Middle School Parents' Beliefs Regarding Learning Management System Use in Mathematics

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CHAPTER 1: THE CONTEXT OF LEARNING MANAGEMENT SYSTEM USE IN MATHEMATICS

This research study examined how parents of middle school children used EdLine, a learning management system (LMS), to support their children's autonomous achievement in mathematics. An LMS can provide middle school parents with an online tool for monitoring and promoting their children's academic progress. Although having parents follow and support their children's educational achievement is essential, disparities exist in performance among middle school students in mathematics (Akayuure & Apawu, 2015; Ballón, 2008; Riha, Slate, & Martinez-Garcia, 2013). This research explores a possible causal factor in such disparities by examining how parents use an LMS to support their children in becoming responsible for their learning in mathematics. This research study could lead to social change because learning how parents use an LMS could assist educators in determining additional resources needed to support their children's achievement in mathematics.

In this chapter, I include a brief history of the study. The problem statement and purpose of the study served as a connection between the problem addressed and the focus of the research. The research questions and the conceptual framework for the study explained how Eccles and Wigfield's (2002) expectancy–value theory and Bandura's (2002) social cognitive theory relate to the research and the study's research questions.

Furthermore, I provide a rationale for the nature of the study, including the selection of the design, and I briefly summarize the methodology and how the data was gathered and analyzed. In this section, I include definitions of fundamental concepts and the meanings of terms used; determine assumptions, limitations, and discuss the scope and delimitations of the research; and provide a report on the significance of the study. I end the chapter with a summary that recapitulates the main points of the study.

Background

In middle school, an LMS provides online tools that support teachers and students in the learning process. An LMS also informs parents of their children's academic progress (Emelyanova & Voronina, 2014; Nasser, Cherif, & Romanowski, 2011). A typical LMS contains an interactive learning environment with mediating tools that support interaction, collaboration, training, communication, and sharing information among other LMS users (Dias & Diniz, 2014). Emelyanova and Voronina (2014) and Nasser, Cherif, and Romanowski (2011) found using an LMS to allow the exchange of information between home and school positively affected student performance. LMS technologies relate to many ongoing issues that have an impact on society. An LMS provides additional means for institutions to engage in communicating with parents (Selwyn, Banaji, Hadjithoma-Garstka, & Clark, 2011). Parents use an LMS to gain further insights into their children's development (Muir, 2012). LMSs support middle school students in becoming independent learners (Blau & Hameiri, 2010; Nasser et al., 2011; Selwyn et al., 2011; Strayhorn, 2010; Wood, Costes, & Copping, 2011).

Parents can use an LMS to monitor their children's academic progress in subject areas such as mathematics. Riha et al. (2013) stated that middle school is a crucial period in the educational advancement of adolescents. During this developmental stage, indicators of future academic performance surface. Riha et al. (2013) witnessed that 88% of middle schoolers acquired educational and social issues that followed with their transition to middle school. Middle schoolers need a positive self-perception of scholastic competence (Froiland, Peterson, & Davison, 2013; Riha et al., 2013). Stayhorn (2010) stated that parental involvement in conjunction with supportive teachers and schools that provided opportunities to engage parents in their student's academic learning supported their student's success in mathematics. Vukovic, Roberts, and Wright (2013) indicated that parents influenced achievement for their children in mathematics by reducing levels of their anxiety, especially when their children took higher levels of mathematics classes. Elements that promoted middle school student academic motivation included positive teacher and student relationships, supportive peer relationships, and familiarity with campus goals. Other factors that encouraged academic motivation were a sense of connectedness to the school and autonomous supportive parental involvement (Froiland et al., 2013; Riha et al., 2013; Vukovic, Roberts, & Wright, 2013).

Dias and Diniz (2014) and Kayler and Sullivan (2011) supported the need to examine further the way an LMS influenced learners' profiles, to assimilate the material in the enhancement of its design. Teachers and parents used an LMS to create positive classroom environments that supported risk-taking for both teachers and students (Kayler & Sullivan, 2011). Dias and Diniz (2014) believed the statistical results suggested the influence of definite commonality among the use of distinct communications devices—synchronous (chat) and asynchronous (webmail). The results also indicated the advantages of reciprocal action (student–teacher information sharing), the attainable education (self-regulated learning), and ease of use (accessibility and efficiency in learning; Dias & Diniz 2014). Additional research studies could further enhance the condition of online learning and teaching, in a distinctive blended-learning culture within an LMS setting (Dias & Diniz, 2014).

Problem Statement

Researchers have found that middle school is a crucial period in the academic progression of adolescents, where indicators of their future performance, particularly in mathematics, surface (Riha et al., 2013). A notable shift in compulsory schooling is the expectation that parents play an active role in supporting their adolescent children in learning mathematics (Selwyn et al., 2011). Muir (2012) pointed out that many parents are not familiar with the content their children encounter in mathematics classes, and believe the way their children learn mathematical skills differs from how the parents learned in grade school (Muir, 2012). Mathematical activities parents use at home can support their children's cognitive and affective development (Muir, 2012). A technology platform, such as an LMS, allows parents to help their middle school children progress in learning mathematical concepts (Selwyn et al., 2011). Parents can learn how to use the features and applications on an LMS (Selwyn et al., 2011). Although an LMS has distinct managerial benefits, questions have arisen regarding how efficient the technologies are in supporting parental involvement (Selwyn et al., 2011). A fundamental challenge for parents using an LMS is monitoring their children's progress in academic subjects such as mathematics (Emelyanova, & Voronina, 2014; Nasser et al., 2011). These fundamental challenges affect how stakeholders, including parents, adopt the use of an LMS. Currently, limited studies exist that examine how parents use an LMS to support their children's mathematical achievement (Emelyanova, & Voronina, 2014). More research could show how using an LMS as a tool for monitoring progress in mathematics influences perceptions and potentially encourages parents to utilize the resource.

Purpose of the Study

The purpose of this qualitative case study explored how parents of middle school children used EdLine, an LMS, to support their children's autonomous achievement in mathematics. The intent of the study examined parents' beliefs regarding the pros and cons of using EdLine. An LMS provided functionalities beyond the instructional context such as management tracking, personalized instruction, and facilitative learning using an organizational learning structure to provide support for teaching and learning (Emelyanova, & Voronina, 2014; Nasser et al., 2011). As parents and teachers worked together toward getting students to accept responsibility for their learning, they began to create positive learning environments to support student achievement (Kayler & Sullivan, 2011). Parents, teachers, and students started to work together to deepen their understandings of how technology could support student learning and achievement (Hilton & Canciello, 2018; Kayler & Sullivan, 2011).

Research Questions

1. How do parents use an LMS to support their children's autonomous achievement in middle school mathematics?
2. What are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics?
    (a) How do parents describe the pros of using an LMS to monitor their children's progress in middle school mathematics?
    (b) How do parents describe the cons of using an LMS to monitor their children's progress in middle school mathematics?

Conceptual Framework

For this study, the framework included Eccles and Wigfield's (2002) expectancy–value theory of achievement motivation. The premise of the conceptual framework revealed that as parents instilled values and expectations of success for their children, the children learned to set their expectations for task completion and achievements (Froiland et al., 2013; Wood et al., 2011). The level of achievement motivation was highly dependent on the degree of value

the individual placed on accomplishing a task. The framework also included Bandura's social cognitive theory. Bandura's (2002) theory explored how an individual's environment, cognition, and behavior all interacted to support achievement motivation and determined how an individual will function. An LMS is a tool that children used to help their learning environment by monitoring their academic progress and performance (Froiland et al., 2013; Kaur & Sidhu, 2010; Strayhorn, 2010). An LMS could shape the way parents and their children interacted and communicated with others throughout their lives (Froiland et al., 2013; Kaur & Sidhu, 2010). Chapter 2 gives a thorough explanation.

Using Bandura's theory, researchers found that parents served as mentors who worked consistently as part of their children's development. Parents who held high aspirations for their children's educational progress in mathematics conveyed those goals (Froiland et al., 2013; Strayhorn, 2010). A dialogue with interviews yielded useful information regarding parents' beliefs with the use of an LMS (Creswell, 2013). Qualitative researchers narrowed or broadened their focus by determining the purpose, resources present, the predetermined time allotments, and the level of interest from the parties involved (Patton, 2002). Researchers analyzed parents regarding their frequency and use with the LMS. Creswell (2013) stated that validating the accuracy of a research study is a process that evolved with the research findings and the participants within the study. Qualitative researchers acknowledged, analyzed, and interpreted their data results to validate the accuracy of their research study. Their ideas translated into perspectives and terms that qualitative researchers called validation strategies (Creswell, 2013). Through journaling, parents who had children enrolled in a middle school mathematics class further reflected and described how they incorporated the use of an LMS. Parent participants used journals to refine their ideas and beliefs. Their responses showed how parents are better able to support their children's mathematical progress (Janesick, 2011; Panaoura, 2017).

Nature of the Study

I used a qualitative case study approach to focus on a real-life, contemporary context, or setting (Creswell, 2013; Yin, 2009). Yin (2009) stated that case study researchers used a comprehensive approach to compare multiple sources such as interviews, observations, documents, and audiovisual materials in their totality. Through data collection, a description of the case would emerge where the details were given such as the history of the case, the

chronology of events, or a day-by-day account of the activities of the situation (Creswell, 2013). The researcher would also concentrate and analyze themes to further define and understand the case (Creswell, 2013; Spector, Merrill, van Merriënboer, & Driscoll, 2008; Yin, 2009). My case study took place within a middle school and explored how parents used EdLine, an LMS, to support their adolescent's autonomous attainment in mathematics. The intent of the research examined parents' beliefs regarding the pros and cons of using EdLine. As a triangulated study, there were multiple sources of data collection which included nine face-to-face interviews with parents of middle school children, ranging from 45 to 60 minutes each, to explore how they used the LMS, EdLine, to support their children's autonomous achievement in mathematics. The study also collected data to capture how parents used an LMS to support their children in mathematics and parent reflective journals.

Definitions of Content-Related Terms

- *Expectancy–Value Theory of Achievement Motivation:* Refers to academic tasks that students believe they could accomplish (self-efficacy) and the level students assign for each task worth pursuing to promote and comprehend educational outcomes and achievement behaviors. Parents support their children by instilling values and expectations of success. The children learn to set their expectations for task completion and achievements (Eccles & Wigfield, 2002).
- *Learner Autonomy:* Refers to a student's ability to set accurate learning objectives toward taking control of their learning. Autonomous learners expected teachers to design and manage learning cultures that provided the structure of learner autonomy (Froiland et al., 2013).
- *Learning Management System (LMS):* A technology tool that provides functionalities beyond the instructional context such as management tracking, personalized instruction, and facilitative learning (Nasser et al., 2011).
- *National Center for Education Statistics (NCES):* The primary federal entity that collects and interprets evidence related to educational schooling (NCES, 2013).
- *Open-Ended Interview:* Provides a way of gathering information from people. An interviewer asks questions of a participant, who then answers those questions. The interview is considered open-ended because even though the questions can be

scripted, the interviewer usually does not know how the interviewee will respond (Patton, 2002).

- *Social Cognitive Theory:* Explores how an individual's environment, cognition, and behavior all interact to support achievement motivation and determine how an individual will function (Bandura, 2002).
- *Spreadsheet:* An interactive computer application, manipulated using software such as Microsoft Excel, for organization, analysis, and storage of data in a tabular form (Microsoft, 2016).
- *Audacity:* An open source, cross-platform audio software for multi-track recording and editing (Audacity, 2016).
- *EdLine:* An LMS designed with features for school districts that keep students, parents, teachers, administrators, and families informed about educational events, upcoming academic assignments, and individual student grades (EdLine, 2016).

Assumptions

Regarding parent participant EdLine use, I assumed that all parent participants had an EdLine account to use regularly in supporting their children in mathematics. For this study, I assumed participants provided open and honest feedback regarding their experiences with the use of EdLine to promote their children's progress in mathematics. I assumed parent responses are an accurate representation of each parent's experience with using EdLine as a resource in supporting their children in mathematics. As the researcher, I assumed these functions would work accurately.

Scope and Delimitations

The scope of the case study included nine parent participants with (a) three Grade 6 parents, (b) three Grade 7 parents, and (c) three Grade 8 parents. Parents who were willing to participate completed a parent participation application and emailed the request directly to me. Criterion sampling with purposeful selection was the method I used for selecting parent participants. The sampling strategy added a critical component to an information management system that is typical of quality assurance efforts (Maxwell, 2013; Patton, 2002). The study included parent participants who engaged actively in their adolescent's

learning and promoted using school resources such as EdLine to monitor their children's academic progress. For the middle school parent interviews, the sample of parent participants explained how they use EdLine to monitor and support their children's progress in mathematics. Each parent participant entered information on an EdLine data spreadsheet that captured other patterns of LMS usage. Parent participants also maintained a reflective journal to achieve how they used EdLine to support their children in mathematics. In gathering information through parent participant interviews, EdLine data spreadsheets, and parent reflection journals, I strengthened the precision, validity, stability, and trustworthiness from the research findings (Miles, Huberman, & Saldaña, 2014). The data collection and analysis from the study relied solely on the perceptions of individual middle school parents. Delimitations for the examination included aspects that influenced each participant's level of parental support. Prior experience, home life, and peer and social interactions could significantly affect each parent's capacity to support their children's autonomous achievement in middle school mathematics. The parent participants' perceptions were subjective and reflected each parent participant's experience in using EdLine as a resource or technological tool to support and monitor his or her child's progress in mathematics.

Limitations

Limitations of case studies include restrictions on the number of available cases due to cost considerations, ethical constraints, the natural occurrence of the phenomenon, or data gathering techniques available (Bengtsson, 1999). Some groups of parents may not have had Internet access to set up an EdLine account. The different aspects of how parents used EdLine required adaptations to the way data was gathered (Bengtsson, 1999). For my study, each parent had varying levels of experience with using EdLine features. As a result, adaptations were made to conduct the parent participant interviews, gathering information from the parent participant EdLine spreadsheets, and gathering information from the parent reflection journals. The generalizability of findings from the case study are limited to parents within the middle school setting and may not occur in other settings. However, EdLine as an LMS had specific access requirements for further comfort with online and written communication use. The cases were limited to the community of parents who have children attending the middle school. Although high school parents also used EdLine to support their children, the focus of this study emphasized middle school parents' beliefs with the use of EdLine as their children transitioned through their adolescent development in middle school.

Significance

Research focusing on LMS integration to support children's autonomous achievement in mathematics opened new implications for the impact of positive social change. At the individual level, an LMS allowed families and mathematics instructors to collaborate and support the learner's progress. The interaction between parents and teachers encouraged open lines of communication. At the community level, the symmetrical interactive applications among parents and mathematics teachers would allow schools to build and maintain networking relationships within their organization (Blau & Hameirie, 2010; Selwyn et al., 2011). The online pedagogical interaction and communication between teachers, parents, and their children could create a society of purposeful discussions regarding individual student mathematical data and achievement. The culture could allow all parents to gain access to their children's progress in mathematics with daily data from teachers regarding the mathematics topics, educational materials, homework, and information regarding their children's attendance, discipline, homework preparation, and grades. The school organization promoted direct interactions among mathematics teachers, parents, and students (Blau & Hameirie, 2010; Selwyn et al., 2011). Further research with the integration of LMSs in K–12 school settings for mathematics could provide a catalyst where parents and learners received the learning tools for being responsive. They could become empowered to participate more effectively in online learning experiences (Kaur & Sidhu, 2010). School officials and technology providers could examine the value of educational professionals that included learners and parents participating in the application of the change with technology (Blau & Hameirie, 2010)

Summary

This chapter examined how parents of middle school children used EdLine, an LMS, to support their adolescent's autonomous achievement in mathematics. An LMS provides middle school parents with an online tool for monitoring and promotes their children's academic progress. In middle school, the LMS offered online tools that supported teachers and students in the learning process. The LMS also informed parents of their children's academic progress (Emelyanova & Voronina, 2014; Nasser et al., 2011). Middle school is a point in the academic progression of adolescents where indicators of future academic performance surface (Riha et al., 2013). Parents can play an active role in advocating for their

adolescent's learning (Selwyn et al., 2011). There are few studies that examine how parents use LMSs to support their children's achievement (Nasser et al., 2011). More research could show how using an LMS as a tool for monitoring progress in mathematics influences perceptions and encourages parents to utilize this resource.

This study used qualitative methodology with a case study approach. A case study as a dissertation inquiry focused on an issue, but I selected multiple data sources to illustrate the point (Creswell, 2013). I explored a setting or context and used a comprehensive approach to compare data sources in their totality. As a triangulated study, the methods of data collection included parent participant interviews, a parent participant EdLine spreadsheet, and a parent participant reflective journal. The framework for this study included the expectancy–value theory of achievement motivation (Eccles & Wigfield, 2002). As parents instilled values and expectations of success for their children, the children learned to set their expectations for task completion and achievements (Froiland et al., 2013; Wood et al., 2011). The framework also included Bandura's (2002) social cognitive theory. Bandura's theory explores how an individual's environment, cognition, and behavior interact to support achievement motivation and determine how an individual will function. In Chapter 2, I provide a comprehensive study of the conceptual framework, the research related to theories, and a literature review that guides the research about how the LMS, EdLine, offered middle school parents an online tool for monitoring and supporting their children's academic progress.

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CHAPTER 2: THE LITERATURE REVIEW OF LEARNING MANAGEMENT SYSTEM USE IN MATHEMATICS

The purpose of this study explored how parents of middle school children used an LMS support their children's autonomous achievement in mathematics. The study also examined parents' beliefs regarding the pros and cons of using the LMS EdLine. An LMS could provide functionalities beyond the instructional context such as management tracking, personalized instruction, and facilitative learning. An LMS used an organizational learning structure that provided support for teaching and learning (Nasser et al., 2011). Nasser et al. (2011) further examined parents' beliefs regarding the use of an LMS. This study addressed that need by examining parents' beliefs regarding the use of an LMS in middle school mathematics.

The literature review began with an examination of the conceptual framework including the expectancy-value theory of achievement motivation (Eccles & Wigfield, 2002) and social cognitive theory (Bandura, 2002). The review included an historical overview of middle school program development and examined parental mathematical achievement expectations. Within the report, there were strategies and standards to support middle school students in mathematical achievement. The study also included an examination of how parents encouraged their children's mathematical performance in middle school. The literature review described how school stakeholders used an LMS to support student achievement and explained how autonomous-supportive learning environments associated with behaviors that facilitated student learning.

Literature Search Strategies

The strategies employed in conducting this literature review included selecting articles from peer-reviewed journals, as well as from other scholarly publications, such as books, periodicals, doctoral dissertations, professional conferences, and reports. Research in

various fields such as education, psychology, and sociology helped to connect with educational materials related to the topic for this current study. Relevant scholarly or peer-reviewed journal articles came from databases and other publications used. The databases and resources included Academic Search Premier, EBSCOhost, Education Research Complete, the Educational Resource Information Center (ERIC), Google Classroom, SocIndex, and Thoreau Multi-Database Search.

To assure saturation in the literature search, I explored educational and organizational websites. Literature resources included The National Middle School Association (NMSA), and The National Assessment of Educational Progress (NAEP). Other literature resources included The American Educational Research Association (AERA), The National Center for Education Statistics (NCES), The American College Testing (ACT), and The Scholastic Aptitude Test (SAT). Keywords and phrases used through the Boolean search engine included: Learning Management Systems, middle school reform, school mathematics achievement, parent perceptions of middle school mathematics, parent perceptions with using an LMS, learner autonomy, self-efficacy, and student motivation. Other keywords included the history of mathematics, mathematics reform, mathematics achievement, mathematics education, and adults' perception of mathematics. Additional keyword terms included adults' mathematical self-efficacy, adults' perception self-efficacy for mathematics, middle school students' perception of teachers, teachers' perception of middle school students, the value of self-efficacy in teaching, National Assessment of Educational Progress, No Child Left Behind, and Common Core State Standards (CCSS).

Conceptual Framework

My study examined how parents used an LMS to support their student's attainment in mathematics. As part of the conceptual framework, the study used Eccles and Wigfield's (2002) expectancy-value theory of achievement motivation and Bandura's (2002) social cognitive theory. The conceptual framework allowed students to gauge or interpret their task-values of performance and expectancies for success. The conceptual framework showed how an individual's environment, cognition, and behavior related to their ability to stay motivated, achieve, and function. According to the conceptual framework, parents modeled practices to instill values so that their children can set expectations for success.

Supporting Eccles and Wigfield's Expectancy-Value Theory

Eccles and Wigfield (2002) have conducted several research investigations to support children including adolescents with their development to have values that are subjective, beliefs in their ability, and the expectation to succeed (Eccles & Wigfield, 2002; Wigfield, 1994). Studies to form the expectancy-value theory included a longitudinal research study that focused on gender differences in beliefs with academic achievement and included values regarding English and mathematics learning among adolescents in fifth through twelfth grade. Additional studies focused on how students were transitioning from elementary school to middle school and how student's values and beliefs changed through social activities, academic subjects, and sports. An added longitudinal study lasting ten years focused on how children's views in achievement and their values varied as the children progressed through primary and secondary school (Wigfield & Eccles, 2000).

In each study, learners completed questionnaires that showed how adolescents subjective values, expectations for success, and beliefs in their ability changed from year to year; and how their beliefs and values related to student performance and assignment selection. The findings showed how change impacted the structure of student's values and ideas related to their ability; and difference measured at the mean level of adolescents with values and beliefs associated to their ability (Wigfield & Eccles, 2000). The expectancy-value theory indicated that beliefs with ability, the assumption to succeed, and the different expectations with task values could provide separate constructs that were distinct in children's minds (Wigfield & Eccles, 2000). Harter (1981) found that learners first had immense comprehensions that they were smart or not intelligent and later developed a better sense of ability for specific activities. Wigfield and Eccles (2000) centered on the differentiation of learners' knowledge with their beliefs, their expectations for success, and their subjective task values. An example depicting an ability belief item included students rating their proficiency in mathematics or comparing their performance in mathematics class to the performance of the best and worst performing students (Wigfield & Eccles, 2000).

Examples of expectancy items included how well a student expected to do in mathematics during the year and how well a student planned to do with learning a new concept in mathematics class (Wigfield & Eccles, 2000). Subjective task values included the term,

usefulness or when a student discovered an idea from school that applied outside of education such as learning how plants grew in a garden (Wigfield & Eccles, 2000).

Wigfield and Eccles (2000) analyzed data from the three studies, using confirmatory factor analyses (CFA). CFA allowed the examiner to theoretically test imitative hypotheses about the build of specific variables and approved for a definitive comparing of different surrogate models (Freeman & Bordia, 2001; Wigfield & Eccles, 200). The results showed that young people had ability beliefs and expectancies during early childhood and adolescent years (Eccles et al., 1993; Wigfield & Eccles, 2002). Expectancies and beliefs with ability did not appear to be experimentally different (Wigfield & Eccles, 2002). However, adolescent learners had beliefs that could relate to their capabilities and acceptance of their expectancy that was domain specific (Wigfield & Eccles, 2002). An example includes Eccles et al. (1993) who assessed first-grade learner's beliefs with the ability and their expectancies to succeed in the domains of mathematics, reading, sports, and music. The CFA showed learner's beliefs among domain developed specific circumstances characterized by measured beliefs with the ability and the expectancy to succeed (Wigfield & Eccles, 2002). Wigfield and Eccles (2000) examined if the utility value, interest, and attainment expressions of adolescents featured by Eccles et al. (1983) was distinguishable scientifically in the discipline of mathematics.

The CFA showed that the three task value factors clearly distinguished younger adolescents in grades five through seven, whereas older adolescents in grades eight through twelve showed no differences (Eccles et al., 1983; Freeman & Bordia, 2001). Wigfield (1994) concluded that during learners' younger elementary school years, their subjective beliefs and values differentiated less. Utility-importance and interest emerged in the CFAs of learners' answers to items in the mathematics, reading, and sports domains (Wigfield & Eccles, 2000). Learners' beliefs related to their ability discerned from other activities, although from a given event their beliefs related to their ability and expectancies to succeed factored together (Wigfield & Eccles, 2000). Their ability beliefs and expectancy constructs were highly connected empirically (Wigfield & Eccles, 2000). However, different components of subjective values were identifiable through empirical studies (Wigfield & Eccles, 2000). The effort reviewed for the expectancy-value theory revealed that younger learners constructed diverse beliefs related to their ability and values that were subjective (Wigfield & Eccles, 2000).

Stipek and Mac Iver (1989) revealed in their cross-sectional research that younger learners had better achievement-related beliefs that were positive. Eccles et al. (1993) stated that decreases in learner's beliefs were acquainted with their ability over their primary school years, especially in domains related to academic achievement. Wigfield et al. (1997) also found that learners' beliefs associated to their ability for reading, instrumental music, mathematics, and sports declined through primary school years and could continue into secondary school and across into college school years.

Wigfield and Eccles (2000) also compared learners' self-efficacy development through all three studies. Learners' self-efficacy to read and write increased among seventh and tenth-grade students when compared to fourth-grade students. Shell, Colvin, and Bruning (1995) took measures of self-efficacy and asked students how certain they believed in their ability to complete increasingly difficult reading and writing tasks. They found that students' beliefs in efficacy increased if their sense to compare to other students decreased (Brouwers, Evers, & Tomic, 200; Shell, Colvin, & Bruning, 1995; Wigfield & Eccles, 2000).

The ten-year longitudinal study showed how learners' beliefs related to their achievement and values changed through the development and displayed how students' subjective values declined (Eccles et al., 1993). Wigfield et al. (1997) further studied changes on how learners' beliefs about the importance and usefulness of pursuing interests in studies related to mathematics, instrumental music, reading, and sports activities decreased through the duration of three years. However, only interest students had in reading and instrumental music declined; their curiosity in mathematics and athletics remained the same (Earley, 1994; Eccles et al., 1993). The findings described the essence of examining the different aspects of learner's subjective values with different activities.

Eccles et al. (1993) and Wigfield et al. (1997) discovered that during the transition to middle school, learner's ratings of both the importance of English and mathematics decreased. In mathematics, learners' importance ratings continued to decline through seventh grade, whereas their importance ratings of English increased somewhat through seventh grade. During their high school years, however, learners again began to value the significance of performing well in academic subjects including mathematics and English (Eccles et al., 1993; Wigfield et al., 1997).

During early adolescence, learners attained negative beliefs related to their ability and values (Hutchinson, Sherman, Martinovic, & Tenenbaum, 2008; Wigfield & Eccles, 2000). Learners believed they were not as competent to conduct activities but often felt less value for those activities (Wigfield & Eccles, 2000). Learners increased in their ability to understand and interpret the evaluative feedback they attained which resulted in engaged social comparison activities with their peers (Hutchinson et al., 2008; Wigfield & Eccles, 2000). Thus, many learners could realistically self-assess their abilities more accurately (Earley, 1994; Stipek & Mac Iver, 1989). The school culture also changed to make evaluation more pertinent and competitiveness among learners likely to occur, thus decreasing some learner's attainment beliefs (Stipek, 1996; Wigfield & Eccles, 2000).

Children and adolescent's beliefs related to their ability and task-completion values also predicted choices made and performance (Brouwers, Evers, & Tomic, 2001; Wigfield & Eccles, 2000). Wigfield and Eccles (2000) first study on achievement and gender differences showed key findings that emerged from their analyses. First, when controlling performance, learner's beliefs regarding their ability and expectation for their success produced indicators of grades in mathematics (Wigfield & Eccles, 2000). Second, learner's task values that were subjective also showed the strongest indicators of learner's intentions to continue taking mathematics courses (Wigfield & Eccles, 2000).

