and support their learning. The majority of the answers showed that tools that were easy to use for both teachers and students covered much of the feedback. The ease of assessing and grading through the tool also was selected heavily.

Chapter Five Summary of the Study

The use of LMS was catapulted into the mainstream in all levels of education due to the COVID 19 pandemic and its effect on classrooms across the globe. "The advantages of e-learning as opposed to traditional learning are instantly evident with e-learning making education independent of time and location" (Kakesevski et al., 2008, p. 613). The onset of students immediately being made to work from home thrust LMS to the forefront. The necessity of further research on how teachers use LMS to engage students at the middle school level and below became clear through the literature review.

The Adolescent Community of Engagement is a theoretical framework created by Jered Borup (2014) that looks at four distinct pillars that need to be addressed for this engagement to occur. The four pillars are student engagement, teacher engagement, peer engagement and parent engagement. The questions of the survey were aligned to these pillars, along with demographic inquiries and were distributed to middle school teachers in five districts in Central Pennsylvania. Through the use of Qualtrics and SPSS, the quantitative data from the surveys was studied and significant findings were used to answer the three research questions.

This study examined student engagement with the ACE framework through the eyes of middle school educators in South Central Pennsylvania. Three research questions emerged centered around the ACE framework and how it works with the LMS to engage students and support their learning, how teachers demographic information can affect the use of the LMS, and the tools in these LMS that teachers find useful to assist in this endeavor. As the survey was new, the researcher tested the content validity by reaching out to experts in the field.

Summary of the Findings

The LMS allow students access to their classrooms and class information at any time. The way that teachers set up these tools can help to engage students and support their learning. By examining the mean response to the Likert Scale questions of the survey showed which of the four main pillars of the ACE framework were used by the majority of the survey responders. The results show that teachers do try to engage students, a priority under the ACE framework. The same is true for the parent engagement pillar, and the teacher engagement pillar. This is not a surprise as teachers were the focus of the survey questions. By linking the student, parent and teacher pillar, this group of educators were comfortable in connecting these three groups through the LMS. Connecting these three groups provides for three of the four pillars being reached by this group of educators. More work can be done in these areas to improve and district leadership can capitalize on these positive areas with increased professional development.

The peer engagement pillar is an area where this group of educators falls short and is an area where these professionals could improve in how they use LMS to engage students. District administrators and trainers can push for increased understanding of the importance of including this groups through the LMS. The survey questions focused on partner work, group work, and chat features of the LMS to connect this pillar. Additional ways and methods for connecting peers should be researched and shared to ensure inclusion of them for increased support and engagement for students. Another way to improve this area is to question other participants in the engagement process. Questioning students, and parents could provide additional insight into how to make this connection possible.

The second research question highlighted some emerging differences between the survey responders based upon their differences in the demographic questions of the survey. The teachers

of older middle school students showed statistically significant differences when compared to teachers of multiple grade levels. This signifies that there is a connection between age and experience of student with the overall success of using LMS. Students who have experience is using electronic tools in their educational background show a better ability to perform with the tools of the LMS. When a teacher has multiple grade levels to plan and prepare for, it is possible that the use of a LMS becomes secondary in importance when related to creating plans for different subjects and grade levels. The same could be true when examining the experience and ability of parents to successfully use the LMS. If their student is older and has experience with this electronic tool, the chance that parents have more experience is greater.

Differences in content area also become evident, with Math and Science showing statistically significant differences. This could be linked to the traditional format of math assignments and work and how teachers have collected and graded this material. This difference could ease as more technology becomes available and math assignments are completed and assessed in technology friendly ways. Increased time to work towards the classroom features of the LMS should help teachers improve in these areas, and district leadership needs to be aware of these areas of need. Reaching out to experts in this field can provide exemplars for teachers in all subject areas and grade levels. This is also something that the LMS providers can capitalize on to improve their product and help the districts that are purchasing their product.

The third research question was answered through the short answer questions of the survey. Fewer teachers responded to the short answer questions dealing with only 50 responses collected compared with 83 complete responses through the demographic and ACE framework questions.

The ease of use of tools for both students and educators was also a common theme that was discovered using Text ID through Qualtrics. Teachers also agreed that the ability to assess and grade student work were aspects of tools on LMS that they would use. They also liked the ability to link to other tools or sites, and Google products were mentioned multiple times in answers given. Finally, they selected grading features, video uploads, rubric features and gradebook features as aspects of tools that motivate their use.