In general, a learner determined their subjective task value by predetermining the characteristics for accomplishing a task (Hutchinson et al., 2008; Eccles, O'Neill, & Wigfield, 2005). The learner also assessed other significant aspirations, ambitions, values, inspirational affiliations for performing the task, and emotional memories the learner assigned with similar tasks from the past (Eccles, O'Neill, & Wigfield, 2005). The degree to which a learner could fulfill a task confirmed the central aspects of a person's self-schemata (Eccles, O'Neill, & Wigfield, 2005). Fulfilling an accomplishment also facilitated a learner's ability to reach their goals, affirmed their values, and elicited positive versus negative affective associations that influenced the assigned value a learner attached to engaging in that task (Eccles, O'Neill, & Wigfield, 2005).

Wigfield and Eccles' (2000) first study provided an example of children's subjective task values. Seventh and ninth graders' beliefs in their ability and progress in mathematics during their first-year predicted their beliefs in achievement and performance for the

second year (Meece, Wigfield, & Eccles, 1990). The second-year beliefs in achievement included expectancies for success, perceived importance of mathematics, anxiety in mathematics, and intent to take more mathematics courses. Meece, Wigfield, and Eccles (1990) found through structural equation strategies that first-year beliefs with ability positively predicted second-year expectancies for success and prevented mathematics anxiety. Learners' expectancy to succeed supported mathematics achievement (Meece et al., 1990).

The expectation for learners to succeed, subjective task values, and beliefs in their ability, worked towards the development of the expectancy-value model of motivation (Eccles & Wigfield, 2000). In comparing these constructs to related constructs in the motivation field, a critical issue for further studies was to conduct other valid research (Eccles & Wigfield, 2000). The studies tested additional similarities and differences, especially among constructs related to ability (Eccles & Wigfield, 2000). Research should continue to address how learner's beliefs compared to their knowledge, and subjective values developed through the school years and related to their choice and performance (Eccles & Wigfield, 2000).

The ten-year longitudinal study showed what adolescents believed about their competence in mathematics and expectations for success in mathematics could strongly predict their consequential mathematics marks (Wigfield, 1994). Expectancies could enhance when students gained opportunities to succeed in different areas (Bembennutty, 2012). They could focus on their improvement that could result in successful performance (Bembennutty, 2012). The value that students had regarding mathematics courses could strongly predict their expectations to continue having advanced mathematical courses during high school (Eccles & Wigfield, 2002; Wigfield, 1994).

Expectancy-Value Theory

Research on motivation with achievement attempted to clarify learner's choices of achievement, persistence, perseverance to follow-up on tasks, and included task performance (Wigfield, 1994; Wigfield & Eccles, 2000). A plethora of models developed by motivation theorists attempted to explore how motivation influenced the choice of achievement, performance, and persistence (Wigfield & Eccles, 2000). Atkinson (1957) and Atkinson (1964) created an official, mathematical expectancy-value design of accomplishment

incentives to describe various kinds of behaviors that related to achievement. These attempts included models to strive for success, select among tasks of accomplishment, and perseverance.

Atkinson (1957) thought that incentives to succeed comparatively balanced frames of mind and contained both incentives to access accomplishments and considerations to evade deficiencies in theory. He also emphasized that individual identification took place through the tenacity of accession and evasion of deficiencies. Atkinson (1957) defined an individual's expectancy for success as the prediction the individual could accomplish an assignment successfully. He defined incentive value as the corresponding allurement to succeed on a given assignment for achievement and emphasized that incentive value had an inverse relationship that corresponded to the possibility of success. Thus, for Atkinson, expectations and values were linked to accomplishing certain assignments instead of being linked to general tendencies (Wigfield & Cambria, 2010). Further, the reverse partnership between expectancies and values meant that tasks that were valued were tasks that individuals thought were difficult to complete (Atkinson, 1964; Wigfield & Cambria, 2010; Wigfield & Eccles, 1992).

Atkinson (1957) stated that behaviors in achievement developed through accomplishment incentives, expectations to succeed, and standards of motivation. Accomplishment incentives were comparably solid frames of mind that included both an excuse to an approach for accomplishment and an incentive to avoid a deficiency (Atkinson, 1957). Atkinson (1957) believed that individual descriptions were through the corresponding fortitude of their access to succeed and prevent weaknesses (Atkinson, 1957). He also found that incentives for accomplishments represented the person's expectation of accomplishing an assignment (Atkinson, 1957). Modern expectancy-value theories assimilated through Atkinson's (1957, 1964) work that linked performance achievement, persistence, and selection most directly to learners' expectancy-related work and assignment value beliefs (Wigfield & Cambria, 2010). However, the views differed from Atkinson's expectancy-value theory in multiple ways (Wigfield & Cambria, 2010). First, expectancy and value components combined with a more-dense pattern of psychological, social, and cultural components (Wigfield & Cambria, 2010). Second, the models tested were in real-world achievement scenarios rather than with the temporary assignments that were used to compare Atkinson's theory (Wigfield & Cambria, 2010).

Eccles and Wigfield's (2002) development of the expectancy-value model of success provided an understanding of early adolescents' areas of development, choice, and progress in the domain of mathematical achievement. The expectancy-value theory included motivational influences on individuals' performance on different attainment activities and their choices of which activities to pursue. Bembennutty (2012) stated that the most unequivocal influences on outcomes and choice were the beliefs individuals had about their ability in different areas.

The level of achievement motivation was highly dependent on the degree of value the individual placed on accomplishing an assignment (Eccles & Wigfield, 2002; Pekrun, 1993). The expectancy-value model of success provided a structure to understand learners' abilities to perform tasks. Tasks related to expectancies for success and the instinctive value students attached to success on those assignments. The learners became engaged in task-oriented activities that stimulated their motivation to begin setting expectations for task completion and achievement (Eccles & Wigfield, 2002; Froiland et al., 2013; Wigfield, 1994; Wood et al., 2011).

Expectancies

Expectancies represented individuals' preconceptions that their progress pursued was either a triumph or downfall (Wigfield, 1994). In the expectancy-value model, personal or efficacy expectations along with outcome expectations were part of the model. Expectancies allowed individuals to develop their sense of control over outcomes (Eccles & Wigfield, 2002). Every individual's beliefs were related to the question, "Can I do this task?" (Eccles & Wigfield, 2002, p. 115). Individuals engaged in different activities that supported values in achievement, interests that dealt with intrinsic and extrinsic motivation, and goals (Eccles & Wigfield, 2002). Eccles and Wigfield (2002) stated that people needed compelling reasons for accomplishing a task. Individuals were intrinsically motivated when they willingly participated and engaged in activities on their own (Eccles & Wigfield, 2002). Individuals who were extrinsically motivated became involved in assignments for individual or other reasons, such as achieving a reward (Eccles & Wigfield, 2002). The individuals integrated expectancy and value constructs that linked motivational and cognitive practices to support self-regulatory practices and promoted their self-efficacy (Eccles & Wigfield, 2002).

Self-Efficacy Beliefs

Self-efficacy beliefs played a role in personal encouragement and attitude as a central focal point of theoretical viewpoints other than viewpoints affiliated with social cognitive theory. Numerous findings supported the dissension among social cognitive theorists regarding the expectation of self-efficacy, but they also helped the assertions of other expectancy theorists (Kuhn, 1970; Multon, Brown, & Lent, 1991). Bandura (1997) characterized expectancies with his point of view on self-efficacy. He defined the differences between expectations on efficacy and outcome expectations. Efficacy expectations described were beliefs that a person could complete a task, and outcome expectations related were beliefs that actions would support an outcome (Pajares, 1996). Bandura (1997) characterized self-efficacy as a person's assurance in their abilities to proceed and accomplish an assignment. He defined self-efficacy as a multifaceted construct that varied in generality, vigor, and level of complexity (Eccles & Wigfield, 2002; Pekrun, 2000). As a result, some people had beliefs regarding their efficacy that encompassed many situations while different people had more narrowed conventional systems. Whereas there were people who believed they were efficacious during the most challenging assignments, other people thought they were competent only on easier assignments (Eccles & Wigfield, 2002).

Bandura (1997) believed self-efficacy should measure specific beliefs that related to behavior, whereas, Pajares (1996) compared self-efficacy to constructs that were connected. Self-efficacy measures taken were at a specific-task level. The tasks typically allowed learners to report their confidence in accomplishing tasks. Bandura (1997) distinguished between individual's self-efficacy beliefs about task accomplishments and expectancy beliefs. By self-reflecting, individuals could assess their responses to various actions (Bandura, 1986; Bandura, 1997).

Self-efficacy beliefs permitted individuals intuitively to interact in the performance, describe the results of their responses, use the explanations to design and establish acceptance about their capacity to communicate in successive performances in comparable disciplines and respond in concert with new acceptances developed (Bandura, 1986). A school is a model where the self-efficacy acceptances that students developed regarding their learning capacities helped to prescribe what occurred with the experience and accomplishments they learned. Their learning attainments were in part the result of what they came to interpret what

they had accomplished and could attain (Bandura, 1986). Self-efficacy beliefs explained why learners' student accomplishments differed when they had comparable skills (Bandura, 1986). Pintrich and De Groot (1990) suggested that student's self-efficacy beliefs played a moderate act in cognitive collaboration and could support elevated adoptions of cognitive procedures that also led to improved student attainments.

Historically, Bandura (1997) thought that expectancy–value theorists concentrated on expectation beliefs and beliefs that focused on self-efficacy as increasingly predictive of choice and progress than were expectation beliefs. What people knew about their skills or previous accomplishments were not always good predictors of subsequent attainments (Bandura, 1986). People could attain achievements above their capacities directly by presuming that they could (Bandura, 1986). Bandura (1986) stated that adequate functioning required harmony between self-beliefs, skills, and knowledge. Knowledge of self-capacity helped distinguish what learners did with their acquired abilities and accomplishments (Bandura, 1986).

Wigfield and Eccles (2000) could relate with Bandura's suggestion that efficacy beliefs were increasingly predictive of student progress and choice. They believed that their work could measure expectations for success, instead of expectations on performance (Wigfield, 1994; Wigfield & Eccles, 2000). Thus, Eccles and Wigfield's expectancy model was increasingly like Bandura's expectations with efficacy model than it was to the expectations with outcomes model (Wigfield & Eccles, 2000).

An issue that individuals had considered was how to judge their abilities (Eccles & Wigfield, 2000). There mainly was no criterion assignment described, as examiners aimed to recognize the essence of the exchange among incentive descriptions in the lack of achievement accomplishments (Pajares, 1996). Self-efficacy theorists such as Harter (1981) and Marsh (1989) tended to center their focus on beliefs from individuals about their confidence in completing different tasks. Another approach would be for researchers to ask individuals to distinguish their efficacy to the efficacy of other people (Bandura, 1997; Pajares, 1996).

Some self-efficacy appraisals reflected comprehensive behaviors regarding capacities with no comparability to the assignment that was correlated (Pajares, 1996; Stajkovic & Lee, 2001). In other research, perceptions of assurance that barred a glance of comparability to beliefs of

self-efficacy could replace more appropriate particularized measures (Benight, Swift, Sanger, Smith, & Zeppelin 1999; Haciomeroglu, 2019; Pajares, 1996). Pajares (1996) pointed out that as researchers measured efficacy beliefs at the optimal level of specificity, the criteria should be worded as "can" which demonstrated a perception of ability, instead of "will" which demonstrated a testimony of motive (p. 554). Eccles et al. (1983) measured and distinguished expectations for success as learners' beliefs in their ability about their progress on future tasks, either in the long-term or immediate future. Believing in one's ability described an individual's perception or capacity with a given task (Eccles & Wigfield, 2000). Believing in one's ability also supported how people acquired knowledge and skills (Eccles & Wigfield, 2000).

Ability Beliefs

Eccles and Wigfield's (2002) expectancy-value model of motivation theory was essential to other beliefs which also included ability beliefs. Ability beliefs conceptually distinguished expectations for success, beliefs that focused on current ability, and expectations that concentrated on future progress. However, scientifically these models were increasingly related (Eccles et al., 1993; Eccles & Wigfield, 2000; Pekrun, 2006). Ability beliefs referred to learners' observations of their competence in assigned areas. The definition of these models varied some from perspectives that were theoretical. A significant distinction between measures was the specificity level of measurement. Thus, researchers had often measured beliefs related to ability in somewhat different ways.

Weiner (1992) along with his colleagues could identify effort, ability, assignment challenges, and luck were critical to attainment. The attribution classifications set were into three causal dimensions including stability, the arrangement of regulation, and control. The arrangement of regulation dimension illustrated two priorities which included internal versus external arrangements of regulation. The stability dimension captured if causes changed over time (Eccles & Wigfield, 2002). The control dimension contrasted reasons that one could control, such as skill-efficacy, and causes one could not control, such as mood, level of aptitude, others' actions, and luck (Eccles & Wigfield, 2002). Weiner (1992) along with his comrades demonstrated how causal dimensions influenced individuals' expectations to succeed by linking an achievement to an actual explanation such as capacity or accomplishment (Eccles & Wigfield, 2002).

Ability beliefs also played a prominent role in promoting student motivation. Weiner's (1985) attribution theory suggested that individuals would envision their capacities as a sufficient and firm characteristic where attributions occurred through knowledge or lack of skill. Weiner (1985) believed that individual causal attributions for achievement skills helped regulate consecutive attainment aspirations and, as a result, were vital to inspirational expectations. Weiner (1985) also reported that an attribute to success in ability had an increasingly positive motivational consequence, whereas a quality of failure had an increasingly adverse effect.

In his self-worth model, Covington (1992) also provided ideas regarding individuals' ability beliefs. He argued that people attempted to maintain a sense of ability that was positive and preserved their perception of self-worth. Like Weiner, Covington centered his focus on an ability perceived as a firm and accountable capacity. He also noted distinctions in development among individuals' and their conceptions of ability (Musu-Gillette, Wigfield, Harring, & Eccles, 2014; Pekrun, 2009; Wigfield & Eccles, 2000).

Covington (1992) asserted that a critical method of maintaining an impression of self-worth was to guard a person's impression of scholarly competence. That was, students needed to believe they were efficient as valued scholars within a school setting. Therefore, students tried heightening, or at a minimum, guarding, their impressions at being competent. A strategy to support completing an assignment was to designate causal attributions that enhanced a learner's impression of scholastic control and competence (Covington, 1992; Musu-Gillette, Wigfield, Harring, & Eccles, 2014).

Assigning failure to any loss of capacity was a questionable acknowledgment that learners favored avoiding (Eccles & Wigfield, 2002). Some students avoided defeat by "simply not trying" (Covington, 1992, p. 74). Other students sacrificed their chances for success by settling for failure. In doing so, they could salvage their reputation for demonstrating ability (Covington, 1992). An example includes a student striving for an unattainable goal that invited failure. Even though the student failed, they demonstrated "failure with honor" (Covington, 1992, p. 74). The odds are against the student being able to succeed (Covington, 1992).

Covington (1992) found that students preferred their ability, more so than effort. Students preferred and believed their ability contributed towards an individual's feelings of self-worth and well-being (Covington, 1992). Covington (1992) stated that multiple students developed strategies to avoid any lack of their ability. These procedures included making justifications, procrastination, not trying, and quitting. Covington (1992) stated that effort was a "double-edged sword" (p. 78). Putting forth effort was an ingredient for attainment and was promoted by family members and instructors.

However, if learners failed, it was complicated not to accept the outcome that the learners lacked the skills for success (Eccles & Wigfield, 2002). Therefore, if failure seemed likely, some children would not try because trying and failing threatened their ability self-concepts (Eccles & Wigfield, 2002). Covington (1992) also discussed how progressive students could advert failure. Instead of responding to and putting forth the effort to complete rigorous tasks, these learners would avoid completing the assignment as a measure to preserve their impression of capacity (Eccles & Wigfield, 2002). Covington (1992) and Eccles and Wigfield (2002) recommended reducing the frequency and focusing on effort allowed more students to keep and maintain their self-worth without having to resort to failure- strategies of avoidance.

Weiner's (1985) attribution model and Covington's (1992) self-worth model provided ability beliefs or constructs that supported the model of expectancy–value of motivation. The beliefs measured varied among theory, especially about accuracy and exact expectations with an ability (Eccles & Wigfield, 2000). The differences displayed an implication for when investigators choose measures for advanced work on beliefs related to ability, were carefully considered on specifics wanted and measured aspects of ability they perceived as most interesting (Eccles & Wigfield, 2000).

Ability beliefs described a person's viewpoint of present assurance of completing an assigned task (Eccles & Wigfield, 2002). Whereas, expectations to succeed were beliefs regarding their progress on a future assignment (Eccles & Wigfield, 2002). In the expectancy-value model, ability beliefs were about confidence in each domain and contrasted learners' expectations of accomplishing on an upcoming assignment (Wigfield, 1994). Wigfield and Eccles (2000) agreed that these constructs were highly related.

Learner's ability beliefs influenced their self-schemata and goals in achievement. Learner's expectations promoted assigned values that supported their self-competence (Wigfield, Tonks, & Klauda, 2009). Their perceptions of other people's attitudes and expectations were also influenced (Latterell & Wilson, 2016; Wigfield, Tonks, & Klauda, 2009). What further contributed to student self-efficacy, motivation, and achievement were the value students attained through accomplishing an academic task (Eccles & Wigfield, 2002). The expectancy-value model theory consistently considered any influences of subjective values and expectations with beliefs on different types of behavior that related to achievement and could influence people's involvement to work on an assignment (Wigfield, 1994).

Elements of Achievement Task-Values

Values represented an individual's attraction to succeed or fail a task (Wigfield, 1994). Higgins (2007) defined value as the intellectual attainment of appeal to or repelled by matter or experience. According to Eccles and Wigfield (2002), values had both an active and more specific definition. Values as beliefs were about desirable end states (Wigfield, 1994). Placing value in something meant wanting to acquire it (Wigfield, Tonks, & Klauda, 2009). Wigfield (1994) pointed out the four main elements of subjective values were significant to individual involvement and supported an amount of attainment with importance, utility value or suitability of an assignment, intrinsic value, along with cost. The elements of subjective value allowed students to attain their accomplishment and supported their acceptance of their skills and competence (Wigfield, 1994).

The first element was attainment value which referred to the credibility of succeeding on an assignment. According to Wigfield (1994), the value of attainment was the credibility learners attached to a task that related to their identity and values or their confidence in each domain. As an example, students who prided their ability to be active learners sought confirmation through test scores and assignment grades. These learners were inspired to achieve their outcomes to solidify their self-esteem. Parents and educators could personalize students' educational opportunities by supporting learners with investing in their learning experiences (Wigfield, 1994).

The second element was the intrinsic value or the enjoyment a student gained from completing a task. Intrinsic value was the joy or individual gain from doing a task (Wigfield,

1994). Intrinsic motivation traditionally was at the heart of ethics (Wigfield, 1994). The intrinsic value of something was said to be the value that thing had "in itself" (Wigfield, 1994, p. 52). Intrinsic value was also the value that thing had "for its sake . . . As such," or "in its right." (Wigfield, 1994, p. 52). When people completed assignments valued intrinsically, their psychological consequences were positive and became vital for them (Wigfield & Eccles, 2000).

The third element was utility value. Utility value referred to the value placed on completing the work. Utility value related to how an assignment would fit with a learner's program. An example was registering for a mathematics course to support a prerequisite towards receiving a degree in science (Wigfield, 1994). Utility value was a value assigned to a task of anticipated performance. When considering a new assignment, individuals took the time to determine if the utility value was significant towards fulfilling the requirement (Wigfield, 1994).

The fourth element was the cost. Cost referred to what the learner would sacrifice or "give-up" to accomplish an assignment (Wigfield, 1994, p. 52). For example, cost occurred when a student chose to do their mathematics homework versus calling their friend (Wigfield, 1994). Cost also included the anticipation of effort a student would need to put into task completion (Wigfield, 1994).

Intrinsic Value vs. Utility Value

Within the four main elements of subjective value, Wigfield and Eccles (2000) had further reviewed models that were simulated other intrinsic and utility value models. Intrinsic value included interest value with a construct like intrinsic motivation were doing an assignment was for the joy and interest in completing the assignment (Deci & Ryan, 1985; Deci, Vallerand, Pelletier, & Ryan, 1991; Harter, 1981). Utility value supported external factors for engaging in an assignment, to accomplish the desired outcome.

This model aligned with the extrinsic model of motivation (Deci & Ryan, 1985; Harter, 1981). Potential combinations could occur among these models. It was important to emphasize that intrinsic value and extrinsic value of interest came from perspectives that were theoretical with different intellectual aspects (Deci & Ryan, 1985; Harter, 1981).

Intrinsic Value as an Element of Subjective Value

The intrinsic value of an element of subjective value allowed students to interpret the functional significance of the environment (Deci & Ryan, 1985; Harter, 1981). The intrinsic value of an element also played a significant role for learners feeling a sense of self-determination (Deci & Ryan, 1985; Harter, 1981). Students' attained intrinsic value from the expectancy-value model by interpreting their experience depending on prior experiences or motivational orientation (Deci & Ryan, 1985; Harter, 1981).

Each student's intrinsic motivation to do well in subject areas such as mathematics could partly be due to a more enduring "causality orientation" (Deci & Ryan, 1985, p. 59). Their sense of intrinsic motivation caused the cumulative effects of motivationally relevant experiences. Students had a psychological, innate need for ability, self-determination, and accordance (Deci & Ryan, 1985). The essential desire and conciliation accrued due to activities that were engaging and entertaining (Deci & Ryan, 1985). As a result, individuals completed tasks they found that were engaging. There existed utility value that was practical and focused on assignments and their potential intrinsic interest, that led towards improved assignment selection and design to enhance engagement (Deci & Ryan, 1985).

Self-Determination Theory (SDT)

Deci and Ryan (1985) claimed even though humans endowed liberally with intrinsic motivational tendencies, the propensity or expectancies for success appeared only under specifiable conditions. The emphasis was on circumstances that elicited, sustained, and enhanced a specific type of engagement instead of conditions that subdued or diminished participation (Deci & Ryan, 1985). Deci and Ryan (1985) introduced self-determination theory (SDT) that framed and specifically addressed environmental and social factors. SDT allowed learners to discuss instead of undermining their inherent motivation. SDT reflected the presumption that internal motivation was a presupposition organismic propensity that catalyzed when learners were in environments that were conducive towards its explanation (Deci & Ryan, 1985).

Cognitive Evaluation Theory (CET)

Deci and Ryan (1985) also presented cognitive evaluation theory (CET) to elaborate factors in social settings that produced variability with intrinsic engagement. CET was the sub-theory of SDT and claimed that relational events and formations, such as feedback, rewards, and communications produced feelings of security during an assignment (Deci & Ryan, 1985). The interpersonal events and structures enhanced intrinsic motivation for the action that gave conciliation of the fundamental need for individual security (Deci & Ryan, 1985). Examples to facilitate intrinsic motivation included optimal challenges presented, giving promoting feedback, and giving individuals a sense of freedom from demeaning evaluations (Deci & Ryan, 1985).

Deci and Ryan (1985) believed CET could further specify feelings of security would not promote an individual's intrinsic engagement unless the individual's feelings of competence accompanied a sense of autonomy. CET also specified feelings in terms attributed to an internal cause or perception (Deci & Ryan, 1985). People not only experienced perceived competence, but they also acknowledged their attitude to be self-determined if the intrinsic engagement was enhanced or maintained (Deci & Ryan, 1985). The tenets for CET formulated to integrate the effect of awards, external events and other feedback on intrinsic engagement and motivation that enhanced their feelings of competence (Deci & Ryan, 1985; Harter, 1981).

Environmental Factors that Impact Intrinsic Motivation

Research regarding events on the environment also impacted motivation intrinsically that dealt with autonomy and control instead of competence (Deci & Ryan, 1985). There was a controversial issue that external rewards undermined motivation that was intrinsic (Deci & Ryan, 1985). A meta-analysis confirmed that expected rewards that were tangible threatened any task performance made through internal motivation (Deci & Ryan, 1985). Furthermore, extrinsic factors affected individual abilities to meet deadlines, follow directives, and work under competition pressure (Deci & Ryan, 1985). Extrinsic motivation could reduce intrinsic motivation, and according to CET, learners could experience extraneous factors as leading indicators of their behavior (Deci & Ryan, 1985). However, a time for self-guidance and choice appeared to increase internal incentives, as the attributes that could afford more substantial impressions of autonomy (Deci & Ryan, 1985; Harter, 1981).

The implication of autonomy against control for the maintenance of intrinsic encouragement observed was in a research study of classroom learning (Deci & Ryan, 1985). Studies showed that autonomy-supportive teachers catalyzed in their student's larger intrinsic factors, the desire for a challenge, and curiosity (Ryan & Deci, 200; Harter, 1981). Learners that had no say or control of their learning lost their initiative to perform well and learned less when learning in the classroom became too entangled or required perceived, prolific problem-solving (Bong 1996; Deci & Ryan, 1985; Harter 1981). Similarly, studies showed that students who had parents that were more autonomy supportive tended to increasingly be mastery-oriented (Deci, & Ryan, 1985; Harter, 1981). The students were more likely to explore and extend themselves (Deci, & Ryan, 1985; Harter, 1981).

Deci and Ryan (1985) stated that the cognitive evaluation theory (CET) aspect of self-determined theory (SDT) suggested that home environments and classrooms could forestall and facilitate intrinsic motivation. CET provided support against impeding the needs for adequacy and autonomy (Deci & Ryan, 1985). As a result, it was essential to recall that intrinsic motives and engagement occurred when activities with intrinsic interest for a learner, happened with aspects that appealed of novelty, challenged, or took place when there was aesthetic value for that individual (Deci & Ryan, 1985, Ryan & Deci, 2000). After early childhood, the expectation that students had the liberty to intrinsically motivate shortened any social demands that required individuals to responsibly assume completing non-intrinsically motivated assignments (Deci & Ryan, 1985). However, in school settings, it appeared that intrinsic motivation became weaker upon promotion to a different grade (Deci & Ryan, 1985). Research could capture the dynamics and nature of motives that were external or extrinsic to understand how learners completed assignments that inherently were not interesting (Deci & Ryan, 1985).

Utility Value as an Element of Subjective Value

The utility value as an element of subjective value allowed students to capture extrinsic reasons for engaging in a task to reach some desired outcome (Deci & Ryan, 1985; Harter, 1981). An example would include a student who did their homework and feared punishment from their parent for not doing their assignment was motivated extrinsically (Deci & Ryan, 1985). The student would do the work to avoid punishment as an outcome (Deci & Ryan, 1985). In a similar situation, students who did the assignment and believed it served value

towards supporting a chosen career were also externally motivated and did the homework for its utility value (Deci & Ryan, 1985).

Internalization

Since activities educationally prescribed in schools were not inherently interesting, a central inquiry concerned how to self-regulate, and motivate students to value, and carry out assignments on their own (Deci & Ryan, 1985). The problem was among SDT in supporting the internalization and integration of behavioral regulations and values (Deci & Ryan, 1985). Internalization described the development on how an individual took a task, assigned a task-value, and integrated the task into their expectancy on task-completion (Deci & Ryan, 1985). Internalization was a continuum and described how an individual's motives for behavior could change from a personal commitment that was active too, non-compliance (Deci & Ryan, 1985).

Organismic Integration Theory (OIT)

Deci and Ryan (1985) included another category among SDT known as organismic integration theory or OIT. OIT introductions took place in detail to the differentiated forms of external motives and environmental factors that could promote or hinder the integration and internalization to regulate these behaviors (Deci & Ryan, 1985). Given how significant internal opportunities and discernable experiences were substantial, became essential towards enhancing self-governing management for externally inspired objectives with social conditions to nurture versus inhibiting to the internalization and integration (Deci & Ryan, 1985). As an example, Ryan, Stiller, and Lynch (1994) explained how learners who integrated behaviors with positive indicators expressed a connection and a sense of care from their teachers and parents (Deci & Ryan, 1985).