The idea of how often these tools are used in the classrooms was the focus of the next short answer question. Forty percent of responders noted that they used these tools one to three times daily. Twenty-eight percent stated that they used the tools four plus times daily, and another 28 percent used them at least weekly. This points to the reality that while LMS use was limited in some grade levels just a few years ago, most teachers are using the features of an LMS the majority of the week. This information is most likely very different at this time as educators have been using LMS with great frequency since the pandemic began. Administrators can also assist in this area by providing support and looking for the use of these tools during walk through observations and lesson planning.

Relationship to Previous Research and Theoretical Framework

This study is built from previous research through the lens of the ACE and onto the data collected through this new survey tool. The ACE framework comes directly from the work of Borup et al. (2014). Borup (2014) states “The primary hypothesis of the ACE framework is that student engagement is positively correlated with parent, teacher and peer engagement” (p. 22). The survey used for this dissertation was linked directly to the ACE framework. Area experts did produce content validity that suggested that the questions were linked to each of the pillars of the

ACE framework. The ACE framework is linked to previous research on all four of the main pillars.

Jensen and Minke (2017) detailed the importance of parent engagement on a student's academic and social and emotional success. They continue to mention that it is a schools responsibility to reach out and include parents in the learning process. Borup et al. (2014) would agree with these sentiments and felt that parental engagement was a key to the overall engagement of students. The results of this study demonstrate that the survey participants agree in the importance of getting parents involved. This typically is expected to a higher degree with younger students, but the school closures of the 2019-2020 school year due to the global pandemic, and increased use of LMS demonstrate the need for additional and increased parental support.

Multiple studies were examined relating to the four pillars of engagement from the ACE framework. The early 2000's saw research from Wu and Huang (2007) detailing the importance of teacher engagement to the engagement of students. They point out that a teacher's planning process and educational delivery do much to engage students in the process. This is also related to research question three as how they select their tools and what tools are used is shared. The results of this study point to teacher engagement as the most solid for all of the survey respondents. This makes sense as the teachers are the ones completing the survey. The teachers feel that they post grades on the LMS, that students are able to submit assignments to them and that they can use the LMS to see help. This links to Wu and Huang with the importance of the planning process and the educational delivery.

The major research behind the importance of the peer pillar of engagement came from Oviatt et al. (2018). In multiple studies it was shown that students performed better with added

connectiveness to school. They went on to look at this through the lens of students in cyber programs and noted that they also perform better when they are provided a community of support. The peer engagement pillar was the area that came up as the weakest in the response from this studies participants. As teachers become better in how they prepare and use LMS this is an area where focus needs to be. While some students are self-motivated, others need the added support of working with peers. This is done in traditional classrooms through discussions, question and answer sessions, and partner and group work. Some subject areas have embraced this on LMS as well, but others have not.

When examining student engagement, this study emerged from the work of Yapici and Akbayin (2012) and their research on how school students' views of online learning. The work of Buckenmeyer et al. (2016) looked at college students' views of the benefits of learning with technology and the importance of engagement for success with this method. Greig (2009) stated "for learners that grew up surrounded by technologies and experiencing it from early years in school, the integration of technology in the learning process is expected" (p. 34). The studies of Segal et al. (2019) and Soroka (2019) also examined digital learning. All of these studies present learning through technology as not something that we have to explore, rather something that we must do for our students. The survey responses collected do show that this group of middle school teachers do feel that they are connecting with and engaging their students through the LMS. Even our youngest students are now well versed in learning with technology and we need to support them.

This study also looked into how teachers use LMS to engage students and support their learning through the studies of Alshorman and Bawaneh (2018) and their research on Duke University and Bosdoin College. International studies on the effectiveness of LMS was

examined through the Nasser et. al (2011) study. Pawade (2019) also looked at engagement levels of the learner as did Holmes and Prieto-Rodriguez (2018). Marieno and Shi (2018) looked at high school students transitioning into college and how the LMS affected their engagement. With the shift to increased LMS use, educators can no longer only focus on this group of students. The need for all of the pillars of the ACE framework to be considered when teachers and educators prepare is paramount for student engagement and support.

The lack of available studies for students at the middle levels, coupled with a lack of vetted survey tools pointed to the notion that there was room for a study such as this. Knowing that older, more experienced students can have success with this tool is shown in much of the research detailed above. What is lacking is what might occur for younger students, like those in the middle and elementary levels. This study adds to that area and provides a window into hos LMS is used in five districts in central Pennsylvania. The survey questions that are linked to the ACE framework pillars reinforce the previous research into these areas of engagement and support the work of Borup et. al (2014). This study also provides a tool that can claim content validity, and the framework for a more widely accepted tool when additional steps are taken in future research.

Implications

The implications of the findings of this study reach all involved in the educational process. From classroom teacher, to student, to school administrator, the findings uncovered here can help lead the transition to this tool and other electronic tools for use in the classroom. When looking at the statistically significant data, the age of the student or the student experience with learning in this format did seem to play a role in the teachers perception of success for student engagement. With the addition of the COVID 19 pandemic, and the transition to LMS for many

of the nation's school aged children, the preparedness of students will increase. As each school year passes, teachers will be receiving students who are well versed with learning through technology. This translates to the possibility for increased usage of technology for younger students. Districts will need to explore staff development for teachers at all levels to both prepare students for this increased use of technology as well as increase the capabilities of teachers to deliver content in an increasingly technology friendly approach.

As this usage increases for students of all ages, teachers and professors must embrace the change and prepare themselves to meet students at their educational level. Veteran teachers will need to develop their online presence to meet the needs of their students, and teacher preparatory programs will need to adapt to the new reality of our educational system. The expansion of students attending cyber classes also showcases the need for teachers to increase their abilities to use tools like the LMS. Students and families are expecting more options, and the return to just offering traditional classrooms is not likely. The ACE framework can assist in this endeavor and educators need to focus on including all four pillars in their educational approach.

This study highlighted differences between teachers of older students and those who teach multiple grade levels. All teachers need to be prepared to reach their students and professional development and time to build a robust online presence are needed. Common planning time for grade level teachers and subject areas would provide opportunities to build lessons, activities and improved LMS.

Districts and buildings can build local experts who can aid colleagues in an effort to move teachers forward to meet the needs of their students. Actions such as this can assist with other findings that emerged in this research. Subject areas such as math need more assistance to create and maintain a strong online presence. This study showed math to be the subject area that

struggled the most in utilizing the tools of the LMS. To use these LMS features goes against the traditional ways that math has been taught. These teachers must revamp how they are presenting their material, and assignments and assessments need to be modified to better support students with the LMS.

Finally, these educators point out what they are looking for when using tools in the LMS. First they reveal that district decision making plays the largest role in the tools that they use. They then mention the ease of use for teachers and students, the ability to assess and grade easily and the ability to link to other online tools, such as Google products, as a driving force for them. This group of educators mentions that Google Forms, Google Docs, grading features and rubric features are what they currently are using.

Districts must react with providing their teachers with the tools that they need to prepare for their students. This specifically highlights the need for professional development and training of our educators. Teachers of multiple grade levels must understand how to prepare for multiple grade levels using a LMS. Those who teacher younger students must be able to communicate with their students, help their students submit assignments through the LMS, help parents understand and be able to navigate LMS, and understand how to best organize content on the LMS. Content areas that have struggled to find success with the LMS, like math must be trained to deliver their material through the LMS. Their approach may have to change in how problems and concepts are taught and practiced. Finally, teachers who have been in the profession for a length of time must get the training that they need to meet the needs of their students. It is the district and district leaderships responsibility to make certain that this training occurs. The research has demonstrated that some of this work has been done at the university and even the high school level. Districts can no longer focus only on this age group. Middle and elementary

schools are now using this technology regularly and their teachers must have the same opportunities to prepare. Middle school and elementary educators can learn from this experience and work to move their departments and buildings forward.

Limitations

This study received 94 responses from educators across five middle schools in Central Pennsylvania. Only 83 of the 94 completed the survey in its entirety and could be used in the data assessment. Despite this large response, the answers provided deal with middle school teachers only, and teachers from one small portion of the educational community. Only four of the six demographic questions were able to be used, as the vast majority of the respondents were female and held their masters' degrees. Getting more information from male educators and newer teachers would also help to provide a more complete look at what each district is facing. One of the grade level selections, grade five, had to be removed as only one fifth grade teacher responded. While a large sample group remained, some of the initial interest areas for this dissertation proved to not be useable. These areas can be targeted for future research.