Forms of Extrinsic Motivation

A form of extrinsic motivation was external regulation and occurred when behavior performances took place to satisfy external demands or obtained through a contingency with an externally imposed reward (Deci & Ryan, 1985). Learners externally experienced learned behavior as alienated or controlled, with actions that had an external expectation or

outcome (Deci & Ryan, 1985). Another type of external motivation was introjected regulation. Introjected regulation described how internal management was controlling and allowing learners to perform activities without feeling guilty to gain ego-enhancements or pride (Deci & Ryan, 1985). A historical form of introjected regulation was ego involvement, where a learner performed an act to promote or maintain self-efficacy and the feeling of self-worth (Deci & Ryan, 1985). An increasingly self-determined or autonomous form of external motivation was identification through regulation (Deci & Ryan, 1985). With identification through regulation, a learner identified their level of importance and acceptance of their behavior (Deci & Ryan, 1985). For example, an individual who valued writing would memorize a spelling list and think of writing as a relevant life goal (Deci & Ryan, 1985).

Another form of extrinsic autonomous motivation was regulation integrated and occurred as a learner distinguished and assimilated self-regulation practices (Deci & Ryan, 1985). The person exhibited behavior that integrated regulation practices through self-examination (Deci & Ryan, 1985). Afterward, the person internalized reasons behind an action to bring new regulations into congruence with an individual's values and carefully explored external motivations for an action as the individual becomes extrinsically motivated and self-determined to complete an action (Deci & Ryan, 1985). For example, an individual who attended church and believed that the act aligned with the individual's belief system would be an example of integrated regulation. Even if the person did not participate for the sheer enjoyment of attending church, they gained an individual sense or feeling that it was the right and the proper thing for them to join on a regular basis (Deci & Ryan, 1985).

The continuum underlying extrinsic motivation with stages of internalization allowed individuals to accept a new regulation of behavior that initially could point towards the continuum (Deci & Ryan, 1985). A few behaviors could start as introjects and other behaviors as identifications (Deci & Ryan, 1985). An individual could see exposure to an activity because of external regulation. If the perception of the reward that the learner received was not controlling, the individual could experience activity's that supported intrinsic properties, which resulted in a position shift (Bong, 1996; Deci & Ryan, 1985). A learner who identified with the value of an activity or assessment could also lessen the value sensed through a mentor who controlled and moved ''backward'' towards an external regulatory mode (Deci & Ryan, 1985, p. 63). Thus, development was evident in values and

behaviors that could assimilate and self-increase ego with cognitive capacities (Deci & Ryan, 1985). A learner's development and regulatory style tended to become internal through organismic orientations, autonomy, and self-regulation (Deci & Ryan, 1985).

How External Regulation Impacts Behavior

Deci and Ryan (1985) tested the combination of different examples of incentives could lay across a sequence of relative autonomy. The researchers explored behaviors through achievement with homework completion from elementary school students and assessed introjected, external, intrinsic, and identified reasons for collaborating in these practices (Deci & Ryan, 1985). The researchers found differences in adjustments and attitudes could associate with many different types of external motivation. For example, students who externally increased regularity, displayed less value, effort, or interest (Deci & Ryan, 1985). The learners also blamed others including teachers for adverse outcomes (Deci & Ryan, 1985).

Introjected regulation could positively relate to the expanding accomplishment but also associated with more stressful skills of coping with disappointments (Deci & Ryan, 1985). The identified control also associated with higher enjoyment of school and skills management (Deci & Ryan, 1985; Kilic & Tunc Pekkan, 2017). Intrinsic motivation related to competence, interest, and real pleasure (Deci & Ryan, 1985). Greater internalization appeared to yield increasing behavioral assumptions that were due to less conflict and improving access to personal assets and increased experienced well-being (Deci & Ryan, 1985). Given how significant internalization of behavioral performance outcomes and personal experiences were applied, issue concerns arose on how to promote independent regulation through externally motivated behaviors (Deci & Ryan, 1985).

Learners who identified with externally motivated behaviors were not intrinsically motivated and thus, responded to external prompts (Deci & Ryan, 1985; Graham & Weiner, 1996). The main reason learners were willing to conduct behaviors was that they felt valued by important people they sensed and felt connections with such as a peer group, family members, or society (Deci & Ryan, 1985). The assignment to facilitate internalization provided learners with a sense of connectedness towards different people, within a group, and culture to disseminate a goal. In classroom settings, students felt cared

for and respected by their teacher was found as essential for willingness to accept the preferred class values (Deci & Ryan, 1985).

Another issue was perceived competence. Individuals who adopted their extrinsic goal would need to feel efficacious in their goal (Deci & Ryan, 1985). Students could likely adopt and embody a goal if they understood the goal and had the important skills to succeed (Deci & Ryan, 1985; Graham & Weiner, 1996). A regulation internalized could introject and leave people satisfied with a feeling of relatedness competence (Deci & Ryan, 1985). To only introject a regulation and further be controlled would not be ideal for people who felt self-determined (Deci & Ryan, 1985). Therefore, autonomy support was the essential element to regulate rather than just introject. Deci and Ryan (1985) believed that controlling environments could introject regulation if the environments supported relatedness and competence. However, only autonomy-supportive environments could foster integrated self-regulation (Deci & Ryan, 1985; Graham & Weiner, 1996). To fully support autonomy and self-regulation individuals must inherently understand its meaning and worth (Deci & Ryan, 1985). As individuals grew, their expectations to succeed, beliefs in their abilities, and what they valued could also shift (Wigfield & Eccles, 2000). People internalized and integrated the meanings into their environment that provided support for competence, relatedness, and autonomy (Deci & Ryan, 1985).

Social and Cultural Factors that Impact Learner Performance

There were also social and cultural factors made up of parents and teachers, or socializers, who contributed towards learner's interpretations and perceptions of performance (Behrmann, 2018; Edwards, 2020; Wigfield, Tonks, & Klauda, 2009). Socializers influenced learners' convictions and senses about specific opportunities to enhance their intelligence and cultural environments (Wigfield, Tonks, & Klauda, 2009). Wigfield, Tonks, and Klauda (2009) described the behavior of socializers' demeanor and beliefs in the creation of learners' values and expectations with whom learners had important relationships. As a result, expectancy-value theory implicated relationships as a significant portion of the theoretical design (Martin & Dowson, 2009). Expectations and values are in part, relationally determined where achievement-related beliefs represented learners' tasks, expectations for success, goals for achievement, and beliefs about their progress and capability (Martin & Dowson, 2009; Wigfield, 1994).

Early adolescence represented a significant time where learners' developing views of their identity began to impact job-related outlining and class selection arrangements (Jodl, Michael, Malanchuk, Eccles, & Sameroff, 2001). Parents could potentially influence their adolescents' academic progress, task selections, and professional choices through their portrayal as definers of life-encounters through experience (Eccles, 1993). Jodl, Michael, Malanchuk, Eccles, and Sameroff (2001) claimed as parents provisioned for learning experiences and abilities, they also affected the learner's impressions and sense of standards across accomplishments in related areas. Parents' played a role in supporting their children with being able to interpret and communicate their reality (Jodl et al., 2001).

For example, parents could persuade a potential young athlete to participate in a soccer league through watching a soccer game and expressing to the young athlete that they have talent if they begin to play soccer (Jodl et al., 2001). The message from parents could support the learner's beliefs regarding their ability and could also include any value the learner placed with accomplishing various tasks (Jodl et al., 2001). Moreover, parents that make predictions for a learner's accomplishments could relate to the learner's expectancies, beliefs, and could also affect their actual academic performance (Jodl et al., 2001).

Beliefs and values were not assigned to individual experiences of capacities (Bandura, 2002). Collective expectations encompassed anticipated cumulative efficacy to represent common acceptances to replicate desired outcomes through collaborative activity (Bandura, 2001). The arrangement of recognized cumulative efficacy resided in the psyche of collective minds (Bandura, 2002). The participants acted in concert on a belief to cognize, aspire, motivate, and regulate (Bandura, 2002). The shared beliefs showed how well people used their tools and how much effort placed was into the collective endeavors (Bandura, 2002). Shared beliefs allowed people to demonstrate their "staying power" when joint efforts did not work at producing fast outcomes or met rapid resistance (Bandura, 2002, p. 271). Bandura's (2002) social cognitive theory held that segments of a learner's knowledge attainment could occur through social collaboration. An individual's knowledge acquisition evolved through their group experiences, and outside media influences (Bandura, 2002).

Social Cognitive Theory

The study also included Bandura's social cognitive theory. Bandura's (2002) theory explored how an individual's environment, cognition, and behavior all interacted to support achievement, motivation and determined how an individual would function. With social cognitive theory, behavior was regulated and motivated through exercises of self-influence (Bandura, 1991). Self-regulatory systems provided causal processes and allowed learners to settle the effects of external influences and allowed purposeful action (Bandura, 1991).

Human behavior was mostly purposive and regulated by forethought where individuals formed beliefs about what they could achieve (Bandura, 1991). People planned courses of action by anticipating consequences and setting goals that produced desired outcomes (Bandura, 1991). Through exercising forethought, individuals could motivate and guide their actions in anticipatory and proactive ways (Bandura, 1991). Bandura (1991) stated that the capability for intentional action developed when individuals shared and reacted with other members within their environment to create symbolic messages as a tool for interpreting their social reality.

According to Bandura (1991), people owned self-reflective capabilities which allowed the ability to control thoughts, motivation, feelings, and actions. People could exercise self-directedness to adopt standards of behavior as guides that regulated and motivated their anticipatory responses through self-influence (Bandura, 1991). As a result, the human function regulation took place through generated internal and external sources of influence (Bandura, 1991). People self-regulated through psychological sub-functions that were established and assembled for individual change (Bandura, 1986).

For individuals to influence their sense of motivation and actions, they needed to pay adequate attention to their environment, cognition, and behavior (Bandura, 1991). Individuals would participate in self-regulatory activities that varied and depended on their values and level of functional significance (Bandura, 1991). The process of self-monitoring required learners to access their prior beliefs and existing cognitive structures (Bandura, 1991). Learners displayed significance on different conditions of their ability to function (Bandura, 1991). The selective influence on various aspects of their functioning included how the learners perceived and organized their performance information for memory representation

(Bandura, 1991). The "mood state" affected how individuals self-monitored and cognitively processed their performances (Bandura, 1991, p. 250). As individuals self-monitored their behavior, it uncovered their competence and self-esteem (Bandura, 1991).

Individuals could also activate their affective reactions through self-reflection (Bandura, 1991). Self-observation allowed people to provide the information they needed for setting realistic goals and allowed individuals to evaluate their progress towards meeting their targets (Bandura, 1991). Additionally, individuals had active strategies where they could pay attention to their patterns of thought and actions through contexts in social settings that guided self-directed change (Bandura, 1991).

Self-Diagnostic Function

Self-observation provided systematically was to individuals with relevant diagnostic information (Bandura, 1991). People noticed habitual patterns when they began observing their thought patterns, emotions, reactions, behavior, and settings where self-reactions occurred (Bandura, 1991). Bandura (1991) analyzed regulations in the co-variation between an individual's situation, their patterns of thought processes, and actions. People identified with their psychological behavior and social environment where they learned to behave in ways, learned to alter their behavior, and learned to modify and change their surroundings (Bandura, 1991).

Individuals could identify significant detriments of their psychosocial functioning more effectively through personal experimentation (Bandura, 1991). They could systematically vary things daily in their lives and noted any accompanying changes that were personal (Bandura, 1991). Self-knowledge allowed individuals to provide direction for self-regulatory control where individuals altered their regular patterns of thought, observed any additional effects, and acquired knowledge of how their thinking affected their patterns of emotions, their performance, and level of motivation (Bandura, 1991).

People who carefully monitored their performances would set consecutive goals of improvement and enlisted self-evaluative reactions that assembled their effort for attaining their goals (Bandura, 1991). The motivation effected from individual self-monitoring varied from an increase to a decrease in the observable behavior (Bandura, 1991). An individual

could bring order in the variability of self-monitoring with self-directedness (Bandura, 1991). Performance awareness allowed individuals to alter their subsequent behavior and activate their reactive measures by focusing on achievements and reflective-evaluation (Bandura, 1991). People who engaged in activities and remained informed of their attainments, could set goals spontaneously and surpass people who did not aspire to match their prior level of effort (Bandura, 1991). As a result, individuals who set goals outperformed people who matched their past endeavors (Bandura, 1991).

Bandura (1991) stated that there were factors relating to a person's attributes, demeanor, nature, and competence to administer different self-monitoring strategies (Bandura, 1991). These factors could affect how an individual behaved and how they would enlist self-reactive influences (Bandura, 1991). Implementing the "temporal proximity of self-monitoring to the change worthy behavior" allowed individuals to engage in self-directed change that brought ramifications on behavior (Bandura, 1991, p. 251). Thus, opportunities for individuals to exhibit self-influenced abilities occurred when individuals monitored their progression in behavior (Bandura, 1991).

Another factor or individual attribute was "informativeness of performance feedback" (Bandura, 1991, p. 251). Evaluative self-reactions allowed individuals to know their performance (Bandura, 1991). Self-observation permitted individuals to enhance their attainment when there was proof of progress (Bandura, 1991). The informativeness of performance feedback had minimal effect when there was ambiguity regarding the impact of an individual's actions (Bandura, 1991).

"Motivational level" was another factor that individuals had to mediate the effects of self-observation (Bandura, 1991, pp. 251 - 252). People who were motivated to change monitored their progress and set attainable goals (Bandura, 1991). They also self-evaluated the progress they were making (Bandura, 1991). Individuals with low motivation showed little or no ability to demonstrate self-observation (Bandura, 1991).

"Valence of the behavior" was the factor that affected the type of self-evaluative reactions individuals elicited when they self-observed (Bandura, 1991, p. 252). Attainments that were behavioral in valued domains allowed individuals to manufacture self-satisfactions to raise their goals to impact change (Bandura, 1991). Individuals with devalued behaviors also

demonstrated their self-displeasure (Bandura, 1991). People who attained neutral behaviors could experience alterations that did not arouse behavioral reactions (Bandura, 1991).

Individuals encouraged themselves by tending to their accomplishments (Bandura, 1991). Whereas, people who dwelled on their failures could be discouraged to undermine self-efficacy tendencies (Bandura, 1991). Thus, the direction of change to accompany self-monitoring that individuals used depended on how attention focused on their successes or failures (Bandura, 1991). Although individuals who heavily focused on their failures were dis-spirited, they could also identify possible causes of failure and suggested corrective changes (Bandura, 1991). An individual's behavior could also vary widely due to their "amenability to voluntary control" (Bandura, 1991, p. 253). People who self-monitored their behavior created changes through activities that were relatively easy to manufacture with transient effects and resistance to change (Bandura, 1991).

Self-monitoring allowed individuals to operate through self-referent processes (Bandura, 1991). Self-referent processes allowed individuals to have biases on what they observed where individuals activated their reactive processes to change their course of action (Bandura, 1991). Individuals with a sense of identity and an orientation to fulfill their personal goals were self-directed (Bandura, 1991). Individuals with a pragmatic orientation would not commit to personal standards and tailored their demeanor to match their position (Bandura, 1991). These individuals could also decipher social cues and varied their self-presentation accordingly (Bandura, 1991).

Individuals who monitored and observed their patterns of behavior exhibited the first steps towards doing something to affect it (Bandura, 1991). The information a person gathered from self-observation served a minimal basis for self-guided reactions (Bandura, 1991). Actions allowed people to react to a judgmental function that incorporated several additional supplementary processes (Bandura, 1991). When an individual used personal standards for guiding and making decisions, their actions provided a role in the exercise of self-direction and guidance (Bandura, 1991). The person compared their standards against their performance (Bandura, 1991).

Individuals developed personal standards from material transmitted by three principle patterns of significance (Bandura, 1991). The individuals developed personal specifications

that were partly due to how other compelling people in their lives had impacted their behavior (Bandura, 1991). Eventually, the people would judge themselves through evaluative standards that reflected in the social approval of others (Bandura, 1991). Individuals who developed sociological perspectives emphasized their development of personal standards (Bandura, 1991). The rules acquired were by explicit instruction and reflective acknowledgment of others toward their behavior (Bandura, 1991). People could also draw from standards prescribed to them through direct tuition as a form of influence that was most competent in cultivating the development of standards based on support and shared values (Bandura, 1991). People would teach, prescribed expectations for others, and would exemplify the aspirations in their reception to their behavior (Bandura, 1991).

People constructed personal standards through their reflection with several causes of explicit and commissioned principles (Bandura, 1991). Their development of self-reflection was complex because existed diversity and inconsistency with standards from people who assessed their actions or those of others differently (Bandura, 1991). People differed on how they displayed differences between what they prescribed and what they practiced (Bandura, 1991). The same individual could have presented different expectations in different contexts and regions of activity and resulted in having standards that were mere duplicates of what they had specified or had seen (Bandura, 1991).

Regarding deferential social correlations, people could regulate their behavior when they produced objective indicators of adequacy (Bandura, 1991). There was minimal ambiguity to determine if a person was capable of swimming, flying an aircraft, or balancing a checkbook (Bandura, 1991). Most activities did not require sheer measures of competence (Bandura, 1991). Bandura (1991) proclaimed that people needed to evaluate their performance about the accomplishments of others. An example was where a student received a score of 110 points on a mathematical assessment and aspired to perform in the upper 15% of the class, would not have the groundwork for self-evaluation beyond knowing how other students achieved (Bandura, 1991). Therefore, when competence was relational, assessment of a person's attainment required comparisons among three primary information sources including (a) attained performance level, (b) intimate expectations, and (c) another person's attainment (Bandura, 1991).

The correlation among distinctive people could warrant multiple designs of assignments. During daily exercises, regular patterns among model associations were assigned to resolve a person's relative standing (Bandura, 1991). The people within the groups compared their performance to associates in similar settings (Bandura, 1991). A person within the environment used their prior behavior continuously as a guide to analyzing for comparison (Bandura, 1991). In the deferential process, an individual's self-assessment supplied adequacy (Bandura, 1991). Previous attainments impacted a person's ability to use self-appraisal (Bandura, 1991). After attaining a given level of performance, people explored, "new self-satisfactions by striving for progressive improvements" (Bandura, 1991, p. 255).

The deferential outcomes where individuals evaluated their attitude was designed as a collaborative correlation in communal settings that formed through common standards (Bandura, 1991). Among corporate comparison organizations, group performance recognition proceeded over individual tasks (Bandura, 1991). Self-appraisal took place through a person's relative addition to the team attainment and the contribution measures equally to the performance accepted among the group (Bandura, 1991).

An additional influence among the individual constituent of automatic governance was people's "valuation of activities" (Bandura, 1991, p. 255). People had little regard for their performance in activities that had minimal or no significance (Bandura, 1991). Their effort pertained to areas that impacted their well-being and self-esteem where performance assessments activated their self-reaction (Bandura, 1991). Individuals were likely to use self-evaluative reactions during activities that were more relevant to the person's value choice and sense of intimate adequacy (Bandura, 1991; Zimmerman & Bandura, 1994). An example was when a person invested their self-esteem on how many times they were successful in making a basket while shooting a basketball. (Bandura, 1991).

Self-reactions differed depending on how individuals viewed the origins of their behavior (Bandura, 1991). People valued their accomplishments when they attributed their success to their effort and ability (Bandura, 1991). People did not gather contentment while viewing their abilities as massively derived from external factors or conditional supports (Bandura, 1991). Reactions to wrong and culpable conduct

equivalently depended on imaginative beliefs (Bandura, 1991; Zimmerman & Bandura, 1994). Individuals were critically self-responded to flawed performances for which they held themselves accountable (Bandura, 1991; Zimmerman & Bandura, 1994). However, they did not hold themselves responsible for weak performances they believed came from requirements that were not realistic (Bandura, 1991).

Performance beliefs established a setting for people to use reactive influences (Bandura, 1991). Self-reactions allowed people to use a structure which helped regulate their course of action (Bandura, 1991). People achieved self-regulatory control by creating incentives for their efforts. As a result, people sought outcomes that provided productive responses and abstained away behaviors leading to self-condemnation (Bandura, 1991). Their self-regulating desires provided individuals with positive outcomes or reflections (Bandura, 1991).

Self-incentives affected people behaviorally mainly through functions that had an impact on motivation (Bandura, 1991). By making tangible or self-satisfaction benefits conditional upon attainable accomplishments, people persevered and expended any effort they needed to attain the desired performance (Bandura, 1991). In the case of self-motivators, such as allowing free time or relaxing breaks, people brought themselves to accomplish tasks they would normally not do or avoid by making available rewards dependent upon performance accomplishments (Bandura, 1991). These same individuals non-contingently received a reward, or they monitored their behavior and set conditions for themselves without paying themselves for what they had attained (Bandura, 1986). Self-regulatory accomplishments partly described how people effectively mobilized their resources and efforts during activities prescribed externally (Bandura, 1991).

According to Bandura (1991), "most people valued their self-respect and the self-satisfaction derived from a job well done more highly than they did material rewards" (p. 257). Individuals who self-regulated their behavior with evaluative reactions demonstrated a uniquely human capability (Bandura, 1991). Self-evaluation provided people with direction and empowered motivation towards their behavior (Bandura, 1991). As a result, evaluative self-incentives recruited were in the business of behavior that followed a person's proficiency (Bandura, 1986; Bandura, 1991).

Self-Regulatory Systems Functioning

In turning attention towards the functional operation of a person's self-system, the social cognitive theory of self-regulation included a primary structure of regulation (Bandura, 1991). A person's self-regulation structure of direction provided a massive effort adjacent their capacity for effect, human thought, action, and motivation (Bandura, 1991). A person's regulatory mechanism with self-directedness also influenced their arrangement for self-efficacy to play a role in the adoption of personal agency (Bandura, 1991). In the mode of personal agency, individuals could bring their ability to manage their surroundings and could control the way they live (Bandura, 2002). Among mechanisms of a different agency, nothing was as pervasive to individuals regarding the ability to demonstrate authority with situations that impacted their lives and with their level of performing (Bandura, 2002).

Self-efficacious acceptances provided an essential set of social regulation elements (Bandura, 1991). A person's efficacy and beliefs could influence their aspirations, the decisions they made and the level of attempt they exhibited in each venture (Bandura, 1991). People's belief systems could affect how long they could persevere through setbacks, self-aiding and self-hindering thought patterns, the level of emphasis acquired with expectations, and susceptibility to depression (Bandura, 1991). Such acceptances could impact their ability to self-monitor and cognitively process different aspects of a person's performance outcomes (Bandura, 1991). As a result, individuals who held themselves as highly competent would blame their failures to their insufficient effort (Bandura, 1991). However, people who described themselves inefficient believed the result of their deficiencies were due to little ability (Bandura, 1991). The effects of causal attributions and the influence of social comparisons on motivation and assessment attainments gathered were mostly through peoples' changes in self-efficacious acceptances (Bandura, 1991; Bandura & Jourden, 1991).

Perceived self-efficacy contributed towards people's evaluation in exercises where they, "judged themselves to be self-efficacious and from which they derived satisfaction by mastering challenges" (Bandura, 1991, p. 258). Bandura (1991) stated that intrinsic interest anticipated by perceived self-efficacy was better than substantive ability. People with broad interests in pursuing different categories of life aspirations encouraged their pursuits through choosing differences that matched their skills (Bandura & Jourden, 1991). They

made their selections based on their perceived skills and used similar feedback strategies to promote their development of other pursuits (Bandura, & Jourden, 1991).

People used similar feedback strategies to support their regulation of motivation (Bandura, 1991). They elevated their standards of motivation by endorsing strategies to attain standards before they gained any feedback about their effort (Bandura, 1991). In other words, comparative feedback allowed a person to reflect upon strategies they used to support their success. It was a process where the person anticipated outcomes to different scenarios of policy they could use to accomplish the desired goal.

Comparative feedback allowed a person to be able to plan or use positive control as the individual's primary system for the mobilization of motivation (Bandura, 1991). Any negative feedback they received could support people in moving forward on a preset course (Bandura, 1991). However, people frequently surpassed any feedback they received to engage in new classes by adopting further challenges and creating new motivating discrepancies to be mastered (Bandura, 1991). Bandura (1991) stated that people who surpassed a standard raised their ability to demonstrate self-motivation through reflective responses towards attainments that provided a cognitive function of motivation and self-directedness

Lock and Latham (1990) found consistent and reliable evidence that explicit goals challenged and enhanced an individual's motivation with performance attainments. Standards of motivation involved an individual's cognitive comparison processes (Bandura, 1991). Motivational effects stemmed from people having the ability to evaluate their behavior and not just from setting individual goals (Bandura, 1991). By setting goals, a person specified the needed requirements for positive self-evaluation (Bandura, 1991).

Internal comparison through the activation of self-reactive influences required a person to have both evaluative factors of standards that were personal and understanding of a person's level of performance (Bandura, 1991). "Neither performance knowledge without standards nor standards without performance experience provided a basis for self-evaluative reactions" (Bandura, 1991, p. 261). Studies, where performance feedback and goals were systematically aligned, produced results that were consistent with the nature of a person's pursuit (Bandura, 1986; Bandura, 1991). For a goal to have a motivational impact,

a person continually checked and received feedback on their progress (Bandura, 1991). Studies showed that combining the influence of goals with performance feedback heightened a person's motivation substantially (Bandura & Cervone, 1986).

A person's cognitive motivation with goal intentions could regulate with three types of internal influences. The first kind of self-influence on a person's cognitive motivation was effective self-evaluation. People sought a sense of satisfaction through accomplishing valued standards that magnified their efforts and could prompt themselves by discord with performances that were nonsufficient (Bandura, 1991). Perceived self-efficacy was the second type of self-influence that allowed people to set goals in the pursuit of an endeavor that changed according to the level and pattern of progress that occurred (Bandura, 1991). A person maintained their accomplishments, lowered the standards of their achievements, or pursued a more challenging performance (Bandura, 1991). As a result, the person established the third constituent of self-influence on their cognitive motivation that was their ability to assess their regulation of motivation (Bandura, 1991).

Bandura and Cevrone's (1986) study revealed that self-responsive significance on incentives varied the magnitude and operation of conflict among a demanding assigned standard and performance. Individuals that had more sources of reactive controls could exert higher effort to attain and sustain what they have sought (Bandura & Cervone, 1986). The combination of sources of self-reactive influences along with the energy a person exerted accounted for changes in a variation on motivation (Bandura & Cervone, 1986).

Self-reactive influences provided individuals with a foreseen satisfaction to attain personal accomplishments as a power of motivation (Bandura & Cervone, 1986). Affective self-reactive influences also provided a negative motivator for people with deficient performance functions (Bandura & Cervone, 1986). These forms of motivation contributed differentially depending on the individual's assessment accomplishments and depended on the complexity of the assessment (Badura & Cervone, 1986).

With more manageable tasks where success in accomplishments was established through increases with self-discontent, level of effort, and with small attainments, provided people with a governor of accomplishment incentives (Bandura & Cervone, 1986). Convoluted assignments could require massive intentional and cerebral requirements and contentment

with improvement toward confronting elements could also provide levels of inspirational direction for outcome attainments (Bandura & Cervone, 1986). For example, mathematically oriented students assigned a set of complicated mathematical problems expected to complete the assignment successfully (Tollefson, 2000). The rewards they reaped could extrinsically be a high grade or internally produce a sense of attainment (Tollefson, 2000). The students attained a sense of pride associated with expending maximum effort on completing a difficult task (Tollefson, 2000).

Active, reactive influences that were negative could impair a person's functioning level by interrupting a problematic assignment of producing different remedies of operation (Bandura & Cervone, 1983; Bandura & Jourden, 1991). Thus, on complex tasks, self-accomplishments with progress toward challenging structures could provide individuals with negative motivational orientations towards performance with accomplishments (Bandura & Cervone, 1986). For example, a cluster of learners with a background of not performing well mathematically, could not even attempt to complete any assigned mathematical problems also if they had an opportunity to earn partial credit (Tollefson, 2000). The learners could appreciate the extrinsic accomplishments from educational environments including proficient marks from instructors but would not put forth maximum attempts on completing challenging mathematical problems because they did not assign a value to their expectation of success (Tollefson, 2000).