The survey was only given to five localized school districts in one state. This limits the results to one type of educational system, and very similar districts in terms of population, socio-economic backgrounds, and other defining factors. The survey was also not required, and as a result the demographic backgrounds of the responders was limited. Getting a broader breakdown of responders could allow additional grade levels, a wider variety of educational backgrounds, and a more uniform sampling of content areas to be considered in the study. One of the districts was suburban, but the remaining four were in rural areas. Looking at urban districts, larger schools, and schools in different geographical areas can add to the research collected here.

One of the goals of the study was to provide content validation for the survey instrument. Only eight field experts responded to the survey, falling short of this goal. While there is merit in the responses of the eight experts, only content validity can truly be established. The researcher did analyze the data and found that the questions did link to the ACE framework pillars. More expert participation will improve the tool, but it did provide the needed information to answer the research questions poised in this study.

Recommendations for Future Research

The survey instrument can be improved upon and further validated to become a tool that can produce additional results at other grade levels, or in other locations around the nation and the world. Making the improvements suggested by the limited number of field experts who responded to the questionnaire in an attempt to garner additional validity would improve the survey instrument. Continuing to reach out to additional field experts would also provide necessary support for the survey tool.

As this research sample is limited to a relatively small number of educators in one geographic area of the nation and world, there are numerous areas to expand this study immediately. First, shifting the research to either the high school, intermediate or early elementary ages will add to the data collected here. The study should also be continued on a wider variety of school districts across the nation and world. This study focused on five districts located in Central Pennsylvania. Reaching out to urban districts, impoverished districts, and geographically diverse districts would solidify what the study is attempting to do.

This study highlighted the differences between grade levels and subject areas. Further studies into these differences could produce additional information that would be valuable to educators of all levels. Preparing teachers of lower grade levels is also paramount to the

successful implementation of the LMS. Studies on the practices of teachers who are succeeding in reaching all four of the ACE pillars could foster information to assist district leaders in achieving success in their own buildings. Looking at bringing all subject areas to equal use of the LMS is something that needs to be examined. Examining the subject area teachers who are realizing success could provide methods and examples to subject area teachers who are not realizing this success. The methods of science, social studies and language arts teachers could provide insight into where math teachers need to move with their lesson planning and teaching styles.

The study focused solely on the responses put forth by the middle school teachers during the 2019-2020 school year. Another way to expand the study and gather additional useful information would be to expand the participants to include administration, parents and students. Each of these groups would bring additional concerns with the completion of the surveys, but the entire picture of the effects of the LMS could be seen by all sides.

Summary

This study examined how middle school teachers use LMS to engage students and support their learning, how the demographics of the teachers affected how they used the LMS, and what aspects of the LMS teachers found useful for engaging students. A survey was created, and 94 teachers completed some of the questions and 83 completed it completely. The questions examined the demographic information of the survey responders, asked questions linked to the ACE framework, and short answer questions dealing with the tools that teachers use. The COVID-19 pandemic forced a large majority of schools to use LMS as education shifted to remote learning. This provided a unique setting for the survey questions and provided teachers with the means to use the LMS on a daily basis.

While limitations do exist, this study offered an opportunity to look at how middle school teachers use LMS. It also provided a snapshot into what tools these teachers are using to achieve success, and how they select what tools to use. Studies exist for high school students and LMS use in higher education, but the research is limited for middle and elementary schools. The results of the survey provide useful information for teachers and administrators as the work continues to improve LMS and prepare teachers and students to use them effectively.

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Appendices

Appendix A

Teacher Survey

- How do teachers use learning management systems to engage students and support their learning?
- How do teachers' demographic background impact their use of LMS?
- What aspects of a learning management system do teachers find useful for engaging students?

This questionnaire will be given to middle school teachers. The questionnaire will be given electronically to all middle school teachers. All responses will be provided by selecting an option on a six option Likert Scale. The options are; Very Strongly Agree (VSA), Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD) and Very Strongly Disagree (VSD). All questions will be focused on answering the research questions above.

The theoretical framework of this dissertation is the Adolescent Communities of Engagement (ACE) framework established in 2014. Borup et al (2014) note that this framework "sets forth researchable hypotheses on how those types of engagement may improve students' success.," (p. 3).

Questions

Demographic Information-please answer the following questions describing yourself and your experience in teaching with a learning management system.

1. What is your highest level of educational degree earned?
    a. Bachelors

   b. Masters

   c. Doctorate

2. What is your gender?

   a. Female

   b. Male

   c. Prefer not to say

3. How many years have you been a middle school classroom teacher?

   a. 1-5

   b. 6-10

   c. 11+

4. What grade level do you currently teach?

   a. 6

   b. 7

   c. 8

   d. Combination of grade levels

5. What is your content area?

   a. Math

   b. Science

   c. Social Studies

   d. English/Language Arts

   e. Other

6. How would you rate your experience with teaching with a learning management system (LMS) such as Google Classroom or Canvas prior to the COVID-19 pandemic?

a. I was a frequent user of learning management systems (multiple times daily).
b. I was a daily user of learning management systems (daily use).
c. I used learning management systems 3-4 times per week.
d. I was new to teaching with a learning management system (1-2 times per week)
e. I did not use a learning management system prior to the COVID-19 pandemic.

7. I communicate with students through the LMS.

VSA—SA—A—D—SD—VSD

8. I communicate with parents regarding assignments, grades, missing work and other concerns through the LMS.

VSA—SA—A—D—SD—VSD

9. Parents of my students can contact me through the LMS.

VSA—SA—A—D—SD—VSD

10. I post grades on the LMS.

VSA—SA—A—D—SD—VSD

11. My students are able to submit assignments through the LMS.

VSA—SA—A—D—SD—VSD

12. My students can use the LMS to seek help.

VSA—SA—A—D—SD—VSD

13. I assign students to work as partners in the LMS.

VSA—SA—A—D—SD—VSD

14. I assign students to complete work in groups of three or more through the LMS.

VSA—SA—A—D—SD—VSD

15. I provide opportunities for choice in assignments on the LMS.

VSA—SA—A—D—SD—VSD

16. My students complete assignments on the LMS at a rate equal to assignments given without using an LMS prior to the COVID 19 pandemic.

VSA—SA—A—D—SD—VSD

17. My students use the chat feature in the LMS to communicate with each other remotely.

VSA—SA—A—D—SD—VSD

18. I believe that parents of my students can find student assignments on the LMS.

VSA—SA—A—D—SD—VSD

19. I believe that parents are able to see their child's academic performance in my class by using the LMS.

VSA—SA—A—D—SD—VSD

20. I believe I organize content so it's easy for students to find assignment in the LMS.

VSA—SA—A—D—SD—VSD

Short Answer Questions

1. Which of the following tools in Google Classroom do you use to support student learning (please select all that you use)?
    a. Gradebook
    b. Rubric Feature
    c. Grading features (comment, highlight, comment bank etc.)
    d. Video uploads (through assignment creation)
    e. Other extensions (Nearpod, Quizlet, Kahoot)
    f. Google Docs
    g. Google Forms

2. How often do you use the selected tools to support student learning?
    a. Bi-Weekly
    b. Weekly
    c. 1-3 times per day
    d. 4+ times per day
3. When selecting tools in Google Classroom, what guides your decision making? Why?
4. How does Google Classroom help you assist struggling students?

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Appendix B

Administrative Approval

I. Purpose:
To grant Joel Hain permission to send a survey to all middle school teachers in your school district. I am interested in understanding how your middle school teachers use Learning Management Systems to engage students, and what tools they utilize to do so.

II. Duration:
The surveys will be sent out immediately following IRB approval and data collection will be completed by June 2021.

III. Confidentiality:
Each participant will take the study survey and will not have to disclose their identity in any way. All data will be stored on a password protected computer or in a locked file cabinet.

IV. Research Methods:
This survey will be sent to potential participants electronically. The data will be collected electronically. The survey asks six demographic questions, fourteen questions linked to the Adolescent Community of Engagement framework, and four short answer questions looking at the tools used in the Learning Management System.

V. Informed Consent:
All middle school teachers will receive the request to complete the survey. All surveys are voluntary, and teachers may decide not to participate.