Structures of Goal Systems

People used goal systems to attain a directive, devices for motivation, and individual mechanisms for exerting their effects (Bandura, 1991). A proxy agency was a process where an individual, such as an employer, acted on behalf of an organization to support a person's performance (Bandura, 2002). Goal systems provided a hierarchical arrangement where goals served as benchmarks for motivation, action, and reflected concerns of personal importance and appraisal (Bandura, 1991). Proximal goals provided a structure where people collaborated to set sub-goals, invested in activities with significance, and inquired the thought of attaining higher-level goals (Bandura, 1991). If the incentive of an accomplishment attached to segments of improvement, people provided constant sources of significance and inspiration that was different in comparison with the person's soaring goal (Bandura, 1991).

During the motivational practice, people gathered contentment from continuous comprehension through exercises instead of delayed influence in their venture till they attained their elevated accomplishment (Bandura, 1991). Superordinate goals were explicit where groups of people worked cooperatively together to achieve a goal, which usually resulted in rewards to the group (Bandura, 1991). Superordinate goal attainment coupled with support from other third-party group representatives tended to lead to recurrent proximal development (Bandura & Schunk, 1981). Proximal self-reactive influences supported progress toward goal attainment when people combined their desires with direct self-counseling (Bandura, 1991).

Standards, Motives, and Incentives

Incentives through self-active influences provided essential ingredients in a plethora of inspirational exercises could materialize through contrasting labels (Bandura, 1991). Attainment through inspiration provided some example where immense achievers contributed their completion of specific outcomes (Bandura, 1991). People who set higher aspirational standards tended to work harder, strived to fulfill their aspirations, and excelled in their attainments (Bandura, 1991). They also had a high need to achieve and selected more top scoring goals on achievement assessments in comparison to people who attained average level scores on achievement assessments (Bandura, 1991). A person's high need to do well could affiliate with setting high expectations where the relations between their desire for attainment and performance dispersed through controlling moderations of goal setting (Bandura, 1986; Bandura 1991). According to Bandura (1991), a misperception people commonly assumed was that performance accomplishments were the attainments of excelling learners to choose better performing outcomes in comparison with learners who scored poorly on attainment assessments (Bandura, 1991). Setting goals explained shifts in motivational levels through fluctuations in the mediation of self-processes, whereas rapid changes showed explanatory complications for a dispositional motive or determinant (Bandura, 1991).

People used evidence to support standard setting as a better indicator of a person's continual level of accomplishment in comparison to a person's measures of need for achievement (Bandura, 1991). This process would lend causal priority to personal goal

setting (Latham, 2012). People used self-mediating procedures to shift their level of motivation for setting goals (Latham, 2012). Whereas, individuals who made quick changes in their level of motivation could also have difficulties for a dispositional motive determinant, such as needing to achieve and be successful (Latham, 2012). Goal specificity delineated the conditional requirements for a person's positive self-evaluation where people wrote targeted phrases or developed achievement imagery on performance tasks (Bandura, 1991; Latham, 2012). Self-influence through a person's specifications also contributed to the motivational effects of external feedback and incentives (Bandura, 1991). External incentives had proven to raise progress to the extent that people are encouraged to accomplish ongoing performance outcomes (Bandura, 1991).

Also, Locke, Bryan, and Kendall (1968) found that incentives showed mixed results on performance increase to the scope that they encouraged people to prescribe goals that were motivating for themselves. When participants did not receive feedback regarding their level of return, their motivation towards self-evaluation was not adequately activated (Bandura & Cevrone, 1983; Locke, Bryan, & Kendall, 1968). People motivated with the expectation of attaining extrinsic outcomes applied standards that are evaluative to create challenges for accomplishing their goals (Pervin, 2015; Pritchard & Curtis, 1973).

Self-Regulatory Dynamics in Collective Endeavors

Human endeavors directed through group goals in organizational settings took place through effort socially mediated. Collective agency occurred when people acted together to shape the future of the organization (Bandura, 2002). Perceived collective efficacy was a developing dynamic that embodied sequential and collaborative direction among members of the group (Bandura, 2002). Decision makers provided control over collective outcomes that relied on the concerted efforts of others (Bandura, 1991). Individually, people could monitor their efforts. Regulation through social medication of a group endeavor involved substantially challenging paths of influence (Bandura, 1991). As a result, established individual relationships required people with group level qualifications (Bandura, 1991). The skills that organizations acquired through proximal development supported different functional relationships (Bandura, 1991).

Impact of Beliefs on Regulatory Mechanisms

Some people believed ability was an acquirable competence that increased through gaining knowledge and perfecting competencies (Bandura, 1991; Dweck & Elliott, 1983; Pastorelli et al., 2001). These same people adopted functional learning goals and sought tasks that provided allowances to increase their skill set and competencies. They also regarded mistakes to display as part of the adoption, viewed ability as an inherent capacity where performance level considered was diagnostic of concealed aptitude and saw poor performances as an immense evaluative threat (Bandura, 1991). As a result, people preferred assignments that prevented errors, permitted an open display of their cerebral proficiency, and spared them from having to expand their knowledge and competencies (Bandura, 1991).

Beliefs systems concerned how efficacy-relevant information cognitively processed through belief systems about the extent to which a person's environment was controllable (Bandura, 1991). Human behavior governed perceptions of personal efficacy and social conditions instead of objective properties (Bandura, 1991). As a result, people who believed they were inefficacious were prone to produce limited differences in cultures that provided moments to exercise personal competence (Bandura, 1991). Conversely, people who exhibited an influence through perseverance with ingenuity sorted methods with using control among the environments that contained minimal moments (Bandura, 1991).

Through life experiences, beliefs about self-efficacy and setting controllability were products of mutual causation (Bandura, 1986). People who believed their environment was controllable on matters they perceived as critical became motivated to exercise their efficacy (Bandura, 1986). As a result, their effectiveness enhanced the likelihood of success (Bandura, 1986). Experience with success supported psychological validation of efficacy and environmental controllability (Bandura, 1986). People who approached situations as mostly uncontrollable could produce failed experiences (Bandura, 1986).

Social comparisons of influence affected a person's ability to self-regulate through the impact with a person's capacities and reactions (Bandura, 1991; Bandura & Wood, 1989). Bandura and Jourden (1991) stated that research on organizational management corroborated when a person exhibited self-regulatory factors. They also mediated social-comparative factors on motivation and many attainments (Bandura & Jourden, 1991). For

example, people given feedback that their performance was superior to their comparators attained an efficacious orientation that was self-regulatory (Bandura & Jourden, 1991). Compared to individuals who struggled to gain mastery, people who believed they accomplished relative superiority also set minimal challenges for themselves and felt satisfied with conventional performance attainments for surpassing the accomplishments of their peers (Bandura & Jourden, 1991). Satisfied assertion created little incentive for people to expend effort (Bandura & Jourden, 1991).

There were noticeable and differentiating impacts on self-regulating circumstances and structured outcome accomplishments between similar arrangements of continuous improvement and gradual recession (Bandura & Jourden, 1991). Motivation through people's standards comprised of cognitive comparison processes (Bandura & Cervone, 1986). For example, as people made commitments to precise criteria and expectations, their anticipated severe distinctions among roles and the approach they sought created discouragement that served as an incentive for enhanced encouragement (Bandura & Cervone, 1986). Bandura and Cervone's (1986) study showed that when people applied self-evaluative reactions as measurable antecedents to motivational change, they gained explicit affirmation that self-reflection supported incentive.

Bandura and Jourden (1991) found that social comparisons had beneficial and deficient effects that were not readily avertable in combative structured organizations. People tended not to abandon achievement pursuits and cooperatively formal groups (Bandura & Jourden, 1991). Therefore, people challenged themselves to let go of the discouraging effects of damaging social comparison (Bandura & Jourden, 1991). Having an inherent ability and belief system in controllability helped people attain motivational influence, self-esteem for improvement, and self-reflection upon repeated deficiencies and failures (Bandura & Jourden, 1991).

Affective Consequences of Dysfunction in Self-Regulation

In processes to analyze self-regulation through formation and functions operated over conditional self-evaluations, guidelines, and effort with inspiration was stressful for individuals (Bandura, 1986). Self-directedness provided people with essential and continuing sources of personal sustainability, interest, and self-esteem where people had success in

meeting goals and built a sense of identity (Bandura, 1986). People who did not have goals and evaluative involvement remained bored, became uncertain with their abilities, and depended on outside incentives for fulfillment (Bandura, 1991). Dysfunctional standards of reflection internalized served as causes of Internalization of dysfunctional standards of self-evaluation served as a source of recurrent depression (Bandura, 1991).

People who used self-regulation processes produced effects that were emotional and undermined outcome inspiration and mental health (Bandura, 1991). Numerous flaws individuals inflicted on different people arose through deficiencies in the self-regulation where their accomplishments rarely gave them a sense of fulfillment (Bandura, 1991). The same individuals judged others brutally by the same standards, experienced inflicted stress, despair, and depreciation (Bandura, 1991). People who negatively tolerated a fundamental movement of standardization were prone to despondency and could alter their remembrance of themselves in disparaging control (Bandura, 1991). Contrary discrepancies depleted motivation and produced disheartened mood changes among individuals who judged their behavior as lagging in efficacy to gain challenging outcomes (Bandura, 1991).

Cognitive Regulation of Motivation Development

In conclusion, self-regulation is a multistep phenomenon that provided some subsidiary cognitive processes that included standard setting, self-monitoring, evaluation, assessment, and effective response (Bandura, 1991). Psychological governance of inspiration relied on positive expectations instead of adverse reactions (Bandura, 1991; Schooler, 1987). People could exhibit forethought, self-appraisal that was reflective, and provided their sense of responsibility that gave eminence to psychologically based inspiration in the operation of personal agency (Bandura, 1991; Bandura, 2001; Locke & Latham, 1990). Through anticipation, individuals guided and moved to future events (Bandura, 2001; Schooler 1987). As individuals progressed through their cycle of life, they continued to strategize, reordered their calculations, and structured their plans appropriately (Bandura, 2001).

Bandura's (2002) functional relations studies revealed the brunt of social foundation on learner engagement intervened through anticipated self-efficacy. Social regulators raised assumed efficacy that, in turn, increased learner engagement and more significant

achievement in both school and home (Bandura, 2002). Children with weak self-regulatory efficacy skills and socially disengaged from other children tended to demonstrate increasing commitment in the introverted behavior despite if they followed a proper orientation or collective culture orientation (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Bandura, 2002).

During primary school, parental, educational, and friendship guidance contributed to learners and their sense of academic progress (Bandura, 2002). When students went through secondary education, maternal types of advice from adults declined, whereas, paternal levels of support from adults increased (Bandura, 2002). Father figures as role models supported adolescents in preparation for professional development (Bandura, 2002). Thus, the levels of the contrasting influencers could change through age (Bandura, 2002). However, any assumed level of self-efficacy retained its limited value during the person's lifespan (Bandura, 2002).

Within types of parenting styles, autonomous practices, inspiration, and affection increased measurably as learners gained authority over their maturation (Collins & Laursen, 2004; Eccles, 2007; Steinberg & Silk, 2002). Parental independence supports provisioned moments for adolescents to select, serve in making decisions, and form explanations to situations freely (Grolnick & Ryan, 1989; Wong, 2016). Parental governance included giving concise and constant direction and preserving awareness regarding adolescents' locations, exercises, and peer associations (Coley & Hoffman, 1996; Fulton & Turner, 2008; Juang & Silbereisen, 2002). These parental styles affiliated with conclusions in teenage development as well as immediate conclusions like learner commitment and attainment (Juang & Silbereisen, 2002).

Adolescent Beliefs and Cognitive Development

Expectancy-value theory focused on how early adolescents valued and believed in their abilities could influence their progress in school and work settings. Eccles and Wigfield (2002) claimed that expectancies for success are when learners begin to believe in their ability regarding their progress on future and long-term assignments. Ability beliefs consisted of individuals' assessment of their current competence in evaluating their ability and supported how individuals compared their ability with the ability of others (Eccles & Wigfield, 2002). Individual beliefs regarding ability and expectations for progress predicted

school outcomes and activity choice (Wigfield et al., 2009). For example, research showed that an individual's self-concept of mathematics ability measured in elementary school predicted their plan to pursue a mathematics-related career or course of study in middle and high school (Eccles & Wigfield, 2002; Watt, 2006; Wigfield et al., 2009).

Pre-adolescence represented a probable time where learners' developing views of who they were influenced their career decisions and class selections (Jodl et al., 2001). Individuals anticipated prospective actions with consequences to setting and accomplishing goals and had coordinated courses of action that supported desirable outcomes (Bandura, 1991). With anticipation, individuals empowered and established their responses in anticipatory ways (Bandura, 1991).

Bandura's (2002) cognitive theory described how psychosocial functioning attributed triadic reciprocal causation. An individual's environment, cognition, and behavior all interacted to support achievement to determine how an individual would function (Bandura, 1991). Human behavior motivation evolved through exercises of self-influences (Bandura 1991). Systems of self-regulation lay at the very heart of causal processes (Bandura, 1991). Self-regulatory systems provided external influences that promoted the very basis for purposeful action (Bandura, 1991).

During puberty was a development stage where young people developed interpersonal relationships and social adjustment (Steinberg, 1990; Youniss & Smollar, 1985). Adolescents began to experiment with their interdependence from adults (Steinberg, 1990; Youniss & Smollar, 1985). A common challenge in the development of young adolescents was their ability to transition to a middle school where adolescents perceived that teachers no longer cared and believed they had limited moments to form essential friendships with peers (Eccles & Wigfield, 2002; Wentzel, 1998). As a result, young adolescents negotiated and developed acquaintances with adults and peers with less than ideal circumstances (Wentzel, 1998). As young adolescents established supportive relationships in middle school, their level of performance also enhanced and led towards the adoption of valued goals (Wentzel, 1998).

Supportive relationships associated precisely to educational attainments that could be autonomous of their alliances to inspirational performance (Wentzel, 1998). For

example, favorable adults and friends provided learners with academic experiences that led straight to cognitive, social knowledge, and educational attainment (Wentzel, 1998). There were also connections among complimentary relationships and learning outcomes that merely reflected the positive influence of social support on student motivation. Few studies had examined these associations in social relations, student motivation, and academic achievement (Wentzel, 1998).

Adolescents learned to set goals in directing their behavior towards outcomes they wanted to achieve in middle school (Bandura, 1986). The goals of achievement held by school staff including teachers and administrators reflected aspirations for learners to advance socially, morally, and intellectually (Wentzel, 1998). Wentzel (1998) stated that middle school students who were successful academically reported that they established culturally supportive and scholarly ambitions during their adolescent experience.

Middle School Programs

To better understand how adolescents transitioned into middle school, the literature review provided a historical overview of middle school program development. Burchinal, Roberts, Zeisel, and Rowley (2008), Langenkamp (2010) Froiland, Peterson, and Davison (2013), and Riha, Slate, and Martinez-Garcia (2013) stated that middle school was a crucial period in the academic development of learners. The National Middle School Association (NMSA, 1995) documented requirements of younger adolescent students varied from the needs of older adolescents socially, psychologically, and academically (National Middle School Association [NMSA], 1995). A young adolescent's social development influences could be through contact with more former high school students (Carmichael, Wilson, Finn, Winkler, & Palmieri, 2009; Mac Iver & Epstein, 1993; NMSA, 1995). Additionally, early adolescent placement with elementary students resulted in slower academic progress (NMSA, 1995). Thus, to support students during their adolescent stage of development, educational reformers had suggested that middle-level campuses include grades five or six through eight and high schools serve students in grades nine through twelve (Riha, Slate, & Martinez-Garcia, 2013).

During the adolescent developmental stage, indicators of future academic performance surfaced (Bough, 1969; Hansen & Hearn, 1971; Riha et al., 2013). Outcome attainment expectations represented aspirations to attain success perceived through individual

experiences with the results of assignment completion (Irvin, 1995; Wentzel, 2008). Far from educational ambition expectancies that explained why learners put forth the effort to attain expectations, performance expectations reflected how students desired to obtain a social requirement.

The Impact of Middle School Student Performance

Research on the impact of performance on learners' transitioning from middle school to high school was marginal despite the critical turning point that middle school represented for young adolescents (Krupa, 2011; Riha et al., 2013). The successful transitioning to middle school was an experience shared by 88% of all public-school children in the United States (Riha et al., 2013). The United States Census Bureau estimated that in 1992, about 12% of youth between sixteen and twenty-four were dropouts and in 2008, the United States Census Bureau reported that the percent of dropouts decreased to eight percent (Riha et al., 2013).

Balfanz (2009) pursued many collaborative groups of Philadelphia learners from grade six through one-year post on-time graduation. He contended that grade six students who failed mathematics or reading were absent for 20% or more of the academic school year, or repeatedly displayed undesirable attitudes in a learning subject that had up to a 20% chance of graduating at the end of grade twelve (Balfanz, 2009). Balfanz (2009) added that less than one out of every four students who demonstrated a probability of not graduating on time was able to graduate after one additional year. For example, a sixth grader who portrayed the lack of ability to complete assessments in mathematics or English, and did not complete classroom tasks, would unlikely change their pattern of ability without some successful intervention (Balfanz, 2009). The findings were considered accurate for individuals in low socioeconomic settings where supplies were limited (Balfanz, 2009).

When students entered high school with patterns of classroom failure, they lacked the knowledge, the mindset, discipline, perseverance, and self-esteem to complete high school (Balfanz, 2009; Haverback & Mee, 2013). The students could also feel distanced from relationships with their peers (Balfanz, 2009). If the students continued to fail and did not earn promotion to the tenth grade, they were likely to wait until they had reached the legal age to drop out (Balfanz, 2009; Haverback & Mee, 2013). Similar trajectories seen were for eleven and twelve-year-old's who were absent for several school days or who displayed continual

disruptive behavior in the classroom (Balfanz, 2009). Riha et al. (2013) asserted that transitioning from elementary to middle school was particularly difficult for several adolescents because it often involved a change in campus and school students. Students within those categories could not engage and participate in class (Balfanz, 2009; Haverback & Mee, 2013). Learners often experienced a decrease in educational performance when they transitioned from middle school to high school (Evans & Lester, 2010; Riha et al., 2013). If the behaviors were not self-corrected over time, the actions could lead to academic failure and the probability of not graduating, unless the students received some successful intervention (Balfanz, 2009; Kiplinger & Lim, 1994).

Furthermore, the 2008 National College Admissions Examination, emphasized that a critical defining point existed for students on the college and career readiness path (National College Admissions Examination [ACT], 2015). Students who were not projected to pursue careers or ready for college when they reached the critical defining point could suffer negative and irreversible consequences (Bassiri, 2014). Riha et al. (2013) described college preparedness as the level of education a learner receives and successfully demonstrates proficiency in a course for credit beyond receiving an intervention. Through academic classes, the National College Admissions Examination (ACT, 2015) established that learners who prescribed to suggested essential subjects were ready for attending college or pursuing a career. In preparation for school, learners were required to have three years of mathematics, social studies, and science, and four years of English (ACT, 2015). The benchmarks were scored through academic-specific exams on the ACT to show the degree learners could attain with examples such as 50% probability of earning a "B" or greater or proximal 75% probability of earning a "C" or higher in reciprocal beginning-year credited classes (ACT, 2015). The college classes included Algebra, English composition, biology, and social science courses (ACT, 2015). With a sampling of 214 educational settings and more than 230,000 learners around the country, the reference points included universal class employment principles for the educational backgrounds and standards (ACT, 2015).

In 2008, fewer than 20% of grade-eight students were on track to receive the necessary preparation for university-level course-work after graduating high school (ACT, 2015). Beneficial study habits developed in middle school contributed to academic readiness for college and careers (ACT, 2015). The researchers asserted that increasing college and career readiness required academic interventions before students entered high school (ACT, 2015).

Further, ACT (2015) argued that despite successful completion of eighth-grade exit examinations, many ninth-grade students were unprepared for the rigors of high school coursework. ACT (2008) data showed that fewer than two-in-ten grade-eight students were prepared for university-level assignments after graduating from high school. The data revealed that more than eight of ten learners in grade-eight did not have the capacities needed for high school (ACT, 2015). The doors for high school were supposedly accessible for all learners (ACT, 2015). However, with 80% of the learners and higher, the doors to their futures were already closed (ACT, 2015).

To prepare U.S. students for careers and college readiness, stakeholders in education needed to intervene during elementary grades and middle school, before entering high school (ACT, 2015; Common Core State Standards Initiative [CCSS], 2015). Younger learners who enrolled in stringent courses were more probable to complete high school in preparation for college (ACT, 2015; CCSS, 2015). Also, the standard of educational attainment that learners achieved by grade-eight had a more significant influence on their career and college preparation than during high school (Bassiri, 2014; ACT, 2015).

In 2015, the nation had 1,924,436 learners from the graduating class taking the ACT (ACT, 2015). The students who took the assessment represented an approximated 59% of the national graduating class from 2015 and represented an increase in graduates taking the ACT assessment since 2011 by 19% (ACT, 2015). While close to 90% of nationwide graduates made the evaluation, this analysis characterized a portion of the learners, and the outcomes represented learners who took the exam, instead of the entire class who graduated (ACT, 2015). There was a smaller percentage of Caucasian students who took the 2015 ACT assessment than the rate of Caucasian students who took the 2011 ACT assessment (ACT, 2015). There was an 18% increase of first-generation graduate students and students with parents who did not receive college courses who took the National 2015 ACT assessment (ACT, 2015).

There were also growing participation among college-bound learners who took the Scholastic Aptitude Test, or SAT (College Board Program Results, 2015). According to the College Board Program Results (CBPR, 2015), record 1.70 million students took the SAT from the class of 2015, compared to 1.67 million students from the graduating class of 2014 and 1.65 million in the class of 2011. Minority students accounted for 32.5% of all students who took

the SAT in the class of 2015, compared to 31.3% in the class of 2014 and 29.0% in the class of 2011 (College Board Program Results, [CBPR], 2015; National Center for Education Statistics [NCES], 2013). There were 25.1% of the students using a fee waiver, compared to 23.6% for the class of 2014 and 21.3% for the class of 2011 (CBPR, 2015).

Racial Achievement Disparities

Achievement disparities between minority students and Caucasian students had become a substantial barrier to racial equality and social justice (Paige & Witty, 2010). Holcomb-McCoy (2007) defined the achievement gap as the academic achievement inequality that existed between one group of students and another. Evidence of gap of achievement among Caucasian and minority students manifested through grades. The achievement gap also showed in dropout rates, standardized examination scores, and enrollment in advanced placement courses (Bonastia, 2012; Brunn-Bevel, & Byrd, 2015; Johnson, 2014; Lewis-McCoy, 2014; Metz, 2010; No Child Left Behind [NCLB], 2001; & Strayhorn, 2010). The National Assessment of Educational Progress (NAEP, 2012) concluded in that thirteen-year-old Caucasian students obtained higher average scores than did seventeen-year-old African-American students. Similarly, thirteen-year-old African-American students scored more than 20 points lower than thirteen-year-old Caucasian students (Perie, Moran, & Lutkus, 2005). The NAEP determined that the science scores of Hispanic nine-year-old students lagged more than three grade levels behind their Caucasian peers (Perie et al., 2005). According to NAEP, 90% of Caucasian students graduated from high school; whereas only 81% of African-American learners and 63% of Hispanic learners achieved a similar accomplishment (Perie et al., 2005).

Data from the U.S. Department of Education suggested that academic differences among Caucasian and African-American learners persisted even-though years of school initiatives and government policy regulations focused on decreasing the African-American vs. Caucasian achievement gap (Riegle-Crumb & Grodsky, 2010; Strayhorn, 2010). Caucasian students exhibited a higher rate of college readiness than African-American and Hispanic students in reading and mathematics (Bassiri, 2014; ACT, 2015; Bonastia, 2012; Brunn-Bevel, & Byrd, 2015; Johnson, 2014; Lewis-McCoy, 2014; Metz, 2010; NCLB, 2001; Strayhorn, 2010). A comparison of African-American and Caucasian students with standardized examination scores revealed that Caucasian students outperformed African-

American students by as much as 75% (Paige & Witty, 2010). Paige and Witty (2010) contended that Caucasian students were two times likely to earn a post-secondary degree than African-American students. Darling-Hammond (2010) noted that approximately 40% of U.S. citizens attended college, whereas only 20% of African-American and Hispanic students obtained a college degree.

Paige and Witty (2010) found African-American students were more likely by three times to be committed to institutions, prisons, and other institutional facilities comprised of people from ethnic minority backgrounds. Darling-Hammond (2010) documented that U.S. prisons populated had individuals who were high school dropouts and functionally illiterate. Also, according to McKinsey and Company (2009), the gap in achievement linked to lower financial earnings, poorer health, and increased incarceration rates. McKinsey and Company (2009) contended that closing the achievement gaps among African-American, Caucasian, and Hispanic learners could result in the addition of $525 billion to the annual national economic output.

Factors that Support the Academic Success of Middle School Students

Traditionalists and progressives engaged in pedagogical wars recently undertaken were by proponents and adversaries of standardized testing practices (Popham, 2010). Perspectives from traditionalists in education advocated for competence (Krupa, 2011; Ravitch, 2000). Traditionalists used direct teaching approaches that aligned with prescribed methods in textbooks with practices that allowed students to recall the information and recite factual knowledge (Krupa, 2011; Ravitch, 2000). Teachers used textbook scripts and rarely operated from a position of deep knowledge about content (Ravitch, 2000). Ensuring the quality of education to support opportunities for student achievement has been a challenge for fellow educators (Krupa, 2011; Ravitch, 2000).

John Dewey (1997a) advocated for progressive education. Progressives in education changed the pedagogical focus from teacher-centered, fact-centered, recitation-based classrooms to more learner-centered classrooms. Pedagogical learner-centered classrooms served to understand learner capacities and student thought processes to learn ideas in the context of real-life problems (Dewey, 1997a). Dewey (1997b) pointed out the importance of student-focused learning communities that cultivated an educational setting where learners

collaborated in problem-solving that promoted critical thinking skills. Complex issues of effectively preparing students to become active members of society was a battle between traditionalists and progressives in education. Dewey (1997a) believed that the ability to prepare students in, "adult activities thus depended upon a prior training given with this end view" (p. 9). Intentional agencies such as schools provided explicit materials where studies were devised (Dewey, 1997a). Dewey (1997a) believed that students needed a formal education to transmit all resources and achievements of a complex society where educators provided resources to make student experiences productive and significant.

The desire to provide a more developmentally appropriate environment for early adolescents prompted a national movement to reorganize middle schools where middle-level educators became more knowledgeable about the developmental requirements of pre-adolescents (Education Encyclopedia, 2018; Clark & Clark, 1993). Clark and Clark (1995) suggested increased ability groupings, departmentalization, and high student-to-counselor ratios led to teacher dissatisfaction and the inability to accommodate the commitment of adolescent learners. Riha et al. (2013) hypothesized that learners who were not developmentally prepared in middle school failed courses but also lacked self-confidence in having skills necessary to succeed academically (Riha et al., 2013). Again, the results of prior progress on recent progress determined learner's abilities and expectancies for success. Academic progress in middle school, specifically in grade-eight, had a greater influence on career preparation and college readiness than any other academic event (Bassiri, 2014). Riha et al. (2013) documented that retention rates of grade nine students were three to five times higher than previous grades.

Cooney and Bottoms (2002) recommended that all grade-eight students and their parents become aware of the high school courses that adequately prepared students for academic success and future career options. Riha et al. (2013) reported that course selection in middle school was academically important because high school placement was via student courses taken before high school enrollment. Cooney and Bottoms (2002) suggested that high school readiness indicators included: (a) successful completion of Algebra 1 I or pre-Algebra 1; (b) laboratory and technology experiences with the various sciences; (c) the ability to comprehend and interpret materials by synthesizing and analyzing required texts; (d) competence in completing writing assignments; and (e) development of appropriate study, organizational, and time management skills. Riha et al. (2013) reinforced the importance of

these indicators and stated that effective cognitive and metacognitive strategies were integral parts of a curriculum that allowed students to become critical thinkers.

Middle School Mathematics Achievement

Mathematical achievement in middle school encompassed a comprehensible advancement of knowledge, including a prominence on ability with fundamental topics. According to the 2008 National Mathematics Advisory Panel report or NMAP, American attainment in mathematics was standardized when compared with other countries (National Mathematics Advisory Panel [NMAP], 2016). In 2008, 32% of American learners who were on-level or beyond "proficient" in grade-eight (NMAP, 2016, p. xxi). The data from NAEP (2012) with university entrance exams used Scholastic Aptitude Tests (SATs) to show characteristics. The data showed that students from all races made gains in mathematics (NAEP, 2012).

However, minority students which included African-Americans, made less progress on average when compared with Asian and Caucasian learners (Lubienski, 2006; Strayhorn, 2010). Studies showed that factors such as poverty, preceding student performance, and how learners viewed their mathematics teachers with achievement had a consequentially substantial impact on student learning (Greene, Winter, & Forster, 2003; Strayhorn, 2010). The condition of the educational program, pedagogical assets for learners, among predictive changes which include household surroundings, social and economic condition-oriented students towards focusing on academics and mathematics in general (Gunbas, 2014; Middleton, 2013). Combining the predictive modifications represented a multiplex setting where motivational changes exerted their impact on teaching and learning (Greene, Winter, & Forster, 2003; Middleton, 2013).

There were continual discrepancies in mathematics attainment connected to race and monetary distinctions (NMAP, 2016). These differences were not only overwhelming for learners and households and predicted not well for future leaders, after achieving greater advancement standards of free communities of minorities (NMAP, 2016). Numerous spectators of academic policy viewed Algebra 1 as a fundamental responsibility (NMAP, 2016). The subtle decline of attainment in mathematics acquisition in the country began as learners reached grade-eight to start their coursework in Algebra 1 (NMAP, 2016). Inquiries consistently occurred regarding how learners became ready for taking Algebra 1 (NMAP,

2016). Taking Algebra 1 during middle school demonstrated to be an entrance towards higher-level mathematics attainment. Learners that completed Algebra 1 by grade-eight had an opportunity to enroll in accelerated mathematics classes later at the secondary level such as Calculus and Statistics (NMAP, 2016). Research had shown that completion of Algebra II correlated to students being more than likely to complete college when compared with students with limited preparedness in mathematics (NMAP, 2016).

Middle School Achievement in Mathematics

According to the Institute of Education Sciences (IES, 2015), student performance-based tests had been conducted in 1969 and every two or three years. The NAEP (2012) frequently introduced as The Nation's Report Card, is a referential data source for judging America's progress in education in the tested subject areas (Institute of Education Sciences [IES], 2015). The National Assessment Governing Board (NAGB, 2008) prohibited state administrators and federal officers from making any judgments about student performance in a state based upon its proficiency scores. That was to say, state educational policymakers and school officials could not determine passing rates according to Annual Yearly Progress or (AYP) requirements for proficiency for the state dependent upon any portion of NAEP score data (National Assessment of Educational Progress [NAEP], 2012). According to Linn, Graue, and Sanders (1990), many written articles were both for and against the use of NAEP data as an AYP indicator, and there had been calls to include precise data for future decision-making policies. The NAEP tracked continued student progress in multiple subject areas in fourth, eighth, and twelfth grades across the country (NAEP, 2012).

The relative number of grade-eight learners in the country's public setting who took Algebra 1 or higher-level mathematics course grew by two-fold since 1990 (Domina, 2014). Domina conducted a study with 6,425 students at an average age of 13.7 (Domina, 2014). The results of the longitudinal study indicated that higher-level mathematics courses in middle school boosted learner attainment in mathematics where the effects were most noticeable in academic subjects carefully affiliated to course information and could be dependent on learner educational preparedness (Domina, 2014). In a similar study, Dougherty, Goodman, Hill, Litke, and Page (2015) investigated the impact of assigning middle school students from North Carolina's Wake County Public School System (WCPPS) to accelerated mathematics and eighth-grade Algebra 1 based on a defined prior

achievement metric. The school system adopted a policy that reduced the relationship between course assignment and student characteristics such as income, race, and ethnicity while increasing its relationship to academic skill (Dougherty, Goodman, Hill, Litke, & Page, 2015). The policy increased the standard deviation number of students on track for eighth-grade Algebra 1 by 0.08 (Dougherty et al., 2015). Students placed in accelerated mathematics classes received higher-skilled peers in larger classes (Dougherty et al., 2015). Dougherty et al. (2015) found that the mandatory implementation of the WCPSS mathematics acceleration policy across student subgroups defined by gender, race, and ethnicity, increased overall participation in acceleration mathematics courses. Female students in the accelerated mathematics courses proportionally represented their enrollment with the district (Dougherty et al., 2015).

However, while enrollment rates for African-American and Hispanic students also improved due to an implementation of the WCPSS mathematics acceleration policy, neither group of students has achieved representation in accelerated courses that is proportional to their overall share of district enrollment (Dougherty et al., 2015). Likewise, Domina's (2014) analysis of class inductions indicated that fewer U.S. minorities and students from low-income backgrounds had less access to enroll in advanced classes. The discrimination against these students to access higher-level mathematics courses also correlated and helped interpret the achievement gap among the different races of students and their socio-economic status (Domina, 2014).

Factors that primarily influenced course inductions into middle school mathematics courses included elementary attainment scores in mathematics, literacy assessment scores, instructor's perceptions of learner engagement practices, and learner attainment scores acquired at the start of primary school (Domina, 2014). Dougherty et al.'s (2015) study revealed that policies, which based mathematics placement assignments solely on demonstrated student ability, might not be sufficient to enhance long-standing imbalances in access to accelerated mathematics courses. Systems such as the WCPSS middle school mathematics acceleration policy served to diminish income and race factors that determined a student's mathematics course placement (Dougherty et al., 2015).

Although Domina (2014) and Dougherty et al. (2015) agreed that placing learners in higher-level mathematics courses during middle school had mostly a positive impact on student

attainment, Domina (2014) stated that not all students could equally benefit from placement in advanced mathematics courses. Many students were not ready for the learning expectations affiliated with being in advanced classes, particularly mathematics, during their middle school experience (Domina, 2014). For example, Simzar, Domina, and Tran (2016) conducted a study that used student panel data from 3,306 eighth-grade students to study the comparison among students placed in Algebra 1 and student incentive for mathematics. The changes included learning objectives, expectancies, and encouragement for learners enrolled in Grade 8 Algebra 1 in comparison with other Grade 8 students who were taking lower-level classes in mathematics (Simzar, Domina, & Tran, 2016). Students who received Algebra 1 showed an increase in avoiding performance outcomes but decreased in areas such as self-esteem and student incentive (Simzar et al., 2016). The attenuated association worked for learners who acquired excellent grades in mathematics before taking Algebra 1 (Simzar et al., 2016). As a result, all learners indicated an overall decrease in mathematical performance after taking the Grade 8 Algebra 1 class (Simzar et al., 2016).

The Grade 8 students who previously attained accelerated grades before taking Algebra 1 maintained an increase in their ranks and performance (Simzar et al., 2016). The students who excelled in mathematics before taking the Grade 8 Algebra 1 class, benefitted motivationally after taking the course (Simzar et al., 2016). Whereas, many students who typically had average or low performance in mathematics before taking the Grade 8 Algebra 1 class, could experience poor performance which could also be adverse towards their inspiration and mathematics attainment (Simzar et al., 2016).

Domina (2014) wanted more opportunities for students to take advanced mathematics courses in elementary school. Elementary schools provided differentiated mathematics instruction for students with opportunities to learn and gain access to an accelerated curriculum (Domina, 2014). Future studies could investigate established and casual discernment in elementary mathematics preparation (Domina, 2014; Kepner & Huinker, 2012; McCallum, 2012). Eighth graders who took higher-level mathematics courses in middle school made limited connections with mathematical domains and the implemented mathematics curriculum (Domina, 2014).

The attainment impact of higher-level middle school mathematics course enrollment could be contingent upon the match among learners' competency in mathematical problem-

solving and the level of exposure that the learner has with the course (Domina, 2014). Domina (2014) cautioned that increasing higher-level mathematics course placements reached a mark of decreasing performance as students took classes for which they were unprepared. The exposure to an advanced curriculum and educational experiences for below-standard performance learners along with designs that tailored instruction to learners specifically could support the learners for taking a higher-level mathematics course during middle school (Domina, 2014; Dougherty et al., 2015). The future research considered curricular innovations that helped support students for Algebra 1 instruction, along with academic and regulatory renovations that motivated and prepared learners to perform when they enrolled in advanced mathematics courses. (Domina, 2014; Dougherty et al., 2015).

According to the National Mathematics Advisory Panel, (NAMP) (2016), the curriculum in mathematics for pre-kindergarten – eight could be modernized to reflect a descriptive account of essential subjects. The learning environment supported student motivation and used behavioral indicators such as choices made, effort expended, persistence applied, and challenges sought (Patrick, Turner, & Strati, 2016). Children were motivated to learn mathematics by noticing the influence of having a substantial beginning to their schooling that focused on the reciprocal emphases of visionary consideration, proceeding eloquence, automated recollection of the details, and attempts at an effort that counted in mathematical attainment (NAMP, 2016).

Motivation in Mathematics

Mathematical knowledge and students' motivations were the most linear predictors of student achievement and performance in which tutoring, instruction, and institution organization could have an influence (Eccles & Wigfield, 2002; Han, Cetin, & Matteson, 2016; Middleton, 2013; National Research Council [NRC], 2001). The student performance and achievement factors influenced multiple social, psychological, and cultural determinants, to interact with the learner (Middleton, 2013). Motivation arguably served as a keystone to connect the psychosocial luggage taken by the student with the learning environment, to activate the potential future directions made by the learner (Han, Cetin, & Matteson, 2016; Middleton, 2013). For example, achievement affected student interest where progressive learners tended to show greater enthusiasm in mathematics than shallow learners (Middleton, 2013). Prospective investigations could further examine the data

between significance and attainment, controlled by effort, course selection, and other critical student-related interests affiliated to mathematical understanding (Middleton, 2013).

Adolescent learners' beliefs regarding their ability and progress in mathematics increased over time as the learners increased their capacity to become mathematical problem-solvers (Middleton, 2013). The increase could be due to researchers who studied the progression of motivation and characterized how motivation influenced student learning and achievement in subjects such as performance on an Algebra exam (Middleton, 2013). Evidence from Middleton's (2013) study showed that achievement and motivation were developmental, interconnected, and regulated by the development of educational experiences. During the middle grades, learners tended to demonstrate less interest in mathematics courses, lower self-efficacy in mathematics, and more average performance over time (Middleton, 2013). Middleton's (2013) longitudinal study tested a model of interaction that analyzed a few critical motivational elements that influenced literature on academic achievement after students had completed middle school. The longitudinal study consisted of 21,000 ninth graders from 944 public and private schools where data collection related to learners' decisions on courses taken after completing middle school, occupations to attain, their aspirations for progressive education, and their ideas for collaborating in their pursuits (Middleton, 2013). Middleton analyzed factors of combined influence with structural equations modeling (Middleton, 2013). Specific information collected was on demographics and surveys from parents, science teachers, mathematics teachers, school administrative personnel, and academic support personnel (Middleton, 2013).

Middleton's (2013) study revealed that student interest had positive, healthy relationships among utility, self-esteem, and effort (Middleton, 2013). Self-esteem led to students' developing a mathematical identity (Middleton, 2013). The study showed key motivational variables interacted to significantly influence students' identity in mathematics and success where interest acted centrally construct utility, effort, and self-efficacy were promoted (Eccles & Wigfield, 2002; Middleton, 2013). The recruitment of effective and non-progressive academic designs through learners combined with internal and external directions that were essential (Eccles & Wigfield, 2002; Middleton, 2013). A person's effect and intimacy with academic pursuits were a consequence of learning and achievement but also acted significantly in helping students select assignments to expand their performance (Middleton, 2013).

Additional studies that modeled a structural equations approach showed congruent results. De Lourdes Marta, Monteiro, and Peixoto (2012) examined other variables that predicted achievement in mathematics for grade seven, ten, and twelve. Findings indicated that interest significantly predicted course selection (De Lourdes Marta, Monteiro, & Peixoto, 2012). The achievement was enhanced through course selection (De Lourdes et al., 2012). As an example, De Lourdes Marta et al. (2012) concluded that students' attitudes towards learning in middle school affiliated to incentives. The lessening of prejudice towards mathematics could be affiliated with the reduction of internal stimuli, confidence related to student opinions, enthusiasm, and work-ethic that occurred in middle school (De Lourdes Marta et al., 2012).

The distinctions in the arrangements of progressive and lagging performers seemed to encourage the belief of distinctions on how challenges established through mathematical learning was also sensed from learners within distinctive groups (De Lourdes Marta et al., 2012). For accelerated achievers, mathematical tasks became challenges that could motivate students and supported student learning (De Lourdes Marta et al., 2012). Also, mathematics teachers were challenged to implement mathematical curriculums that required higher-level problem-solving, critical thinking, and abstract reasoning (Larsen & Puck, 2020; De Lourdes Marta et al., 2012). Likewise, Marsh (1989) showed that student's development of a mathematics concept could predict better marks than exam totals as a formula of attainment. Middleton (2013) found that interest predicted the selection of courses, and with class choices, attainment increased among all the grades assessed. A self-concept in mathematics could better predict progress instead of exam totals as proof of achievement (Middleton, 2013: Popham, 2010). Classroom grades provided feedback for students to develop academic concepts (Middleton, 2013). A learners' progression on an independent exam of achievement, is considered as a small portion of the student's overall performance (Middleton, 2013, Popham, 2010).

Middleton (2013) stated that researchers emphasized learners' senses regarding their measurable progress, their assurances about their ability, and self-esteem, as parts of accomplishments that fostered extrinsic and internal motivation, and the common description of incentives in setting (Middleton, 2013). The perspectives theoretically helped characterize the values, beliefs, and goals of learners (Middleton, 2013). The perspectives helped control the academic design consisting of (a) the impact of the principles and ambitions regarding

decisions with attempts, (b) persistence with complex assignments, and (c) alternatives that could academically accelerate their measurable progress (Middleton, 2013). Students' creation of interest in mathematics aligned with their values, gratification, internal inspiration, character, and self-esteem (Eccles & Wigfield, 2002; Middleton, 2013; Telese, 2012). Emotionally, when students experienced pleasure or excitement from their mathematical experiences, their emotions served an educational part to alert the learner about their position as a possibility to become fascinating (Middleton, 2013). The student's emotional reaction was reliant upon the particular significance of the mathematical assignment, social factors involved, and conclusions (Middleton, 2013). Thus, motivated students engaged in exciting mathematical activities and engendered their positive feelings (Middleton, 2013).

Students who lacked motivation would only exert the amount of effort needed for completing a task (Middleton, 2013). Jarvis and Seifert (2002) interviewed 20 grades six and seven students labeled as work avoidant in a study that suggested work avoidance as an attribute of achievement goal theory. The findings indicated that students felt inferior to other students who were motivated to complete learning goals, and their work lacked meaning other than the completion of a task (Jarvis & Seifert, 2002). The explanation for why a student could become work avoidant was that they were either failure-avoidant, thinking that their ability to do the work revealed something about their self-worth or they considered the label "learned-helplessness students" (Seifert, 2004, p. 143). This learned helplessness caused students to avoid work or to refuse to do work only because they did not think they could do the task. Still, other students displayed passive-aggressive behaviors. As a result, they withheld their efforts of a teacher embarrassing or mistreating them unfairly (Seifert, 2004).

The role of the teacher was a guiding factor that affected middle schoolers with mathematics motivation (Middleton, 2013). Any teachers who employed student-focused strategies could advance the common inspiration in their classes, by constructing more engaging activities (Middleton, 2013). A mathematics program required effective teaching that engaged students in meaningful learning through individual and collaborative experiences that promoted the individual's ability to make sense of mathematical ideas and reason mathematically (NCTM, 2015). Effective teaching of mathematics established more explicit goals for mathematics that students were learning, situated goals within learning progressions, and used purposes to guide instructional decisions (NCTM, 2015).

Impact of Culture/Environment in Mathematical Achievement

Dominant cultural beliefs about the teaching and learning were obstacles to consistent implementation of effective teaching and learning in classrooms (NCTM, 2015). When it came to beliefs about teaching and learning, mathematics learning focused on gaining an interpretation of thoughts and procedures through solving problems, reasoning, and discourse (NCTM, 2015). All students should have a range of strategies and approaches from which to choose in solving mathematical problems, including, but not limited to, general methods, standard algorithms, and procedures through solving contextual and mathematical problems (NCTM, 2015).

Family and cultural environments also provided a guiding factor that impacted students and their motivation to learn mathematics (Middleton, 2013). Strayhorn (2010) used data from a 2000 National Education Longitudinal Study to conduct a hierarchical linear regression analysis to approximate the significance of strategies such as parental engagement, teacher impressions, and school climates on African-American learners' mathematics accomplishments in Grade 10. His hierarchical regression analysis showed that six percent of the variance in mathematics achievement could account for the combination of history and psychologically-social variables (Strayhorn, 2010). The study also showed that 14% of the difference in mathematics attainment explained the connection between history and psychologically-social variables (Strayhorn, 2010). Strayhorn's (2010) study showed that 20% of the difference in mathematics attainment explained the categories that comprised of gender, level of education from parents, prior attainment in mathematics, the parental arrangement of control, parental expectations, praise from teachers, and level of homework completion. These factors showed a significant influence on the mathematics regulation among African-American learners receiving free and reduced meal plans (Strayhorn, 2010). Strayhorn's (2010) study showed that African-American students with college-educated parents performed better-concerning mathematics achievement than with non-college educated parents.

The Effect Technology has on Teaching and Learning

Studies on how technology improved middle school student achievement emerged continuously. Simplicio (2002) recommended that teachers lead the change in their teaching

methodologies. Pásztor, Molnár, and Csapó (2015) stated that creativity played a significant role in 21st-century learning. Twenty-first-century skills were essential to metacognition, solving dilemmas, collaboration, and literacy in information and communication technology (ICT) (Akturk & Sahin, 2011; Autio, Jamsek, Soobik, & Olafsson, 2019; Pásztor, Molnár, & Csapó, 2015; Perdana, Jumadi, & Rosana, 2019; Wallace-Spurgin, 2019; Yang & Baldwin, 2020).

One type of instructional technology used for communication was classroom response systems. There is an attraction to the use of response systems in classroom science settings with the use of clickers (Barth-Cohen et al., 2016). Educators who used the instructional tool had learners who answered and discussed questions with peers (Barth-Cohen et al., 2016). Barth-Cohen et al. (2016) focused on finding if computer clicker use, promoted discourse among learners in science settings.

The information collection was among learners taking a middle school physical science course (Barth-Cohen et al., 2016). Students answered clicker questions individually, discussed the matter with their peers, responded to the question repeatedly, and returned to a new collaborative discussion question separately (Barth-Cohen et al., 2016). Peer conversations were audiotaped to capture the essence of the discourse among students (Barth-Cohen et al., 2016).

A grounded analysis approach to the discussions showed that learners in middle school held conversations regarding science concepts with collaborative talks regarding meaning (Barth-Cohen et al., 2016). Furthermore, most of the communications had a positive and negative impact on student performance and included proof of co-construction with collaborative knowledge (Barth-Cohen et al., 2016). Teachers played a role in supporting the medicated clicker- discussions and method to construct academic settings to enhance the probability of learner engagement (Barth-Cohen et al., 2016). As online automation became more cost-effective where learning environments used and realized the relevance of using the online technology, practitioners asserted that learners have access to the technological systems (Downes & Bishop, 2015).

Over the past decade, the use of one-to-one laptop programs increased considerably (Downes & Bishop, 2015, National Middle School Association [NMSA], 2010). Downes

and Bishop (2015) organized a qualitative study that examined the intersection between one-to-one system applications and the distinction of successful middle schools. Their examination consisted of a four-year study with 50 grade-seven and grade-eight students involved in the annual research (Downes & Bishop, 2015). Every learner and instructor who participated acquired laptops for one-to-one wireless computing (Downes & Bishop, 2015). An instrumental case study was designed and consisted of volunteer observation, interviews with both teachers and students, transcriptions of meetings, and student work (Downes & Bishop, 2015). The findings showed that three areas matched with areas of highly successful middle schools that included: (a) ability and society identifications; (b) instruction, curriculum, and testing characteristics; and (c) organization and leadership characteristics (Downes & Bishop, 2015; NMSA, 2010).

Regarding ability and society attributes, the work aimed towards having instructors bring improvement efforts that differed in ways to earn different results as a four-year study (Downes & Bishop, 2015). During the first three years, the teachers neglected essential community and cultural distinctions that nominally set a depression that disrespected the goals of the team's expectations (Downes & Bishop, 2015). As a result, students were upset and torn by the instructor's promises to support learner engagement with technology-rich lessons that were never taught (Downes & Bishop, 2015). During year four, as the instructors placed more effort into promoting the students. Both instructors and adolescents reported having a more inviting and open classroom setting (Downes & Bishop, 2015).

The results showed that technology integration was needed to build the interdisciplinary culture and communal support among staff and students but could not support the development of cultural teams (Downes & Bishop, 2015; Toffler, 1980). The use of technology among groups helped build rewards for learners, especially for learners who had limited friends (Downes & Bishop, 2015). The team activities supported the ability to construct a useful team environment (Downes & Bishop, 2015). Technology-intensive learning environments could also be used to help inquiry-based learning (IBL) as an inductive academic method to enable students to enhance aptitude, support interpretation skills, and increased enthusiasm and academic inspiration (Avsec & Kocijancic, 2016).

Avsec and Kocijancic (2016) investigated how the use of different technologies affected learning performance outcomes in inquiry-based learning (IBL) settings that focused on

individual aptitude, attitudes, and behavior. Their study consisted of an experimental design with 421 learners from 11 middle schools in Slovenian (Avsec & Kocijancic, 2016). Educational attainment measures included pre-assessments and post-assessments, while IBL situations and views were analyzed (Avsec & Kocijancic, 2016). IBL and its impact were specific with an accountable literacy assessment in technology and course design that captured the effect of numerous invaders (Avsec & Kocijancic, 2016). The results showed that course content was the most decisive influential factors (Avsec & Kocijancic, 2016). The study also revealed that previous learning and knowledge affected IBL and decreased powerful psychological mechanisms with a high impact (Avsec & Kocijancic, 2016; National Educational Technology Standards [NETS], 2015). IBL had a significant, positive effect on technological learning and the design of metacognition, and the ability to make decisions (Avsec & Kocijancic, 2016; National Educational Technology Standards for Students [NETS-S], 2015).

Ongoing changes in technology used along with the implementation of pedagogy could support changes with different one-to-one teams and general middle school teams within a school (Downes & Bishop, 2015). Leaders would have to find solutions that high-lighted positive characteristics of team cultures that supported diversity (Downes & Bishop, 2015). Everyday leaders faced a similar tension between supporting active rich learning in education with the use of technology and using the curriculum with qualified guidelines (Downes & Bishop, 2015).

In the last twenty years, the integration or evolution lagged emerged opportunities for learning standards and official curriculum (Downes & Bishop, 2015). For example, Weglinsky (1998) conducted a study comparing the correlation between academic automation and learner attainment in mathematics. The study used a national directory from the 1996 NAEP and following analysis strategies to confine the effects of the computer usage from a list of other variables involved in learner attainment (Weglinsky, 1998). Data resources were from the 1996 NAEP in mathematics, consisting of national samplings of 6,227 in Grade 4 and 7,146 in Grade 8. The information points encompassed (a) the frequency of mathematics computer use, (b) the rate and access to computer use at home, (c) the number of staff development opportunities in mathematics, and (d) the numerous types of mathematical methods for students and teachers (Weglinsky, 1998).

The results showed that the most significant differences with computer consumers were how the computers got used (Weglinsky, 1998). Students from low socioeconomic status backgrounds did not get exposure to higher order uses of computers in comparison with students from middle class and affluent backgrounds (Weglinsky, 1998). The results also showed that technology use mattered depending on how the technology was used (Weglinsky, 1998). In comparing the size of the correlation among different applications of technologies that were positive for learning, attainment was contrary among grade-four students but generous among grade-eight students (Weglinsky, 1998). Weglinsky (1998) believed that future research could delineate the scope of a surface where computers supported instructors for learning.

From a recent study, Downes and Bishop (2015) found that middle grades implementation of one-to-one computing adjoined with guidelines of progressive adolescent training, exploited expressions that existed, and pursued indicators that were missing. Emphasis on pedagogy and content knowledge in education with the use of technology could match with reinterpreted instruction, teaming, and leadership practices that served active middle schoolers in satisfying their desire for responsive schools that use technology (Association for Middle Level Education [AMLE], 2013; Downes & Bishop, 2015; Mishra & Koehler, 2006).

Educators learned much though examining the integration with the use of technology through continuous professional development, parental involvement, and environmental formats with supported purposeful relationships (Bornstein, 2006; Downes & Bishop, 2015). Downes and Bishop (2015) suggested that attached to the educational challenges with individual programs, were accepted activities regarding how to increase support for adolescents with learning (Downes & Bishop, 2015). These examinations could combine to integrate technology acquisition, despite the demands, to face the expanding gap between in-school and out-of-school technology use among adolescents (Downes & Bishop, 2015).

Ultimately, the expectations for teachers were to design lessons with technology and measurement tools to assess outcomes that were specific to the variables (Downes & Bishop, 2015; Weglinsky, 1998). There had been recommendations for teaching practices to make connections from the classroom to the real world (Downes & Bishop, 2015; Weglinsky, 1998). In making connections, teachers transformed their teaching and

evaluation methods where they began to cease from themselves to the term, "isolated educators" (Simplico, 2002, p. 4). They began to view themselves as part of an educational team that shared ideas and led to better instruction and student learning (Simplicio, 2002).

Educators coming together to assess the status of integrated technology and developed plans to increase technology and its use in the classroom could be the key to keeping up with the rapidly changing global world of technology (Dede & Honan, 2005). Social and technological development required new and original ideas and solutions (Pásztor et al., 2015). Examples set by professionals in the discipline of educational technology inspired leaders to gather and analyze information that provided insights into the effects of technology on student performance (Dede & Honan, 2005; Pásztor et al., 2015).

Technology Use to Support Mathematics Education

Technology in teaching for many years had affected student learning and achievement positively (Eyyam & Yaratan, 2014; Gokbel & Alqurashi, 2018; Kadosh & Dowker, 2015; Kleinman, 2015; Walters, L.M., Green, Goldsby, & Parker, 2018). Eyyam and Yaratan (2015) conducted a quasi-experimental research design that investigated students' attitudes towards technology use in a mathematics class and whether the use of technology, improved their academic achievement. The study included grade-seven students from an organized private school with three experimental groups of 41 students and 2.0 control groups of 41 students (Eyyam & Yaratan, 2014). All teams completed a pretest and a posttest where the experimental groups received lesson designs using several technological tools and the control groups used traditional teaching methods (Eyyam & Yaratan, 2014). The technology used for the experimental groups included a laptop with multimedia and a data projector (Eyyam & Yaratan, 2014). At the end of the study, the experimental groups completed a scale to investigate the preferences and attitudes of the students regarding technology-based instruction (Eyyam & Yaratan, 2014).