Thank you for permitting participation in this study. If you should have questions about this study please contact me, the university representative Dr. Dreon and/or the University Institutional Review Board:

Joel Hain	Dr. Oliver Dreon	Millersville University
717-448-2603	Dissertation Committee Chair	Institutional Review Board
jkh@smsd.us	oliver.dreon@millersville.edu	mu-irb@millersville.edu

Signature- give permission for the research study described above.

Administrator Signature Date

Administrator Name Administrator Title

Appendix C

February 16, 2021

Dear Dr. _____,

I am working through the final stages of my Doctorate through Millersville and Shippensburg University and have reached the IRB portion of my dissertation. I am hoping to gain permission to survey the teaching staff of your middle school. My study deals with how middle school teachers use Learning Management Systems to Engage their students and includes a look into the tools of the Learning Management System that they find helpful in doing so. The COVID-19 pandemic thrust the education community into the position of online learning and it is vital that we better understand the tools that we are using to engage students in our current environment and in the classrooms to which we shall return following the pandemic. I would be happy to share the results of my survey with you at the conclusion of my study.

Please consider signing the attached informed consent approval which provides further details into my study. I welcome any questions that you might have and thank you for your time and consideration.

Sincerely,

Joel Hain
Principal
Boiling Springs High School
717-258-6484 ext. 1006
jkh@smsd.us

Appendix D

Administrative Approval

I. Purpose:
To grant Joel Hain permission to send a survey to all middle school teachers in your school district. I am interested in understanding how your middle school teachers use Learning Management Systems to engage students, and what tools they utilize to do so.

II. Duration:
The surveys will be sent out immediately following IRB approval and data collection will be completed by June 2021.

III. Confidentiality:
Each participant will take the study survey and will not have to disclose their identity in any way. All data will be stored on a password protected computer or in a locked file cabinet.

IV. Research Methods:
This survey will be sent to potential participants electronically. The data will be collected electronically. The survey asks six demographic questions, fourteen questions linked to the Adolescent Community of Engagement framework, and four short answer questions looking at the tools used in the Learning Management System.

V. Informed Consent:
All middle school teachers will receive the request to complete the survey. All surveys are voluntary, and teachers may decide not to participate.

Thank you for permitting participation in this study. If you should have questions about this study please contact me, the university representative Dr. Dreon and/or the University Institutional Review Board:

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2/22/21

Administrator Signature	Date
Scott T. Krauser	Assistant Superintendent
Administrator Name	Administrator Title

Appendix E

Administrative Approval

I. Purpose:

To grant Joel Hain permission to send a survey to all middle school teachers in your school district. I am interested in understanding how your middle school teachers use Learning Management Systems to engage students, and what tools they utilize to do so.

II. Duration:

The surveys will be sent out immediately following IRB approval and data collection will be completed by June 2021.

III. Confidentiality:

Each participant will take the study survey and will not have to disclose their identity in any way. All data will be stored on a password protected computer or in a locked file cabinet.

IV. Research Methods:

This survey will be sent to potential participants electronically: The data will be collected electronically. The survey asks six demographic questions, fourteen questions linked to the Adolescent Community of Engagement framework, and four short answer questions looking at the tools used in the Learning Management System.

V. Informed Consent:

All middle school teachers will receive the request to complete the survey. All surveys are voluntary, and teachers may decide not to participate.

Thank you for permitting participation in this study. If you should have questions about this study please contact me, the university representative Dr. Dreon and/or the University Institutional Review Board:

Joel Hain	Dr. Oliver Dreon	Millersville University
717448-2603	Dissertation Committee Chair	Institutional Review Board
jkh@smsd.us	oliver.dreon@millersville.edu	mu-irb@millersville.edu

Signature

I give permission for the research stud described above.

8/2021

Administrator Signature	Date
Mrs. Clarice L. Nace	Middle School Principal
Administrator Name	Administrator Title

Appendix F

Timothy P. Williams, Ed.D. *Superintendent*

Ronald Provard Education Center

1800 Hollywood Drive

York, PA 17403-4256

Phone: (717)885-1210

Fax: (717)885-1211

Scott T. Krauser, Ed.D. *Assistant Superintendent*

ITE SPECIFIC AUTHORIZATION TO CONDUCT RESEARCH

February 22, 2021

Dear Mr. Hain:

The purpose of this letter is to inform you that the York Suburban School District will give you, Joel Hain, permission to conduct the research titled *How Middle School Teachers Use Learning Management Systems to Engage Students* at the York Suburban School District and York Suburban Middle School. We have agreed to the study procedures, detailed in the enclosed Informed Consent, for the research to be released for publication.