Most students reported that they had a positive attitude in using the educational technology (Eyyam & Yaratan, 2014; Harrison & Lee, 2018; Serhan, 2019). Likewise, Sung, Chang, and Liu (2016) also found that mobile devices enhanced educational effects. Their study investigated the usage of electronic devices which included laptops, cell phones, and personal digital assistants that became a learning apparatus with possibilities for blended classroom

learning (Al-Husban, 2020; Bixler, 2019; Boz & Adnan, 2017; Liu, Cheng, Chen, & Wu, 2009; Ojaleye & Awofala, 2018; Omiles, Dumlao, Rubio, & Ramirez, 2019; Sung, Chang, & Liu, 2016). The Sung et al. (2016) study consisted of a synthesis and meta-research analysis that focused on how integrated mobile devices impacted teaching and learning. The study also contained 110 quasi and experimental periodical articles published, coded, and analyzed (Sung et al., 2016). Results indicated the impact of mobile learning programs enhanced with longer intervention durations, technology and curriculum integration, and assessment of higher-level skills (Sung et al., 2016).

Technology also applies to online mathematical environments. Within the layout, comparable achievement took place with students enrolled in an experimental online course with learners in matched comparison face-to-face classrooms (O'Dwyer et al., 2015). The study consisted of 257 learners including 18 full classes from several school districts and a couple of private schools (O'Dwyer et al., 2015). Research instruments included a formative assessment to address general ability in mathematics, a summative evaluation that was comparable to the state's Grade Level Expectations (GLE) in Algebra 1, and a survey to capture synchronous and asynchronous information regarding students' experiences from both types of courses (O'Dwyer et al., 2015). The results of the summative assessment indicated that students from the experimental online courses outscored students on 18 out of 25 components from the control courses (O'Dwyer et al., 2015). The students in the treatment courses indicated they enjoyed and were fond of using technology as a resource for studying mathematics (O'Dwyer et al., 2015). The students in the treatment courses also indicated that their access to use technology was accurate (O'Dwyer et al., 2015).

Both Eyyam and Yaratan (2014) and O'Dwyer et al. (2015) reported that students had a positive attitude in using technology. O'Dwyer et al. (2015) proved that learners in their experimental courses aimed to outperform other learners. Many learners were not familiar with how to apply technological, educational tools in a mathematics classroom and online environment (Eyyam & Yaratan, 2014; O'Dwyer et al., 2015). Eyyam and Yaratan (2014) stated that a significant number of Grade 7 students were indecisive about their preference to use technology rarely used. Eyyam and Yaratan (2014) pointed out that people were resistant to change, and in their study participants for the first time received mathematical lessons that required the use of educational technology. However, Eyyam and Yaratan (2014) stated that after students became acquainted with having technology instruction in their mathematics

classroom, the indecisive students and even some of the students who answered that they did not like using technology, recognized how technology use positively allowed learners to self-regulate and monitor their progress.

Technology also applied to online mathematical environments. Likewise, O'Dwyer et al. (2015) found that when the experimental groups of online students compared to the face-to-face groups of learners, a more significant percentage of learners from the experimental online organizations indicated that their experience was not progressive. Differences in the learning experiences could have been a function of the newness with learners exposed to the online classroom environment for the first time (O'Dwyer et al., 2015). However, through analysis, learners acquired an improved belief regarding characteristics of the material based on the technological resources used to support and strengthen instruction (O'Dwyer et al., 2015).

O'Dwyer et al. (2015) also found that although the summative outcomes were similar with the comparison trial, fewer percentages of learners from the experimental online courses expressed their excitement and enthusiasm with their acquired Algebra 1 knowledge after completing the online course. The findings from Bernard et al. (2004) meta-analysis of relative distance education studies were similar. There were 232 distance education studies reviewed by Bernard et al. (2004) and also included 688 independent-learning, behavioral, and retention-oriented outcomes. Similarly, to O'Dwyer et al. (2015), Bernard et al. (2004) suggested that many students of distance education outperformed their face-to-face classroom counterparts. However, the divide between outcomes into achievement and different forms of distance education allowed different impressions (Bernard et al., 2004). Participants supported classroom instruction in the synchronous environments while participants in the asynchronous settings supported distance educational environments (Bernard et al., 2004). O'Dwyer et al. (2015) also reported that the online Algebra 1 model should require level changes be made based on the relationships mathematics teachers established with their online students.

O'Dwyer et al. (2015) also found that significant numbers of students in the experimental online classrooms felt that they should have had more interactions with their online teacher. The study revealed that the levels of communication with learners from the experimental online courses appeared to counteract a wide-range belief among elementary and secondary

learners in online classes would not remain engaged (Bernard et al., 2004; O'Dwyer et al., 2015). Studies on higher level education programs revealed that learners enrolled in online programs tended to isolate themselves as scholars. As studies in higher education had shown, online programs could often separate students during the learning (Bernard et al., 2004; O'Dwyer et al., 2015). Students from the experimental online classrooms reported being able to spend more time interacting with other students (O'Dwyer et al., 2015). O'Dwyer et al. (2015) found that when comparing online courses with face-to-face courses, learners' level of time allotted for social interactions, their ability to comprehend expectations with assignments, and their ability to collaborate with others was equivalent.

Over half a million learners enrolled in K-12 courses felt the impact of some form of online learning initiative (O'Dwyer et al., 2015). Høgheim and Reber (2015) conducted an experimental study that examined the effect of context personalization and example choice on situational interest in the mathematics of adolescent students. The study consisted of 736 middle school students who learned about probability calculus assigned to one of the several instructional conditions including situational interest, value perception, and task effort (Høgheim & Reber, 2015). The results showed that context personalization and example choice caught the attention of students with a low individual interest in mathematics and helped them become more engaged in the software activity (Høgheim & Reber, 2015).

The practice of context personalization and example choice were particularly relevant for educators as well as educational software developers (Høgheim & Reber, 2015). O'Dwyer et al. (2015) found that students learning through an online Algebra 1 class could identify the aspect of the course they liked most with 71.8% having responded that it was using technology in mathematics. Such findings were significant as they spoke to student engagement. Teachers who adopted the use of technology had a progressive effect on learner achievement in specific academic areas such as mathematics or science (O'Dwyer et al., 2015).

Students from the O'Dwyer et al. (2015) experimental group clarified aspects of the Algebra 1 online courses that supported student achievement (O'Dwyer et al., 2015). Significant numbers of learners favored using the online Algebra 1 course to learn mathematics (O'Dwyer et al., 2015). On the other hand, the Høgheim and Reber (2015) study showed that online learning environments associated with the opportunity for educators to adapt

education, which entailed tailoring education for every student (Høgheim & Reber, 2015). Context personalization and choice represented instructional formats suitable for implementation in a digitalized classroom where the content adapted to students' interest (Høgheim & Reber, 2015).

It was vital that members of the educational community stakeholders could find scientific studies that were used to support their contributions in online platforms to assist scholars in learning mathematics (Høgheim & Reber, 2015; O'Dwyer et al., 2015). There currently lacked studies to mitigate the effect on learner achievement and efficacy levels on results in elementary, middle, and high school online environments. (Bernard et al. 2004; O'Dwyer et al., 2015). More research studies could focus on the efficiency of online platforms in public school settings that highlights learner satisfaction and contentment (O'Dwyer et al., 2015).

Parental Involvement

Parents could also support their adolescent's evolvement of expectancy-belief constructs and social-cognitive processes (Bandura, 2002; Eccles & Wigfield, 2002). Families could support their children's cognitive development achievement (Froiland et al., 2013). Meador (2015) described parental involvement at the level of participation that a parent had in their children's education and school. Many parents were tremendously involved, often volunteering, communicating well with their children's teachers, assisting with homework, and understanding their children's academic strengths and weaknesses.

Early support from parents could increase their children's readiness skills for learning (Froiland et al., 2013). In fact, a student's early results in achievement was an indicator to support their later performance (Froiland et al., 2013). Froiland et al. (2013) indicated that parent involvement allowed students to establish a positive academic outcome. Parents who set expectations for their children regarding their grades supported their children in setting expectations to make progress to meet their goals (Froiland et al., 2013). Likewise, current studies showed that parents who set expectations for their children profoundly impacted their children's ability to set expectations for themselves (Froiland et al., 2013; Raty & Kasanen, 2010).

Parental Expectations

Capturing learner's predictions with attainment superseded their parent's expectations. A study was conducted to measure student's progression in kindergarten, and Grade 8. Froiland et al. (2013) examined a national representative sample of children in kindergarten along with parents. The people willing to participate were volunteers from the National Center for Education Statistics (NCES, 2013), Early Child Longitudinal Study-Kindergarten Cohort (ECLS–K) and studied households between 1998–2006 (Froiland et al., 2013). The study examined how parent expectancies in kindergarten and Grade 8 impacted their children's expectancies for success (Froiland et al., 2013). Froiland et al. (2013) used structural equation modeling (SEM) that supported an examination of multivariate comparisons between parental engagement and student performance while being able to control student characteristics that included race, ethnicity, and family socioeconomic status. The home literacy aspect developed from parental input on the following (a) the frequency of parents reading to their children, (b) the number of learner's books from home, and (c) the number of times parents would tell their children stories. Items that included the number of books children read at home gave data on the frequency with reading used to measure literacy at home as an indicator of the home literacy environment (Froiland et al., 2013).

The results showed that parent's expectancies during kindergarten had an impact on Grade 8 accomplishments and parent expectations (Froiland et al., 2013). Parental involvement in kindergarten allowed children to establish skills to prepare them academically for success (Froiland et al., 2013). The results indicated that for the average Grade 8 student, parent engagement with homework completion and grade-checks could have a slightly negative impact on student progress (Froiland et al., 2013). Parents involved in their children's literacy acquisition during kindergarten could indirectly support and impact their children's progression in achievement by Grade 8 (Froiland et al., 2013). These results further suggested the importance of promoting family engagement with teaching children literacy acquisition skills at home that could also transfer into kindergarten (Froiland et al., 2013). For the parents of typical Grade 8 students, conveying supportive expectancies for long-term success in academics could produce better productive parenting techniques than checking homework (Froiland et al., 2013).

Parents fostered learner's attractions and assignment selections through the practices they provided at home (Jodl et al., 2001). Raty and Kasanen (2010) stated that children's expectations did not develop until later in elementary school and were not indicative of student progress until they transitioned into middle school. As a result, parents translated their standards and expectancies into outcomes through communicating in different learning experiences with their children (Demissie & Rorissa, 2015; Eccles, 1993). Adolescents internalized parental principles and acceptances if they experienced a meaningful, complementary, parent-and-child connection, and viewed parents as significant examples (Demissie & Rorissa, 2015; Jodl et al., 2001). Both parents' and their children's expectancies in Grade 8 predicted grade-level academic success (Froiland et al., 2013).

Wentzel (1998) also investigated the influence of parental expectations by conducting a social relationship and motivational study with 167 sixth graders. She noted that parental encouragement provided functional outcomes related to school interests and goal setting. The results showed that perceived support from parents allowed students to pursue socially responsive attributes in the educational setting and Grade 6 classroom engaged interests (Wentzel, 1998). The level of support potentially influenced the learner's assignment selections and individuality while parents portrayed as experts of sensibility who provided knowledge for the learners (Eccles, 1993).

Congruent to Wentzel's (1998) study, Jodl et al. (2001) examined affiliations of capacities among middle schoolers' and parents with professional ambitions in two realms which included education and extra-curricular activities. The sample included 444 grade-seven students with a symmetrical number of African-American and Caucasian females and males, from families with two parents (Jodl et al., 2001). Jodl et al. (2001) studied if family members' principles and assumptions anticipated processes directly or indirectly. Within the educational sphere, family members' principles and assumptions did not intervene through precise actions when the learners were in grade-seven (Demissie & Rorissa, 2015; Jodl et al., 2001). Instead, parents acted as potential moderators of messages they provided to learners about academic-affiliated principles and assumptions (Jodl et al., 2001). Reciprocal to the results from Wentzel (1998) regarding students and perceived support from parents, Jodl et al. (2001) found that multiple indicators among students' educational realm and family member's principles anticipated learner's principles directly instead of indirectly through their actions.

As parents monitored their children's experiences, they influenced their learner's interpretations and beliefs through educational-affiliated departments (Jodl et al., 2001).

Parental Involvement with Student Achievement

There were also different forms of parental involvement that had distinct effects on student achievement where results could vary depending on the student's ethnic background and characteristics (Patall, Cooper, & Robinson, 2008). For example, Fan, Williams, and Wolters (2012) examined if comparable departments of parent engagement compared to assorted designs of educational inspiration, including educational self-esteem, inspiration in English, mathematics, and commitment. The examination of the structural equation modeling showed the presence of distinctions among ethnicities (Fan, Williams, & Wolters, 2012). Providing evidence that parental advising and parent-school communications regarding benign school issues, were affirmatively affiliated to Hispanic students' internal inspiration with English and educational self-esteem in English, but adversely impacted to Asian American students' mathematics internal inspiration and mathematics self-esteem (Fan et al., 2012). The results also showed that parental engagement in educational settings spontaneously impacted the education inspiration developments for African-American and Caucasian learners (Fan et al., 2012). An adverse consequence that made communication efforts detrimental among parents and schools was due to learners from different ethnicities having complications (Fan et al., 2012).

What parents could do to promote their children's development was an important question not only for developmental and educational psychologists but also for schools and parents (Fan et al., 2012; Jodl, 2001). Parental participation was affiliated with advanced measures of academic attainment, professional standing, and technological ambitions between middle schoolers and grown people (Jodl et al., 2001). For example, when parents read they sent a precise communication about the worth of educational attainments to learners (Jodl et al., 2001).

Other parenting behaviors that supported academic achievement included verbal interaction, various strategies for helping with task and assignment completion (Jodl et al., 2001). These parental strategies could impact middle schoolers and their choices, their internal beliefs, and their academic and career opportunities (Jodl et al., 2001). Parenting style, communication

between parents and their children, interdependence, and accordance between the parent and their children predicted middle-school attitudes and choices made in school (Eccles, 1993; Froiland et al., 2013; Jodl et al., 2001). Mortimer, Lorence, and Kumka (1986) suggested that the message parents gave to their children enhanced their self-image and attitude towards work and supported their children's ability to choose a subsequent occupational outcome.

Although parents generally would like to increase their children's motivation in learning and support the learner's accomplishment in academics, they may not be aware of practical ways to achieve these goals (Fan & Chen, 2001). Many schools had programs aimed at increasing parental involvement such as game nights, home activities, and varied opportunities for volunteers (Froiland et al., 2013; Meador, 2015). An institutional direction in parental engagement was critical as parents did not realize how crucial and useful their participation was towards supporting learner achievement (O'Sullivan, Chen & Fish, 2014). Involvement among parents included establishing aspirations, the adoption of parental skills affiliated with student achievement, and providing discussions among parents and their children (O'Sullivan et al., 2014). O'Sullivan, Chen & Fish (2014) suggested that schools host parental workshops for supporting parents from low-socioeconomic environments in learning to build structures for their children that guide support with assignment and homework completion. Teachers could give parents some recommendations on how to monitor their children's achievement and progress (O'Sullivan et al., 2014).

School psychologists who were knowledgeable and supported family engagement could also facilitate parents with educational involvement (Froiland et al., 2013). Multiple parents admitted they did not sufficiently engage in learner's educational acquisition and believed their children's teachers were responsible for most of their children's academic learning (Froiland et al., 2013). However, many parents did not feel understood and believed their children's performance in education developed through combining engagement and expectations in place of lengthy-extended forecasters such as socioeconomic conditions (Froiland et al., 2013).

Parental Involvement with Mathematics Homework Completion

To further study levels of support with homework completion, Patall, Cooper, and Robinson (2008) a composite examination regarding the impact of parent engagement with

mathematics work completion. A meta-analysis study with 14 investigations to manipulate parent preparation for mathematics involvement in work completion occurred. The study revealed that preparing parents to get engaged in their children's homework completion resulted in better measures of homework completion, fewer problems with doing homework, and improved educational progress among children in elementary school (Patall et al., 2008).

Likewise, Fan et al. (2012) and Strayhorn (2010) reported that African-American parents who attended Parent Teacher Association or (PTA) gatherings and conferences had children that performed well in mathematics. Patall et al. (2008) also conducted another meta-analysis study with 22 examples from 20 investigations comparing parent engagement and performance-affiliated conclusions. The study revealed complementary affiliations for primary school and high school students but adverse alliances among middle school students (Patall et al., 2008). The investigation also revealed a stronger association between parent rule setting, a negative association with mathematics achievement, and a positive association with verbal achievement outcomes (Patall et al., 2008).

Both Froiland et al. (2013) and Patall et al. (2008) believed that parent engagement with middle school completion of homework in mathematics class had an adverse reaction to their children's performance. The findings supported Hill and Tyson's (2009) study, which indicated that support from parents with homework completion did not encourage students in middle school. Evidence suggested that many children experienced declining grades at the beginning of middle school (Eccles et al., 1993; Hill & Tyson, 2009; Patall et al., 2008). The negative association may be due to a decline in achievement among middle school students causing parents to get involved differentially for those students experiencing the most significant decline (Patall et al., 2008). During middle school, different types of parent engagement could have a distinct impact on learner engagement, and these results could differ according to the learner's attributes (Patall et al., 2008). Different types of parent engagement that supported their children's autonomy such as allotting an area with resources for work completion and speaking to their children's instructor provided a structure in the form of precise and consistent guidelines (Patall et al., 2008).

However, not all forms of parental support with middle school mathematics homework completion were negative. Parents' expectancies for learners to attain post-secondary advanced measures of education predicted more valuable achievement in Grade 8 (Froiland et

al., 2013). Strayhorn (2010) found that African-American parents who rarely or never checked their children's homework tended to have children who scored higher on mathematics assessments. The results could reflect a more intuitive relationship that parents established with their children than actual cause and effect (Strayhorn, 2010). For example, African-American students who scored lower on mathematics assessments have parents prompted to monitor their children's homework more frequently (Strayhorn, 2010).

To explore the impact of parental middle school mathematics homework involvement, O'Sullivan, Chen, and Fish (2014) conducted a study that examined the relationship among parents assisting their children with homework completion in mathematics for accelerated learners, low-performing students, and learner's achievement among families from low-socioeconomic settings. The study was conducted in an urban school setting and included 79 Grade 7 and Grade 8 student participants from low-socioeconomic backgrounds along with their parents and mathematics teachers (O'Sullivan, Chen, & Fish, 2014). The parents of each student filled-out a parent questionnaire with 27-questions to address their children's characteristics and the level of assistance needed to support their children in completing mathematics homework (O'Sullivan et al., 2014).

The parents also filled out parent questionnaire that asked for their children's demographic information, their levels, and degrees of homework assistance through different methods, and parental self-efficacy (O'Sullivan et al., 2014). The parent participants used a Hoover-Dempsey and Sandler's scale to rank their beliefs in their ability to support and influence their children with the performance in mathematics (O'Sullivan et al., 2014). The teachers of the children completed a questionnaire regarding their students' grades in mathematics class (O'Sullivan et al., 2014). A 13-item scale was used and revised to measure each parent's level of autonomous support in mathematics with homework completion (Cooper, Lyndsay, & Nye, 2000; O'Sullivan et al., 2014).

The results showed that parents from low-socioeconomic settings valued structure of environment as a leading indicator to supporting their children with mathematics homework completion. (O'Sullivan et al., 2014). Direct assistance and autonomy support as forms of parental interventions with mathematics homework completion was not effective (O'Sullivan et al., 2014). The findings also showed a relationship between parents' socioeconomic status and their ability to provide autonomy support with homework completion in mathematics (O'Sullivan

et al., 2014). The parents from low-socioeconomic backgrounds provided their children with direct assistance with homework completion and emphasis with structuring their children's homework environment, instead of focusing directly with the mathematics assignment (O'Sullivan et al., 2014). The parents from low-socioeconomic backgrounds also felt less confident with encouraging their children to solve mathematical problems independently due to their lack of confidence in their ability to solve mathematical problems (O'Sullivan et al., 2014).

Parental involvement in literacy and mathematics during their children's formative, elementary development years had a more significant impact on their children's progress than merely checking homework when they got into middle school (Froiland et al., 2013). Parents needed to believe in the possibility of being able to provide support to their children in mathematics with homework completion. Although parents did not feel confident in being able to deliver direct support with homework completion, they could still influence their children's mathematics environment (O'Sullivan et al., 2014). The communications parents gave to learners on achievement in mathematics revealed a continual conclusive relationship among self-attributes of mathematics capacities and took higher-level mathematics classes along with ambitions to begin careers affiliated with mathematics with science and technology orientations (Jodl et al., 2001). Different forms of parental engagement with homework completion in mathematics could either support or not support the student's successful completion, and the type of parental involvement changed as children moved through middle and high school (Froiland et al., 2013; Patall et al., 2008; Strayhorn, 2010).

Froiland et al. (2013), Patall et al. (2008), O'Sullivan et al. (2014), and Strayhorn (2010) showed that some forms of parental involvement supported their children's autonomy. Parental involvement could provide students with clear and consistent guidelines for efficient work completion (Patall et al., 2008). Both O'Sullivan et al.'s (2014) and Strayhorn (2010) stated that the most prevalent method of parental involvement among the low-socioeconomic participants was to provide structure. Parental involvement in conjunction with supportive teachers and schools that provided opportunities to engage parents in the learner's academic learning supported the learner's achievement in mathematics (Strayhorn, 2010).

Parental home-based involvement, as well as expectancies for their children's progress, was connected to positive outcomes academically in numerous investigations (Froiland et al., 2013; Patall et al., 2008; Riha et al., 2013). O'Sullivan et al.'s (2014) findings suggested the

urgency in getting parents to believe in their ability to help their children in mathematics. Bandura (1997) stated there were multiple ways of supporting parents with believing in themselves. When parental efforts supported learner emotions, children's ability to believe in themselves could arise (O'Sullivan et al., 2014). Elements that promoted middle school academic motivation included positive teacher and student relationships, supportive peer relationships, and familiarity with campus goals. Other features added a sense of connectedness to the school and autonomous supportive parental involvement (Froiland et al., 2013; Patall et al., 2008; Riha et al., 2013, Spera, Wentzel, & Matto, 2009; Strayhorn, 2010).

Future parental engagement intervention studies could reflect the effectiveness of adding supports that focused on raising positive parental expectations that utilized competencies from social-cognitive theory, expectancy-value theory, and hope theory (Froiland et al., 2013). Froiland et al. (2013) suggested that scientists develop interventions during early childhood that taught parents about the importance of parent engagement and home literacy acquisition techniques such as shared reading, and practical reading intervention strategies that varied according to their children's age. Because parental engagement intervention strategists had continuously portrayed the challenges in having low-socioeconomic participants in productive intervention parent involvement programs, school psychologists and educator should convey a high expectation to parents that the interventions could be valuable (Froiland et al., 2013; O'Sullivan, 2014). Future studies using multiple sources of data on parent engagement tasks could include reports for students, teacher reports, and other measures of involvement, could allow for a comparison of the validity of scales and allow for a comparison of any causal conclusions about the relations (Fan et al., 2012).

It could be interesting to study how learners understood their parents' support in traditions of different ethnic groups as parent involvement for some ethnic groups were viewed as more passive (Fan et al., 2012). Cultural studies that examined the social, cultural, political, and historical contexts that drove parental involvement of various ethnic groups and explained its relations with school motivation and achievement would make an important contribution to the literature (Bornstein, 2006; Fan et al., 2012). O'Sullivan et al. (2014) believed parents of low-socioeconomic backgrounds needed help in recognizing how engagement with providing environmental parameters to their children also supported their children's performance in mathematics. Teachers and school officials could communicate with parents by sending the message to parents that they are needed to provide their children with an appropriate

mathematical home learning environment (O'Sullivan et al., 2014). Further research on the perspectives and opinions of parents from different socioeconomic backgrounds and ethnic groups regarding their roles and the role of the schools in educating the child would provide valuable information that could further increase the competency of the portrayal of parent engagement in education (Fan et al., 2012; O'Sullivan, 2014).

Parental Involvement in the Use of Technology

Three decades ago, educational practitioners and researchers analyzed how parental involvement and the need to foster family-school partnerships enhanced the social, academic, and emotional learning for children including adolescents (Olmstead, 2013; Patrikakou, 2015). On a larger scale, processes and variables could have effects that were indirect and direct with the influence of parental involvement (Patrikakou, 2015). Also, establishing success for students became increasingly exact and supported parental participation with school-family partnerships as part of the student development process (Patrikakou, 2015). Access to using media resources by children and teenagers had changed enormously the parameters in the field that pursued a way to clarify how using technology affected relationships between parents, children, and teachers (Patrikakou, 2015).

Adolescents could spend seven daily hours or more with media, which in many ways, was the extreme time allocated to an assignment, which included getting rest (Patrikakou, 2015). Ninety-seven percent of learners reported they could engage in technological games in many settings, which included micro-computers, game consoles, and hand-held devices (Olmstead, 2013; Patrikakou, 2015). According to policy from the Council on Communications and Media of the American Academy of Pediatrics or (AAP, 2016) expressed interest about how media use increased. Media use could potentially have harmful effects, but it could also have a positive impact on communication in society (American Academy of Pediatrics Council on Communications and Media [AAP], 2017). The AAP suggested that pediatricians make recommendations for parents to supervise and limit exposure to media and use (AAP, 2016).

Digital natives were the first to develop and grow within a digitalized society. Although, digital natives were not the first set of learners who created a media-wide sense of

uneasiness with use among parents (Patrikakou, 2015). When television was easily accessed, its use and effects on adolescents also alarmed parents and educators (Patrikakou, 2015).

Today's learners experienced technological developments at an accelerated pace. The technological developments also included a period where the technology used imbued markets in the world and added multiple conditions that were new to encounter (Patrikakou, 2015; Roberts & Foehr, 2008). On average, adolescents learned more than their parents regarding how technological aspects of new forms of communication could impact the progressive or detrimental effects on family union (Patrikakou, 2015). For example, Patrikakou (2015) stated that if media used socially could potentially drive conflict among family members instead of using media for purposes associated with a school, then its use could lead to disputes.

Patrikakou (2015) stated that there were outcomes where parents seemed to exercise influence about technology and media use where they monitored online activities through technology filters and other software. They could also restrict their children from accessing peculiar websites or limit the time their children spent on the internet. However, limited studies existed regarding what parents knew about their teenager's computer use (Patrikakou, 2015). Rosen, Chever, and Carrier (2008) conducted a study and stated that parents seemed unaware of their children's use of social media. The study included Myspace parent and teen pairs that worked on internet surveys given in June 2006 and September 2006 (Rosen, Chever, & Carrier, 2008). There were 266 parent and student pairs in June and just 34 in September (Rosen et al., 2008). The online surveys allowed the pairs of participants to appraise their affiliations between parenting affiliations, restriction settings, watching internet behaviors, the possibility of online warnings, adolescent online use.

The results showed that parent strategies could be related to teenage opportunities in using MySpace, along with expectancies, and values (Rosen et al., 2008). Parents with older children that had adverse or indulging parent strategies were not likely to establish internet expectations (Rosen et al., 2008). The study also revealed the level of sexually soliciting behaviors, pornographic material, and internet bullying were somewhat low when compared with investigations that asserted high incidents of problems related to the

internet (Rosen et al., 2008). Parents with high instances of internet dangers and warnings did not match their lower proportions of the limited environment and teen-watching (Rosen et al., 2008).

Patrikakou (2015) also found first evidence that linked styles with parenting and uses with online media. There were four styles of parenting based on dimensions of parental behavior that included authoritarian, authoritative, neglectful, and indulgence (Patrikakaou, 2015). Authoritarian parents were obedience and status-oriented and expected their orders were followed (Patrikakaou, 2015). Authoritative parents accepted their children's unique needs, abilities, and perspectives, taking age and temperament into account (Patrikakaou, 2015). Authoritative parents also kept their expectations appropriate, considered their child's developmental skills and attitude (Patrikakaou, 2015). Neglectful parents dismissed their children's emotions and opinions and were emotionally unsupportive of their children (Patrikakaou, 2015). Indulgent parents had very few behavioral expectations for their children (Patrikakaou, 2015). Indulgent parents were also permissive, non-directive, and lenient (Patrikakaou, 2015; Rosen, Cheever & Carrier, 2008). The research showed that differences in development linked with parenting methods and how online practices monitored (Patrikakou, 2015). The younger adolescent's parents who displayed authoritative and authoritarian ways seemed likely to oversee computer use jointly with guidelines in comparison to students with older parents who practiced increasingly neglectful styles of parenting (Patrikakou, 2015).

Patrikakou (2015) showed that media use types mediated how parents reacted and limited commanding behavior. For example, the technology could be used to complete assignments and gain skills and knowledge that was comparable with parental expectations (Patrikakou, 2015). If technology were only for entertainment and purposes that were social, then it could contradict expectations from parents, increase conflicts among parents and children, and, therefore, could negatively impact family cohesiveness (Patrikakou, 2015).

Technology could support a role vital towards increasing parental involvement towards the educational process (Patrikakou, 2015). More than 77% of adults in all schools around the U.S. were able to access and connect to the Internet (Olmstead, 2013). Internet use helped increase home-school communication efforts and fostered relationships that

were meaningful among home and school (Olmstead, 2013). Technology as a resource could actively involve but could not require the parents to be present physically for use at school (Patrikakou, 2015). Technology also could provide increased attention to education and home communication (Patrikakou, 2015).

Allowing parents to stay enlightened about assignments, in addition to their academic progression, was becoming increasingly productive through technology with the use of an LMS (Patrikakou, 2015). Online school and staff sites could inform parents of student achievements provided if student's grades were regularly updated (Patrikakou, 2015). Through a student's perennial statement, "I don't have any homework," which a parent could easily confirm and more importantly, gave adolescents the message that the line of home and school communication was current and well-established (Patrikakou, 2015, p. 2257). Online progress with grade reports from an LMS provided parents with a way to monitor their children's school performance (Patrikakou, 2015). Online technologies could also directly support communication among parents and staff members through links available that parents accessed and could ask questions regarding their children's progression (Patrikakou, 2015).

To investigate other efforts on improving direct communication between parents and schools, Olmstead (2013) conducted a study to determine whether emerging technologies facilitated better parent-teacher communication and parental involvement. Data collected was through 89 collected parent surveys, seven teacher surveys, and seven teacher semi-structured focus group interviews from grade four to grade six parents to analyze the relationship between parents' and teachers' perceptions of student achievement when electronic communications were used to parents and school (Olmstead, 2013). The results indicated that as the use of technology expanded to parents, students, and teachers, the capabilities for connecting parents to schools continued to grow (Olmstead, 2013). As schools invested in technological websites, Voice over Internet Protocol (VoIP), LMS online curriculum, and other types of technologies connected schools to home (Olmstead, 2013).

As access to technology continues to expand, it would be imperative that teachers and administrators remained current with the tools that families used to communicate (Olmstead,

2013). Teachers would need to create and adhere to the new norms that technology was setting on how humans communicated today (Olmstead, 2013). Keeping parents involved in their children's schooling was just as much a responsibility of the school as it was the parent (Olmstead, 2013). It would be important that teachers and administrators stayed current with the tools that families used to communicate by adhering to the new norms that technology was setting on how humans communicated today (Olmstead, 2013). Thus, technology professional development needed to be at the forefront of every staff development plan (Olmstead, 2013). Under the belief, to foster school-family partnerships became an important part of technology use and learning (Patrikakou, 2015). Thus, administrators should model for teachers the effectiveness of proactive communication by keeping the school's website current, using email to communicate with teachers, and responding to email promptly (Olmstead, 2013).

When many students began middle school, they had an opportunity to pursue careers and take science, technology, engineering, and mathematics (STEM) related-classes (Harackiewicz, Rozek, Hulleman, & Hyde, 2012; International Society for Technology in Education [ITSE], 2015). Harackiewicz, Rozek, Hulleman, and Hyde (2012) organized a field investigation to test if an intervention with theory-based design used to let parents know the significance of science-related and mathematics classes to middle-school aged learners and could lead to more levels assigned in high-school (Harackiewicz et al., 2012). Harackiewicz's et al. The intervention was three-parts and included a couple of brochures mailed to parents and an internet site that featured the efficiency of STEM classes (Harackiewicz et al., 2012). The location and pamphlets gave parents insight about the utility of science and mathematics classes for their learner's foresight and emphasized the significance of supporting learners network among science and mathematics within their lives (Harackiewicz et al., 2012). In the experimental group, mothers perceived more suitability among the STEM courses for their children in comparison with the control group (Harackiewicz et al., 2012). Parents in the experimental group also indicated they were inspired to discuss the materials from the mediation with their children (Harackiewicz et al., 2012).

The outcomes showed that mediation led students with parents in the experimental group to continue by taking additional semesters of mathematics and science classes

during their last two high school years (Harackiewicz et al., 2012). Parents within the experimental group provided a system for increasing STEM motivation among adolescents, and the outcomes demonstrated that theory in inspiration could apply to the increase in the number of secondary learners who could take mathematics and science courses (Harackiewicz et al., 2012).

Educational policies and school organizational systems seemed involved and not progressive to change. The prediction was for technological applications to continue, that student academic expectations would continue to rise, and that any student progress with the use of technology was expected to continue (Patrikakou, 2015). A better understanding of cultural heritage could highlight a different list of parental formats when the parent, teacher, and student interactions addressed any modifications with the instruction, academic meanings, and family outreach (Patrikakou, 2015; Rosen et al., 2008). For example, Latino heritage parents could portray a portray a sequence of parental formats from parents of different backgrounds (Rosen et al., 2008). The parents had children who spoke Spanish and who could research the internet and behaved contrastingly on the internet with other teenagers that spoke only in English (Rosen et al., 2008). Future research should continue to focus on the effectiveness of these technologies with increasing parental involvement (Olmstead, 2013).

Learning Management Systems

In middle school, LMSs could provide an online tool that supported teachers and students in the learning process. LMS use could also inform parents of their children's academic progress (Hebebci & Alan, 2017; Nasser et al., 2011). A typical LMS could embed a collaborative environment for learning with intervening mechanisms that supported interactions, cooperative-groupings, student-development training, communication, and discussion among other LMS users (Dias & Dinis, 2014, Oaks, 2002). Nasser et al. (2011) found that using an LMS to provide consistent information about home and school could positively have an impact on student performance. An LMS could support middle school students in becoming independent learners (Blau & Hameiri, 2011; Nasser et al., 2011; Strayhorn, 2010; Wood et al., 2011). Parental use of an LMS shaped home-school relationships and the broader politics of parental engagement (Selwyn et al., 2011).

Before the wide-spread increase of owning a home-computer was popular, computers in education were in existence since the 1950s (Watson & Watson, 2007). Computer designers and some educators perceived that the application of an LMS in education was conceivable, necessary, but not understood, plus the title "LMS" was also not used correctly (Watson & Watson, 2007, p. 29). There were different strategies for using an LMS as an educational resource with multiple vocabulary words that relate to computer use.

History and Definition of LMS

The history of the adoption of computers included computer-based instruction (CBI), computer-assisted instruction (CAI), and computer-assisted learning (CAL) in general terms (Watson & Watson, 2007). These computer terms described continual application programs, coaching, and specialized preparation (Watson & Watson, 2007). An LMS identified as an integrated learning system (ILS) offered additional performance beyond teaching the curriculum (Watson & Watson, 2007). Examples of other functions included monitoring and capturing, individual support, and diffusion through the educational setting (Watson & Watson, 2007).

An LMS described many different educational applications and acted as the structure that handled various levels of the learning progression (Kuosa et al., 2016; Oakes, 2002; Watson & Watson, 2007). An LMS could provide the structure to deliver support in managing pedagogical information (Watson & Watson, 2007). LMS use could promote the use of specialized instructional for tracking student improvement in the process of meeting required benchmarks (Oakes, 2002; Watson & Watson, 2007). An LMS could also provide a platform with resources to foster student learning and engagement within the platform setting (Oakes, 2002; Watson & Watson, 2007). LMS usage could deliver content but also allowed learners to register for courses for keeping track of grades and monitoring course announcements (Oakes, 2002; Watson & Watson, 2007).

Watson and Watson (2007) recommended that an LMS integrate within the school or organization as a functional requirement. LMS usage should have administrative tools that enabled features such as profile management, curricular guidelines, assignment guidelines, discussion boards, writing resources, and instructor information (Watson & Watson, 2007).

An LMS provided a learner access to content that was instructor-led in a synchronous or asynchronous setting (Kuosa et al., 2016; Watson & Watson, 2007).

As a systematic application, an LMS incorporated several characteristics to provide the appropriate learning environment within the school setting (Watson & Watson, 2007). Additional clarity could contrast an LMS with related technologies (Watson & Watson, 2007). Many computer users in education could have access to applications with non-traditional terms and acronyms that were confusing to understand (Kuosa et al. 2016; Watson & Watson, 2007). As a result, users misunderstood which expressions were well-suited for using (Watson & Watson, 2007). It was essential to distinguish an LMS from other related technologies (Watson & Watson, 2007).

Course Management Systems

The term LMS could be affiliated with computer functions that identified as Course Management Systems (CMS) by previous literature (Evolving Technologies Committee [ETC], 2003; Watson & Watson, 2007). A CMS was an application that allowed a method for managing content from a central location (Watson & Watson, 2007). CMSs were mainly used for online courses and blended learning where learners had access to online materials for course, tools and resources that provided pertinent information related to the course, progress, and grade-tracking features, and communicative platforms for group chats, discussions, and posts (Watson & Watson, 2007). A few of the same features within an LMS were in a CMS. An LMS provided a training control system as a platform for housing all types of eLearning courses, as well as tracked who had completed them, when, and what kind of score they received on assessments (Watson & Watson, 2007).

Learning Content Management Systems

Learning Content Management Systems (LCMS) affiliated with LMSs (Watson & Watson, 2007). LCMS usage often interchanged alongside LMS usage or publicized as a more current LMS. Both products focused on various operations that were complementary (Watson & Watson, 2007). The word "content" separated any primary variation among both forms of technologies (Watson & Watson, 2007, p. 36).

A LCMS focused on learning content and gave instructional designers the means to create e-learning content more efficiently (Watson & Watson, 2007). Oakes (2002) reported that a LCMS as a structure was recycled to "create, store, assemble and deliver personalized e-learning content in the form of learning objects" (p. 73). Watson and Watson (2007) stated that a LCMS and LMS integrated where the LCMS supported the formation and transmission of learning objects (LO). An LMS could guide the progression of learning and instruction by including the LCMS and supplying the rules, whereas, the LCMS provided the content (Watson & Watson, 2007).

Learning Objects and Related Technologies

Learning objects represented the basic element found in a LCMS or LMS (Watson & Watson, 2007). Learning objects or LO's offered mighty conceivability based on their agreement of use across numerous environments (Watson & Watson, 2007). The integration of LO's supported contemporary education, versatility to support the requirements of specific students, and functions to accommodate the requisites of both greater and lesser congregations that may not impact adjustments in expenditures (Watson & Watson, 2007). Learning objects could hold any digital media that supported students with learning outcomes and adhered to standards like Shareable Content Object Reference Model (SCORM), provided evidence to characterize object and the environment for its adoption (Oakes, 2002; Watson & Watson, 2007). SCORM was a collection of specifications for web-based electronic educational technology (Oakes, 2002; Watson & Watson, 2007). There were numerous measures for distinguishing the use of LOs (Watson & Watson, 2007).

Ideally, LOs, CMSs, and LCMSs adjusted and combined within an LMS that provided an environment to connect the other integral technologies (Watson & Watson, 2007). LOs serve as minuscule forms of information held inside of a LCMS to support students (Watson & Watson, 2007). LOs were from recent assignments and achievement to help specific instructional outcomes, handled by the LMS (Watson & Watson, 2007). The CMS behaved as a learning structure that could adjust pedagogical information into courses to that supported communication among learners as well as their instructors (Watson & Watson, 2007).

The Role of LMS in Education

The significance of discerning an LMS in addition to its associated technologies relied on the portrayal it served in meeting the learning and instructional needs of modern students (Watson & Watson, 2007). Society had adjusted from the Industrial Revolution into the Information Age (Reigeluth, 1994; Toffler, 1980; Watson & Watson, 2007). As part of the Information Age, educational systems had teachers as facilitators that were beginning to create student-learning environments where students used technological tools for researching to become information experts (Hebebci, 2014; Reigeluth, 1997; Watson & Watson, 2007).

Achievement among students varied where lower-achieving students remained left behind, and higher-achieving students remained held back from progressing (Reigeluth, 1997; Watson & Watson, 2007). The substitute for keeping time consistent and insistence that learning occurred individually could support achievement at a consistent ability measure (Reigeluth, 1997; Watson & Watson, 2007). Performance held at a steady ability level required organizational and instructional changes from a uniformity level of failure to a systemization level of success to meet the needs of all students (Watson & Watson, 2007).

An LMS could monitor student progression towards improvement, assessed student learning, helped instructors grasp what type of counseling support was required, provided, and accordingly sequenced levels of preparation, stored materials of fulfillment, and systematically integrated all technological functions (Watson & Watson, 2007). During the modern age in education, an LMS could also appraise students' present ability and accomplishment level (Branch, 2015; Watson & Watson, 2007). Instructors and students could use an LMS to define specific goals in learning, sequenced information that was pertinent for a student, and assessed products for learner performance. Instructors could also use an LMS for a stored document of attainment, supported alliance, and generated accounts to administer knowledge that maximized the performance of the entire educational organization (Watson & Watson, 2007).

Ultimately, LMSs could bring additional constructivist-based preparation that focused on adjustable, instructional-defined expectations (Branch, 2015; Kitchen & Berk, 2016; Reigeluth, 1994; Watson & Watson, 2007). LMSs could also provide combined instruction internally and externally from the organization to expand the instructional group to the

home and beyond involved parents, significantly addressed individual assessment, progressed monitoring, broadcasting, and attention to instructional requirements (Reigeluth, 1994; Watson & Watson, 2007). LMSs could cultivate the need for competent analysis and improvement for teachers and educators (Kitchen & Berk, 2016; Watson & Watson, 2007). While challenges existed such as lack of commitment and adherence to support standards, multiple issues which adversely impacted the ability to use learning objects, provided promise for students, teachers, and current educational practitioners to possibly advance the progression (Watson & Watson, 2007).

Towards an Enhanced LMS to Support Student Learning

Students who firmly grasped expectations on how to use LMS features assisted their learning and academic performance (Najmul Islam, 2016). In recent studies, Najmul Islam (2016) collected LMS usage data from a group of 179 university students using an accessible LMS, Moodle, for engaging in a hybrid course. The study explored a controlled role of anticipated rapport on the companionship among outcomes and e-learning use (Najmul Islam, 2016). The learning outcomes through e-learning were conceptualized using educational outcomes, anticipated educational support, and anticipated assistance with community-building (Najmul Islam, 2016). Najmul Islam (2016) employed partial least squares (PLS) to analyze the quantitative data. The qualitative data were used and analyzed to back-up the outcomes of the PLS model (Najmul Islam, 2016). The findings from the study showed that anticipated rapport moderated the union among educational issues and e-learning system use that did not necessarily improve learner outcomes (Najmul Islam, 2016). Najmul Islam (2016) believed that teacher training on the applications of LMS features could further motivate students into using e-learning tools. Future research could also give an adjacent view to comprehending what other assets an LMS provided to create an improved concept of e-learning performance (Najmul Islam, 2016).

LMS could allow learners to merge cooperative and collective learning assignments that required a sociocultural commitment from educational collaborators (Dias & Diniz, 2014). Dias and Diniz conducted a scientific investigation that aimed at describing students' profiles and used the profiles to optimize giving students' feedback on their performance. The study had 36 students from a public higher education institution and used variant blended learning activities (Dias & Dinis, 2014). A synergistic combination of qualitative

and quantitative pieces of evidence included face-to-face semi-structured interviews and multivariate content analyses that were systematic (Dias & Diniz, 2014).

Results displayed three distinct students' profiles oriented to an interactive learning environment, Information and Communication Technologies (ICTs) teachers' expectancies, and students' preparation (Dias & Diniz, 2014). In a rethinking of the LMS within the blended learning environment could be approached through the enhancement of interactivity, fostering users' ICT acquaintance, and incorporating further training. The results showed that learners' profiles became acquainted to collective e-learning environments, Information Technology Teachers or ICTs' expectations, and learners' preparation (Dias & Dinis, 2014). Dias and Diniz (2014) and Najmul Islam (2016) believed that providing students training is effective towards supporting online discourse and student collaboration. Dias and Diniz (2014) and Najmul Islam (2016) pointed out that LMS features facilitated student intrinsic motivation and provided discussion strategies to support student learning. The approach of enlisting student's profiles in the LMS viewpoint provided a systematic approach, establishing it as practical according to the learner's abilities (Dias & Dinis, 2014).

As students engaged in using LMS features, they began to self-regulate their learning and progress (Hebebci & Sahin, 2015; You, 2016). You (2016) studied to find important observable signs of learning with the use of LMS information on internet course attainment. Specifications to reflect self-controlled knowledge were linked to study the affiliation among LMS information specifications and classroom attainment (You, 2016). Data gathered was from 530 college students on who took an online course (You, 2016). Similar to characteristics that described Dias and Dinis's (2014) learner profiles, You (2016) included Howell's (2001) recommendations for educators to use LMS characteristics which include a syllabus, assignments, a schedule, discussion forum, tips, employment, relevant links, and the professor. Results from the Howell (2001) study showed that students would use the course website only if they found it useful. You (2016) analyzed students' rate of normal application, tardy turn-ins of tasks, login sessions and frequency, and proof of reading the course information packets predicted their class attainment. You (2016) found the characteristics to be significantly predicted student course achievement.

You (2016) collected the same measures where students self-regulated and monitored their learning in the middle of the course. Students that monitored their online submissions of assignments, frequently logged into the course, and read the course information packets performed well. The findings verified the significance of self-collective knowledge and revealed the benefits of putting forth specifications gathered during the class anticipated attainment (Dias & Dinis, 2014; You, 2016). Even though LMS data logged in could allow a sequence of indicators, it may not necessarily improve the predictability of student achievement (You, 2016). As a result, examiners and professionals in education would continue to describe and form LMS signs that adequately captured learners' engagement and ability to self-regulate (You, 2016).

Educational practitioners had the potential to provide LMS educational environments that engaged and allowed learners to self-regulate (You, 2016). Gašević, Dawson, Rogers, and Gasevic (2016) examined how learning environments influenced the learner success through nine blended learning courses offered to 4, 134 undergraduate courses offered in a blended learning model consisting of 4,134 students. The study illustrated the difference in, "predictive power and predictors between course-specific models such as mathematics and generalized predictive models" (Gašević, Dawson, Rogers, & Gasevic, 2016, p. 68). The results suggested that it was important for research in learning analytics account for many ways where technology was used in specific course contexts (Gašević et al., 2016). Dias and Diniz (2014), You (2016), and Gašević et al. (2016) believed that differences with the use of technology that related to how learners used LMSs, required attention before the data was merged to create a derived version for promoting learner achievement. Instructors who ignore their instructional environment could undermine the effects of LMS features that could support their students' academic achievement (Gašević et al., 2016). The findings from the study had broader implications among students identified at risk of academic failure (Gašević et al., 2016). Studies suggested that future research in learning analytics needed to consider learning conditions when creating LMS promotion models (Dias & Dinis, 2014; Gašević et al., 2016; You, 2016). Instructional conditions could determine if new LMS features are being used (Gašević et al., 2016).

What Current LMS(s) Offer

Currently, LMSs were made from several products, and it was imprecise how well the items

worked together. There was also the possibility that the products would not work (Watson & Watson, 2007). Due to the significance, additional care and support needed when applying the vocabulary terms to the research literature (Watson & Watson, 2007). Learners could learn to accept better their ability with how to use an LMS. Learners could also interpret how to use additional technologies with the use of an LMS (Watson & Watson, 2007). Researchers and practitioners could communicate and discuss the future of technology use in education. (Watson & Watson, 2007). Teachers and practitioners should continue to learn and incorporate how to use an LMS and how to use the different technologies (Watson & Watson, 2007).

Nasser et al. (2011) conducted a study to enhance teacher and student performance in middle school with the use of an LMS known as Knowledge-Net or K-Net. The study explored factors that impacted student use of the LMSK-Net in Qatari independent schools (Nasser et al., 2011). Quantitative data collected was from 1,376 students through a questionnaire administered to students in 37 schools (Nasser et al., 2011). Interviews that were semi-structured helped confirm any results of the quantitative findings and provided additional insight into students' perspectives regarding the use of the LMS (Nasser et al., 2011).

Despite the benefits of the LMS, Nasser et al. (2011) found that its use by students had been limited due to some manipulative and non-manipulative factors that could influence student behavior and use (Nasser et al., 2011). Students reported that many of the parents and their teachers did not require them to use the LMSK-Net system (Nasser et al., 2011). Children whose parents were not engaged in aspects that concerned their children's schoolwork were less likely to use an LMS than students whose parents were more involved (Nasser et al., 2011). Results indicated a teacher's reluctance to use an LMS serves as a barrier for both students and parents (Nasser et al., 2011). Nasser et al. (2011) also found that when teachers could build activities in and around the LMS with some benefits and rewards, the students were motivated to use the LMS. Nasser et al. (2011) recommended the development of a rewards system to motivate students and parents along with teachers modeling the expectation to use an LMS to encourage its use (Nasser et al., 2011).

Selwyn, Hadjithoma-Garstka, and Clark (2011) also investigated how middle schools were supporting parental involvement with the use of an LMS to provide parental engagement in their children's education. The research involved a comparative case study in England consisting of twelve schools (Selwyn et al., 2011). The research design emphasized LMS usage and bonuses of learning technologies across school organizations and encompassed teaching and learning, parental involvement, and areas of leading and management. Data collection strategies included structured-interviews among school leaders, information communication technology (ICT) coordinators, classroom teachers, and parents (Selwyn et al., 2011).

According to an in-depth research case study across England with six primary schools and six secondary schools, the study explored the different methods that schools implemented, adopted, and used learning technologies to encourage usage among families (Selwyn et al., 2011). Digital technologies allowed parents to engage in their children's academic progress on assignments (Selwyn et al., 2011). Parents learned how to use the LMS features and applications (Selwyn et al., 2011). LMS demonstrated work assignments, offered student progress reports, supported parent engagement, and provided the potential for the use of social media applications and social networking (Branch, 2015; Selwyn et al., 2011). Most of the parent users received accounts via school staff, on their children's progress (Selwyn et al., 2011).

While an LMS provided clear managerial benefits, questions arose regarding how effective the technologies supported parental involvement (Selwyn et al., 2011). The results showed that there were limits on the use of LMS technologies to support parent engagement (Selwyn et al., 2011). Like Nasser et al. (2011) and the findings regarding students and limits with LMS usage, Selwyn et al. (2011) found manipulative and non-manipulative factors that schools highlighted parental LMS usage. Some factors that schools communicated to parents included an advertisement distribution of knowledge, announcements, and work samples for parents. LMS usage within schools often conformed to existing unilateral patterns of allocation of information and resources (Selwyn et al., 2011). LMSs currently, are used for uploading assignments but could be used for communicating, interactive learning and parents could be assigned access to school secured intra-net systems (Selwyn et al., 2011). As a result, LMSs appeared to provide a platform that displayed student progress and could provide an informative resource for teachers, students, and their parents (Branch, 2015;

Selwyn et al., 2011). LMS use would not likely support parental engagement unless the school organization provided parent training and emphasized a culture that supported LMS use (Selwyn et al., 2011). Selwyn et al. (2011) suggested that schools provide a culture that engaged parents in highlighting LMS features they could use to communicate, collaborate, and monitor their children's progress.

Fostering Learner Autonomy

As student-centered and constructivists online learning environments developed, middle school students gained a significant understanding of how learning through individualized efforts grew in importance (Moreno-Murcia, 2016). A constructivist approach allowed students to create knowledge by participating actively in the learning process, and by giving importance to the learners' autonomy (Moreno-Murcia, 2016; Wang, 2011). In online environments of interaction, the teacher became the facilitator, planned tasks, and supported the expectation for learning, provided students with options, and helped students in their decisions and problem-solving for themselves (Moreno-Murcia, 2016).

Consequently, this new expectation provided learners with options to question and create learning concepts and strategies that based on existing knowledge (Moreno-Murcia, 2016). Teachers believed and learned to accept their students' autonomy, their enterprising spirit, and acknowledged their role in providing support (Moreno-Murcia, 2016). A primary objective of education was to promote students' autonomy (Moreno-Murcia, 2016).

How Teachers Beliefs Support Student Learning

Understanding what teachers believed was critical because beliefs influenced how teachers made decisions (Wong, 2016). In mathematics and science classes, teacher beliefs impacted how curriculum implementation supported learner success in the classroom (Wong, 2016). With the push for science, technology, engineering, and mathematics (STEM) education in the United States, it became essential to investigate the beliefs of teachers who integrated these subject areas into their classroom (Wong, 2016). Wong (2016) conducted an examination of 21 U.S. middle school science and mathematics teachers enrolled in an Integrated Science Mathematics and Reflective Teaching or iSMART. iSMART provided a two-year cohort-based online master's program that used an LMS and emphasized theories

and pedagogies of research-based science and mathematics teaching (Wong, 2016). iSMART also provided a scaffold to the integration of both content areas over the two-year period (Wong, 2016). All participants in iSMART practiced middle school mathematics or science in a southern region state of the United States (Wong, 2016).

Wong (2016) found that teachers' participation in year one of a two-year online graduate program used LMS features that stressed how inquiry-based instruction could influence learners with their beliefs. When disaggregating different belief-systems, learners' beliefs regarding teaching and learning was more student-focused (Wong, 2016). Results indicated that teachers' beliefs could change significantly over time and years of experience (Wong, 2016).

Wong (2016) also found that science teachers changed their beliefs over time, while those of mathematics teachers' beliefs stayed the same. If mathematics teachers were to integrate science into their instruction to support learner autonomy, it was important they developed student-centered beliefs that fostered inquiry-based instruction (Wong, 2016). This study highlighted the need for further study into ways that impact the beliefs of non-science teachers who integrated science into their curricula (Wong, 2016). The findings also supported the notion that formal knowledge had an impact on teacher and parent beliefs (Wong, 2016). Fundamentally, both mathematics and science teachers needed to hold the student-centered beliefs that aligned with inquiry-based instruction to create learning concepts based on existing knowledge (Moreno-Murcia, 2016). Teachers learned to accept their students' autonomy and promoted learner success (Moreno-Murcia, 2016; Wong, 2016).

Promotion of volitional functioning was a perspective that distinguished autonomy support of SDT from other expectations that associated autonomy with promoting interdependence (Moreno-Murcia, 2016). Volitional functioning distinguished the thought of autonomy support of the self-determination model from different focuses that could associate autonomy to encourage independence (Moreno-Murcia, 2016). Studies had demonstrated that there were benefits to promote volitional functioning, including deep level learning, positive affect, and achievement and behavioral persistence (Haerens, Vansteenkiste, Aelterman, & Van den Berghe, 2016). Teachers could promote volitional functioning by providing students with choice, giving students a meaningful reason when the selection was constrained, not

counteractive in raising anger during the learning process and using a more alluring language. (Haerens et al., 2016).