Conducting educational research is an important and critical process in enhancing both the teaching profession and the outcomes for our students. I commend your efforts in this process, and I am eager to receive an update to your findings. I would greatly appreciate it if you would please share with me, and Dr. Snedden, a brief update on your findings and the corresponding recommendations after the completion of your study.

I wish you the best of luck in your study.

Sincerely,

Scott T. Krauser, Ed.D.

Assistant Superintendent

CC: Dr. Mike Snedden, Principal, York Suburban Middle School

Enclosure: Informed Consent

Inspiring a **BOLD** *Future*

Appendix G

Administrative Approval

1. Purpose:

To grant Joel Hain permission to send a survey to all middle school teachers in your school district. I am interested in understanding how your middle school teachers use Learning Management Systems to engage students, and what tools they utilize to do so.

II. Duration:

The surveys will be sent out immediately following IRB approval and data collection will be completed by June 2021.

III. Confidentiality:

Each participant will take the study survey and will not have to disclose their identity in any way. All data will be stored on a password protected computer or in a locked file cabinet.

IV. Research Methods:

This survey will be sent to potential participants electronically. The data will be collected electronically. The survey asks six demographic questions, fourteen questions linked to the Adolescent Community of Engagement framework, and four short answer questions looking at the tools used in the Learning Management System.

V. Informed Consent:

All middle school teachers will receive the request to complete the survey. All surveys are voluntary, and teachers may decide not to participate.

Thank you for permitting participation in this study. If you should have questions about this study please contact me, the university representative Dr. Dreon and/or the University Institutional Review Board:

Joel Hain	Dr. Oliver Dreon	Millersville University
717-448-2603	Dissertation Committee Chair	Institutional Review Board jkh@smsd.us
	oliver.dreon@millersville.edu	mu-irb@millersville.edu

Signature

I give permission for the research study described above.

	2/21/21
Administrator Signature	Date
Matthew Strine	Superintendent
Administrator Name	Administrator Title

Appendix H
Informed Consent for Participant/Teacher
Project Title:

A STUDY ON HOW TEACHERS USE LEARNING MANAGEMENT SYSTEMS TO ENGAGE STUDENTS AND SUPPORT THEIR LEARNING IN MIDDLE SCHOOLS IN CENTRAL PENNSYLVANIA

Involvement:

My name is Joel Hain and I am working on my Doctorate at Millersville and Shippensburg University. I am interested in adding to the lack of current research, in the educational field, on how middle school teachers use Learning Management Systems to engage students in the learning process.

Overview:

The purpose of this study is to examine how middle school teachers use Learning Management Systems to engage students in the learning process and to find out which tools of the Learning Management system they find helpful in this endeavor.

Risk and Benefits:

All data collected from this study will be protected and stored in a way that will allow all participants to remain anonymous. This study will provide data regarding how middle school educators to effectively use Learning Management Systems to engage students. Participating districts will have the opportunity to review the findings which could assist them in planning how to train faculty and which tools may be most helpful in engaging students.

Compensation:

There will be no compensation for participation in this study.

Confidentiality:

All surveys will be anonymous. Surveys will be grouped by participating district and all results will be stored in either a password protected computer, or locked filing cabinet.

Voluntary Participation:

Your participation is voluntary. No middle school teacher has to complete the survey. You may choose to withdraw from participating at any time during the research process by contacting me.

Thank you for considering to participate in this research study. If you have any further questions regarding this study, contact me, the university representative Dr. Dreon and/or the University Institutional Review Board.

Joel Hain	Dr. Oliver Dreon	Millersville University
717-448-2603	Dissertation Committee Chair	Institutional Review Board
jkh@smsd.us	oliver.dreon@millersville.edu	mu-irb@millersville.edu

Signature- give permission for the research study described above.

Participant Signature Date

Participant Written Name

Appendix I

Experts Survey-ACE survey reliability

Question 1-

I would like to invite you to participate as an expert evaluator of the content validity of survey questions linking the Adolescent Communities of Engagement framework with the use of Learning Management Systems to engage middle school students.

I understand that there is no benefit for you participating in the survey, but my hope is that this research will add to evaluation of the benefits of using LMS with students in middle school.

The risks are no greater than those in everyday life. Data will be collected using Qualtrics and will be stored on a secure laptop. Confidentiality will be kept through these means.

The survey is not mandatory and if you choose to participate you may stop at any time. Please skip any question that you do not wish to answer.

If you have questions, feel free to contact me at 717-448-2603 or at jkh@smsd.us (Joel Hain). You can also contact my dissertation chair, Dr. Oliver Dreon at Oliver.Dreon@millersville.edu.

By clicking the link below you are confirming that you have read this form and agree to participate in the study described. The project has been explained and the possible risks have been outlined. My consent indicates that I am 18 years of age or older.

Do you agree to participate?

Yes

No

Question 2-

What are your roles at your educational institution? (please select all that apply)

a. I prepare PK-12 teacher candidates to work in online schools.
b. I prepare PK-12 teacher candidates to teach in “brick and mortar” schools
c. I engage with professional scholarship about online teaching.
d. I lead professional development for faculty to teach online at my institution.
e. I consult with institutions regarding their online programs.
f. None of the above.

Question 3-

How long have you been in this role?

a. 0-5 years
b. 6-10 years
c. 11-15 years
d. 16+ years

Question 4-

How familiar are you with the Adolescent Community of Engagement?

a. Extremely familiar
b. Very familiar
c. Moderately familiar
d. Slightly familiar
e. Not familiar at all

Question 5-

The following questions are all linked to one of the pillars of the Adolescent Community of Engagement. Student Engagement is first, Teacher Engagement is second, Peer Engagement is third, and Parent Engagement if fourth. With this in mind please rate the following survey questions on the following protocol. This question connects with the corresponding pillar of the ACE Framework.

Question	Yes	Somewhat	No
1. I communicate with students through the LMS. (student engagement)			
2. My students are able to submit assignments through the LMS. (student engagement)			
3. I provide opportunities for choice in assignments on the LMS. (student engagement)			
4.My students' complete assignments on the LMS at a rate equal to assignments given without using a LMS prior to the COVID 19 pandemic. (student engagement)			

5.I post grades on the LMS. (teacher engagement)			
6. My students can use the LMS to seek help. (teacher engagement)			
7. I believe I organize content so it's easy for students to find assignment in the LMS. (teacher engagement)			
8. I assign students to work as partners in the LMS. (peer engagement)			
9. I assign students to complete work in groups of three or more through the LMS. (peer engagement)			
10. My students use the chat feature in the LMS to communicate with each other remotely. (peer engagement)			
11. Parents of my students can contact me through the LMS. (parent engagement)			
12. I communicate with parents through the LMS. (parent engagement)			
13. I believe that parents of my students can find student assignments			

on the LMS. (parent engagement)			
14. I believe that parents are able to see their child's academic performance in my class by using the LMS. (parent engagement)			

Question 6-

The following questions are all linked to one of the pillars of the Adolescent Community of Engagement. Student Engagement is first, Teacher Engagement is second, Peer Engagement is third, and Parent Engagement if fourth. With this in mind please rate the following survey questions on the following protocol. The question is worded in a way that is easy to understand.

Question	Yes	Somewhat	No
1. I communicate with students through the LMS. (student engagement)			
2. My students are able to submit assignments through the LMS. (student engagement)			
3. I provide opportunities for choice in assignments on the LMS. (student engagement)			
4.My students' complete assignments on the LMS at a rate equal to assignments given without using a LMS prior to the COVID 19 pandemic. (student engagement)			
5.I post grades on the LMS. (teacher engagement)			

6. My students can use the LMS to seek help. (teacher engagement)			
7. I believe I organize content so it's easy for students to find assignment in the LMS. (teacher engagement)			
8. I assign students to work as partners in the LMS. (peer engagement)			
9. I assign students to complete work in groups of three or more through the LMS. (peer engagement)			
10. My students use the chat feature in the LMS to communicate with each other remotely. (peer engagement)			
11. Parents of my students can contact me through the LMS. (parent engagement)			
12. I communicate with parents through the LMS. (parent engagement)			
13. I believe that parents of my students can find student assignments on the LMS. (parent engagement)			

14. I believe that parents are able to see their child's academic performance in my class by using the LMS. (parent engagement)			