Haerens, Vansteenkiste, Aelterman, and Van den Berghe (2016) also stated that on occasions, teachers could expect their students to manage their studies interdependently, without the instructor's availability to support them or supervise their learning process. Within this point of view, autonomy support could equate with promoting independent functioning, which consisted of conceding students unlimited freedom so that they could complete their tasks without the teacher's assistance (Moreno-Murcia, 2016). However, in looking through the viewpoint of the SDT, students' autonomy support had a different meaning, since teachers were concerned about responding to students' interests and responses (Moreno-Murcia, 2016). Teachers could engage students in collaborative information seeking strategies to promote student interest and learner autonomy (Moreno-Murcia, 2016; Reynolds, 2016).

LMS Structures to Support Learners

Reynolds (2016) investigated middle school students in the United States regarding information-seeking collaboratively, making sense, and building knowledge practices knowledge-from a discovery-based guided program of designed game learning. Learners and their instructors participated in credited courses for a year (Reynolds, 2016). The knowledge gained could support knowledge acquirements which include a wiki LMS that housed could organize design activities, facilitate curriculum, highlight features of social media, includes tutorials, and provides knowledge-oriented tasks (Reynolds, 2016). Learners engaged in a blended learning constructionist environment and worked collectively in groups designed for gaming (Reynolds, 2016). The examination included a video with qualitative data from six group cases that used a coding method of categorizing for the concepts of an assignment, seeking collaborative information, and resolution inquiry outcomes (Reynolds, 2016).

Results from the study supported students' cultivation of greater autonomy and learning across the full spectrum of culturally and linguistically appropriate services, provided with an appropriate learning structure as the program's aim (Reynolds, 2016). A few categories of assignment appeared to relate to groups of learners and their selected collaborative information seeking the approach to problem-solving (Reynolds, 2016). The findings

concluded that social constructivists from educational environments used corroborative knowledge searching and information construction with game developers provided to an academic tolerance of the methods more commonly in affiliated work environments that are project-based with both adults and young people (Reynolds, 2016).

Related to Reynolds (2016) findings regarding collaborative information seeking, Haerens et al. (2016) pointed out that the expectations that could favor behavior, cognition, and affectivity depended on the social factors surrounding learners. An example of social determiners was the way in which students perceived autonomy support not just from teachers, but also from parents, family members, and peers (Haerens et al., 2016; Moreno-Murcia, 2016). Through social gatherings, it was possible to reduce pressure on performance, and on external control of behavior, which implied regulating behavior, by approaching the motivations and values established themselves by the students (Haerens et al., 2016; Moreno-Murcia, 2016). In this way, Ryan and Deci (2000) indicated autonomy frustration as being responsible for the lack of satisfaction with life. For example, teachers and parents that supported autonomy considered children's perspectives, thoughts, feelings, and encouraged their ability to develop self-regulatory practices which motivated and fostered their internal motivational resources, offered explanations, used informative language, and showed patience (Moreno-Murcia, 2016).

While student engagement in the compulsory schooling sector was well- established in face-to-face contexts, online learning environments were still in the developmental stage (Louwrens & Hartnett, 2015). The most online engagement research was with older students in tertiary education contexts (Louwrens & Hartnett, 2015). Louwrens and Hartnett (2015) researched by exploring student engagement in an online, middle school in a New Zealand distance education context. Three critical dimensions of student engagement included behavioral participation, cognitive involvement, and emotional commitment as part of an in-depth investigation to explore what engaged middle school students when they learned online (Louwrens & Hartnett, 2015). Data comprised of student and teacher interviews, online asynchronous discussion transcripts, and LMS statistical data (Louwrens & Hartnett, 2015). Results showed that students tended to engage behaviorally with all required activities (Louwrens & Hartnett, 2015). Complementary to Reynolds (2016) findings with collaborative information seeking, Louwrens and Hartnett (2015) found that cognitive engagement was evident in the giving and receiving of feedback as well as the

interest and relevance specific activities generated for learners. The emotional involvement took place in the design and facilitation of learning activities, and through the ongoing development of a learning community in which students felt safe to contribute (Louwrens & Hartnett, 2015). Emotional engagement also aligned with Reynolds (2016) beliefs on how collaboration supported the realistic appearance of methods that resulted from increasing assignment information and could yield task knowledge gains.

Distance education online settings allowed acceptable and straightforward connections to knowledge occurrences (Prior, Mazanov, Meacheam, Heaslip, & Hanson, 2016; Sahin, 2007). In addition to other types of academics, advanced self-esteem usually encouraged increased learner competence and assurance (Prior et al., 2016). Louwrens and Hartnett (2015) and Prior, Mazanov, Meacheam, Heaslip, and Hanson (2016) believed that while self-efficacy had an assured impact on face-to-face learning, its predecessors and reactions in the distance online education provided antecedents that included attitude and digital literacy (Prior et al., 2016). Online learning environments considered the impact of self-esteem on three types of academic actions which include learner engagement, LMS collaboration, and course acclimation (Prior et al., 2016). Prior et al. (2016) found from a study online of 151 middle school learners suggested that digital literacy and assured learner approaches significantly contributed towards collaborative information seeking and cognitive and emotionally engaged activities that promoted self-efficacy and peer engagement.

Developing an online environment in which middle school students felt safe to contribute their thoughts and ideas were necessary to increase emotional engagement (Louwrens & Hartnett, 2015; Reynolds, 2016). Teachers along with parental support provided adolescents with choice and control over their learning because this helped increase behavioral and cognitive engagement (Louwrens & Hartnett, 2015; Moreno-Murcia, 2016; Prior et al., 2016). A notable shift in compulsory schooling was the expectation for parents to play active portrayals with supporting learner's education (Selwyn et al., 2011). Teachers who incorporated activities that encouraged interaction among students and new scholarly knowledge that stemmed from bridges between the learning sciences and information sciences had strong potential to yield new academic understanding (Louwrens & Hartnett, 2015; Reynolds, 2016).

Summary

The comprehensive literature reviews for this study examined how parents used an LMS to support their children's achievement in mathematics, notably when their children entered middle school. Topics discussed in the literature review included: (a) the conceptual framework, with Eccles and Wigfield's (2002) expectancy-value theory of achievement inspiration and Bandura's (2002) social cognitive theory, middle school programs, mathematics achievement, parental involvement, LMSs, and fostering learner autonomy. The conceptual framework consisted of two theories including the expectancy-value theory that explained how an early adolescent's beliefs and values influenced their performance in school and work settings, and social cognitive theory that focused on how systems mediated the impact of external forces and provided the guidelines for predetermined action. During adolescence, young people transitioned, developed interpersonal relationships, and made social adjustments (Steinberg, 1990; Youniss & Smollar, 1985). Links among relationships of support and learner success could positively impact student inspiration (Wentzel, 1998). More studies are required to examine the associations among social relationships, student motivation, and learner success (Wentzel, 1998).

Middle schools supported the social, moral, emotional, and physical cultural requirements of young learners where broadening life-lived assignments of assembling a sense of individuality, acquiring social abilities, achieving autonomy, and establishing character and a set of values began (Ernest, 2015; Irvin, 1995; NMSA, 1995). A constructivist approach allowed students to improve their learning through actively participating in the learners' progression and by giving importance to the learners' autonomy (Moreno-Murcia, 2016; Wang, 2011). New scholarly knowledge stemmed from bridges between the learning sciences and information sciences that both had strong potential to yield new academic understanding (Louwrens & Hartnett, 2015; Reynolds, 2016).

In examining mathematics achievement, there were continual differences in mathematical attainment affiliated to income disparities and race (NMAP, 2016). The disparities were overwhelming for families and learners, and projected adversely for the nation's progress, even with the youth along with increasing amounts of the growing minority communities (NMAP, 2016). Although mathematical acceleration into higher-level mathematics courses could have mostly positive effects on student achievement, many students were not prepared

developmentally for the educational disputes affiliated with being in advanced mathematical courses during middle school (Domina, 2014). Future research for considering curricular innovations that prepared students for advanced-level mathematics instruction, along with instructional and organizational reforms that motivated and prepared students to succeed when placed in advanced mathematics courses, were needed (Domina, 2014; Dougherty et al., 2015). Additional mathematical resources for teaching advanced-leveled courses would support students in becoming mathematically proficient (Domina, 2014; Kepner & Huinker, 2012; McCallum, 2012).

Family and cultural environments also provided a guiding factor that impacted students and their motivation to learn mathematics (Middleton, 2013). It was vital that decision-makers made sure that students and their parents had access to studies used to instruct their online platforms to support all learners in mathematics (Høgheim & Reber, 2015; O'Dwyer et al., 2015). The additional research examined similarities and differences among online versus face-to-face mathematical courses (Bernard et al. 2004; Eyyam & Yaratan, 2014; O'Dwyer et al., 2015).

Parental participation had been affiliated with higher levels of educational achievement, occupational status, and vocational aspirations among older adolescents and young adults (Jodl et al., 2001). Although parents would want to increase learners' motivation in learning and supported their children's success in academics, they may not have been aware of the effective ways to achieve those goals (Fan et al., 2012). School programs could increase positive parental involvement, address the discrepancies to school motivation, and result in positive environments that enhanced motivation (Fan et al., 2012).

Both Froiland et al. (2013) and Patall et al. (2008) found that parental support in middle school mathematics homework completion negatively impacted student performance due to a decline in achievement among middle school students causing parents to get involved differentially for those students experiencing the greatest decline. Parental predictions of arrangement contributed to learner's performance in mathematics (O'Sullivan et al., 2014). Future parental engagement intervention studies could investigate the efficiency of applying support for parents that focused on the use of methods taken from social-cognitive theory, expectancy-value theory, and hope theory (Froiland et al., 2013). Additional research on the perspectives of parents could provide valuable information that would

further increase understanding of their role as parents (Fan et al., 2012; O'Sullivan, 2014; Rosen et al., 2008).

The use of LMS within schools often conformed to existing patterns of delivery of information and resources (Selwyn et al., 2011). Results from the literature reviewed showed little evidence that LMS use provided circumstances for a more unified replenishing partnership among parents and schools (Selwyn et al., 2011). Selwyn et al. (2011) suggested that schools provide a culture that engaged parents in highlighting LMS features they could use to communicate, collaborate, and monitor their children's progress. More studies to show how parents used an LMS to promote their children's autonomy and achievement were needed (Selwyn et al., 2011).

As students engaged in using LMS features, they began to learn how to self-regulate their learning and progress (You, 2016). The concept of involving learner's profiles with the use of an LMS perspective provided a more pragmatic approach to prepare a more sensible according to the learner's needs (Dias & Dinis, 2014). Examiners and people in education needed to persist in finding and developing compelling LMS signs that efficiently captured students' corroboration and ability to regulate individually (Dias & Dinis, 2014; Gašević et al., 2016; You, 2016).

In chapter 3, I describe how the qualitative research design aimed at showing how parents used EdLine, an LMS, to support children's autonomous achievement in grasping mathematical concepts. The study also examined parents' beliefs regarding the pros and cons of using EdLine. As an LMS, Edline provided functionalities beyond facilitative learning using an organizational learning structure to provide support for teaching and learning (Nasser et al., 2011).

Citation

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CHAPTER 3: MEASURING PARENTS' BELIEFS REGARDING LEARNING MANAGEMENT SYSTEM USE IN MATHEMATICS

This qualitative case study examined how parents of middle school children used EdLine, an LMS, to support their children's autonomous achievement in mathematics. An LMS provided middle school parents with an online tool for monitoring and supporting their children's academic progress. Although having parents monitor and support their children's academic progress was essential, researchers found that there still existed disparities in performance among middle school students in mathematics. What remained limited were studies that examined how parents used an LMS to support their children in becoming responsible for their learning in mathematics. In this chapter, I include the research design and rationale for choosing the approach instead of other methods. With this case study approach, I explored parents' beliefs regarding the utilization of an LMS. For this chapter, I also include a description of my role as the researcher, the methodology that describes the logic for participation selection, the instrumentation used, processes for researcher-developed instruments, procedures for recruitment, systems for participation, methods for data collection, and a data analysis plan. Within this chapter, I discern issues of trustworthiness and ethical procedures. I concluded this chapter with a summary.

Research Design and Rationale

The intent of the study examined parents' beliefs regarding the pros and cons of using the LMS, EdLine.

Research Questions

The following research questions helped examine parents' beliefs regarding the use of an LMS to support their children in mathematics:

1. How do parents use an LMS to support their children's autonomous achievement in middle school mathematics?
2. What are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics?
   (a) How do parents describe the pros of using an LMS to monitor their children's progress in middle school mathematics?
   (b) How do parents describe the cons of using an LMS to monitor their children's progress in middle school mathematics?

Central Concepts and Chosen Tradition

A qualitative research methodology was custom designed and aimed at achieving a deeper interpretation of a specific set of arrangements or event, as opposed to an external characterization of a larger swath of a community (Creswell, 2013; Maxwell, 2013). For this study, I examined how parents used an LMS to support their children's achievement in mathematics, particularly when their children entered middle school. As a research methodology, my study sought to provide a definitive interpretation of the format, arrangement, and expansive arrangements seen with groups of participants (Maxwell, 2013). My research study consisted of generating different forms of data about interactive human groups in social settings (Creswell, 2013; Maxwell, 2013). The qualitative research allowed for meaning to emerge from the participants (Maxwell, 2013). My study did not use a quantitative approach because quantitative research methods provide a means for testing scientific theories by investigating the connection between variables (Creswell, 2013). My study supported the use of concepts, data collection tools, and data collection methods suited to qualitative research, and the research progression (Creswell, 2013; Maxwell, 2013). This study was broad and required an open-ended approach to exploring different parent management styles on how they used an LMS to monitor their children's progress in middle school mathematics. As a result, the study was conducted under qualitative methodology and drew on multiple sources of information to explore a setting or context and present a detailed analysis of a specific case (Bengtsson, 1999; Creswell, 2013). A case-study approach required the researcher to study a phenomenon without affecting the environment (Bengtsson, 1999). As the researcher, it was important to ensure that the process of interviewing and observing did not influence the subject in ways that could affect the phenomenon of research (Bengtsson, 1999). Narrative studies explore the life of an individual through telling stories

of individuals' experiences (Patton, 2002). The narrative approach was rejected as an option for my study because narrative studies analyze data for stories and often use a chronology, whereas a case study analyzes data through descriptions of a case, themes that evolve, and cross-case themes that emerge (Creswell, 2013; Maxwell, 2013). Phenomenological studies examine concerns that describe a group of individuals' lived experiences. The phenomenological approach was not as an option in my study because unlike a case-study approach, the phenomenological approach does not examine commonly held views (Creswell, 2013). Grounded theory researchers attempt to develop a new theory that evolves from the data based on views from participants. The grounded theory approach was rejected as an option because my study already had a conceptual framework design (Creswell, 2013). Ethnographical studies examine shared beliefs and patterns among people within the same culture (Patton, 2002). For this research, an ethnographical research approach would not provide an in-depth understanding of each participant's perspective (Creswell, 2013; Patton, 2002). Unlike other methods, a case-study approach provides a faceted view of a group process or activity (Creswell, 2013; Maxwell, 2013).

Role of the Researcher

As a qualitative researcher, I needed to set boundaries that defined aspects of the case to study (Miles et al., 2014). I worked in a middle school as an assistant principal for an extensive school system in a mid-Atlantic state using EdLine as an LMS. As a middle school assistant principal, I had established many working relationships with parents, students, and staff members. I had also worked with parents in my school building who were classroom teachers and paraprofessionals. A conflict of interest could have arisen with my role as the administrator in seeking to gain honest responses from parents. As a result, the study occurred in a middle school setting in the same school district where I did not have an affiliation with either the parents or their children. Through establishing a working relationship with parents in another middle school setting, I could help uncover, confirm, and qualify the ways parents used EdLine autonomously to support their children (Miles et al., 2014). In the middle school where the study took place, I was responsible for tasks related to initiating the study. Examples included gathering permission from the principal of the middle school to conduct the study and gathering information from different grade-level middle school parents that included (a) parent participant interviews, (b) an EdLine data spreadsheet, and (c) a parent reflection journal. I was also responsible for collecting and

analyzing the data, including distributing and collecting permission documentation. I was responsible for performing all parent participation interviews, collecting EdLine spreadsheet data, and gathering information from every parent participant's reflection journal. I used Audacity, a computer software program, for recording interviews. I also transcribed, coded, and analyzed the interview recordings. I also analyzed and coded data from the other information sources which included the EdLine data spreadsheet and the parent participation reflection journal.

Methodology

Qualitative researchers tended to work with small samples of people within their study. They also managed to use purposive sampling deliberately as the strategy for selecting settings, persons, or activities to provide information that is particularly relevant to the research questions and goals (Maxwell, 2013). As the qualitative researcher, I set boundaries that defined aspects of the case to study (Miles et al., 2014). Qualitative researchers also needed to be able to create a conceptual framework to help them uncover, confirm, or qualify the underlying constructs that undergird their study (Miles et al., 2014). The sampling decisions within qualitative research were theory-driven in the beginning, or they became so progressively as the study evolved. Qualitative researchers should be able to provide their readers justification on why they selected a sampling strategy for their research (Miles et al., 2014). In choosing their sample, qualitative researchers made within-case sampling decisions that the researcher could test (Miles et al., 2014).

Participation Selection Logic

After institutional review board (IRB) approval of my research study, the study took place in a middle school from a large county school district in a suburban area of a mid-Atlantic state. The school population included 543 students total, 48.6% female and 51.4% male (Montgomery County Public Schools, 2016a). The racial composition of students was 33.3% Hispanic, 30.9% Caucasian, 19.9% African American, and 11.4% Asian, with less than 5% American Indian, less than 5% Pacific Islander, and less than 5% who identified as two or more races (Montgomery County Public Schools, 2016a). Other student characteristics included 9.4% English language learners (ELLs), 38.4% receiving free and reduced meals (FARMS), and 11.4% individual educational plans (IEPs). The student enrollment by grade

included 195 students in Grade 6, 191 students in Grade 7, and 157 students in Grade 8 (Montgomery County Public Schools, 2016a). During the 2015–2016 school year, students took the Partnership for Assessment of Readiness for College and Careers (PARCC) assessment in mathematics. The PARCC was a consortium of states and the District of Columbia that worked to create and deploy a standard set of K–12 assessments in mathematics and English (Montgomery County Public Schools, 2016a). Within PARCC, states based the content of these evaluations on what it took to be successful in college and careers in the future. The results indicated in Grade 6 that 30.1% of all students, 53.6% of Asian students, 9.7% of African American students, 15.9% of Hispanic students, and 45.6% of Caucasian students met the performance expectation in mathematics. In Grade 7, the figures were 13.9% of all students, 40.0% of Asian students, 8.6% of African American students, 8.3% of Hispanic students, and 17.4% of Caucasian students. Finally, in Grade 8, the figures were 30.3% of all students, 63.6% of Asian students, 16.8% of African American students, 10.0% of Hispanic students, and 55.6% of Caucasian students (Montgomery County Public Schools, 2016a). As a qualitative researcher, I gathered data on how the middle school parents used EdLine features to support their children in mathematics (Maxwell, 2013). Purposeful selection allowed me to select parent participants and establish relationships for more accurate responses to the research questions (Maxwell, 2013). As the researcher, I used purposive sampling as the strategy for selecting settings, persons, or activities to provide information that was particularly relevant to the research questions and goals (Maxwell, 2013).

Qualitative researchers made within-case sampling decisions that the researcher could test and provide their readers with justification on why they selected a sampling strategy for their study (Miles et al., 2014). For the current research, parents with an active EdLine account were asked to volunteer as participants. For my study, I selected three parent participants with EdLine accounts from each grade level (6, 7, and 8). The parents were selected based on their brief response regarding the EdLine features they used to support their children's progress in mathematics class. Purposeful selection allowed researchers to select groups or participants where they established relationships that enabled them to answer the research questions (Maxwell, 2013). Criterion sampling was one strategy used with purposeful sampling. Patton (2002) emphasized the logic of criterion sampling was to review and study individuals in the case study that meet some predetermined criterion of importance. My study included parent participants who had a minimum experience with using EdLine for one marking period which

was equivalent to 45 days. Criterion sampling added a critical component to a management information system. Patton (2002) emphasized that the logic of criterion sampling is to review and study all participants in the case study that meet some predetermined criterion of importance. Regarding decisions about data collection, I needed to be able to anticipate how well participants would understand the interview and follow-up questions, understand the guidelines for placing information on the EdLine data spreadsheet, and be able to express how they were able to support their children in mathematics through a reflection journal. Qualitative researchers are responsible for setting boundaries that define aspects of the case they study (Miles et al., 2014). For my study, the participants in the case study exhibited predetermined criterion characteristics that I identified for in-depth analysis (Patton, 2002).

My sample consisted of nine parent participants with multiple perspectives on how they used EdLine to support their middle-school children in mathematics. Purposeful sampling focused on selecting information-rich participants who illuminated the questions under investigation (Patton, 2002). By including a sample size of nine parent participants for the study, I could gather and analyze several parent perspectives from three different grade levels on how they used EdLine to support their children's mathematical progress. I also had many opportunities to identify and analyze themes among parents within and across three grade levels (Creswell, 2013). The criteria for making selections included selecting parents who had an assigned EdLine parent login account and experience with using EdLine for one school marking period or 45 days. Selected parents also had knowledge of using EdLine features such as (a) the combined parent and student EdLine calendar; (b) how to access the teacher's interactive classroom study guides; and (c) the ability to track their children's grades, attendance, and other reports. I selected nine parent volunteers, which included three parent participants in Grade 6, three parent participants in Grade 7, and three parent participants in Grade 8, who were willing to participate in my case study.

Instrumentation

Each data instrument for the study provided a summary of ways parents used EdLine to support their children in mathematics. After receiving IRB approval for conducting the study, parent participation interview, EdLine data spreadsheet information, and parent reflection journal information was gathered from multiple data instruments. Each data collection instrument used also aligned and addressed each research question (Appendix

A). Creswell (2013) states that validating the accuracy of a research study is a process that evolves with the research findings. Each data source shows how ideas translate into perspectives and validation strategies (Creswell, 2013). Each data source shows how parents use multiple strategies to support their children's progress in mathematics (see Table 1 for the list of Specific Questions, Types of Data, and Sources of Data Collected).

Table 1. Specific Questions, Types of Data, and Sources of Data Collected

Specific Questions	Types of Data	Source of Data
How do parents use an LMS to support their children's autonomous achievement in middle school mathematics?	Parent Interviews EdLine Spreadsheets	Personal Interview Parent Login Entry Date, EdLine Features Used, Children's Progress, Follow-Up, or No Action Needed
	Parent Journals	Journal Entry Date, Strategies Used, Features and Tools Used, Children's Progress, Follow-Up, or No Action Needed
What are parents' beliefs regarding the use of an LMS to support their children's progress in middle school mathematics?	Parent Interviews Parent Journals	Personal Interview Journal Entry Date, Strategies Used, Features and Tools Used, Children's Progress, Follow-Up, or No Action Needed
How do parents describe the pros of using an LMS to support their children's progress school mathematics?	Parent Interviews Parent Journals	Personal Interview Journal Entry Date, Strategies Used, Children's Progress, Follow-Up, or No Action Needed
How do parents describe the cons of using an LMS to support their children's progress in middle school mathematics?	Parent Interviews Parent Journals	Personal Interview Journal Entry Date, Strategies Used, Features and Tools Used, Children's Progress, Follow-Up, or No Action Needed

As the researcher, I gathered sources of data from parent interviews, an EdLine spreadsheet, and a parent reflection journal. Interviews with parents who had children in a middle school mathematics class showed how the parents incorporated the use of an LMS. A dialogue yielded useful information regarding parents' beliefs about an LMS (Creswell, 2013). A qualitative researcher narrows or broadens his or her focus by determining the purpose, resources present, the predetermined time allotments, and the level of interest from the parties involved (Patton, 2002). My study also included an EdLine spreadsheet that captured EdLine parent login information in addition to EdLine features that parents used. My study included a parent reflection journal to reveal additional information regarding parents' beliefs towards the use of an LMS (Creswell, 2013). Parent participant interviews provided a data source for answering both research questions. Parent participant interviews yielded useful information regarding parents' beliefs in using the LMS, EdLine, to monitor and support their children's achievement in mathematics (Creswell, 2013). Parent participant interviews also revealed the level of support each parent designated towards supporting their children's autonomous achievement in mathematics.

An EdLine spreadsheet provided a source of data to answer Research Question 1. The spreadsheet was used to capture EdLine account usage. The EdLine data spreadsheet captured each parent participant's EdLine login entry date. The EdLine spreadsheet also captured features parents used, parents' ability to assess their children's progress in mathematics, and a brief explanation for any parent-participant response. Examples of a brief explanation included making a mental note, communicating with their children or their children's mathematics teacher (text, phone, face-to-face discussion, etc.), or no action. The spreadsheet showed how parents used EdLine resources to support their children's autonomous achievement in mathematics. This is consistent with Creswell's (2013) suggestion that validating the accuracy of a research study is a process that evolves with research findings and the participants. A parent reflection journal also provided a data source for answering both research questions. The parent reflection journal prompted parents to reflect on their experiences in using EdLine to monitor and support their children's progress in mathematics. Parent participants had an opportunity to analyze how their beliefs influenced their EdLine use as a resource to support their children's autonomous achievement in mathematics. The parent reflection journal provided an additional source of information to reveal parents' beliefs in using EdLine. (Creswell, 2013).

Researcher-Developed Instrument

Creswell (2013) made comments on intermediate steps that researchers needed to be able to code their data and make comparisons. Madison's interpretation of qualitative research (as cited by Creswell, 2013) recommends that qualitative researchers create an interpretive or conceptual framework. The structure is essential to being able to analyze data critically. Qualitative researchers can build their conceptual framework through existing research and theories relevant to what they want to accomplish. Qualitative researchers need to be explicit on which paradigm(s) their work draws from to justify their philosophical and methodological stance (Maxwell, 2013). Qualitative researchers can also combine aspects of different models within their research study (Maxwell, 2013). To get the best responses from the interviewee, as the interviewer, I established questions using a standardized open-ended interview approach. Patton (2002) stated that this method allows an interviewer to word each question carefully before the interview. The standardized open approach is the best way to guard against variations among interviewers (Patton, 2002). The data collection process is still open in the sense that the respondent supplies his or her words, and thoughts (Patton, 2002). Patton purports that the intention of having an investigative interview is to gather knowledge from another person's perspective. Interviews allow the researcher to collect meaningful views of the people they interview. I transcribed the information from the parent interview recordings and hand-coded into patterns that aligned to my conceptual framework and research questions.

As previously described, an EdLine data spreadsheet revealed how parents used EdLine resources to support their children's autonomous achievement in mathematics. EdLine was the LMS technological tool used for providing school and class organization. EdLine also provides classroom, school, and district level website support for administrators, parents, teachers, and secondary students. The information gathered from the EdLine data spreadsheets was transcribed and hand-coded into patterns that aligned to my conceptual framework and research questions. I also asked parent participants to write entries in a parent reflection journal which allowed parent participants to reflect on their habits and beliefs with using EdLine. A parent reflection journal provided additional information to reveal parents' beliefs towards the use of an LMS (Creswell, 2013). The journal allowed parents to reflect upon their habits of mind that developed while using EdLine as a resource for monitoring and advocating the learner's progress in mathematics (Janesick, 2011). They could specify many

aspects that encompassed their role in supporting their children mathematically. Journal-writing helped parents deepen their self-awareness through writing, thinking, reflecting, and their ability to communicate (Janesick, 2011). The information gathered from the parent reflection journals was transcribed and hand-coded into patterns that aligned with my conceptual framework and research questions.

Procedures for Recruitment, Participation, and Data Collection

Procedures for recruitment of participants for this study had a breakdown of three stages. After receiving IRB approval, the first procedure was to find a middle school within the school district for conducting the study. The second procedure was to identify possible parent participants based on their level of EdLine usage and the level of parental engagement within the school (a) for the parent interviews, (b) to capture data and information on an EdLine spreadsheet, and (c) to write a parent reflection journal. The third procedure was to determine if parents were willing to agree and participate in the study. In the first stage, it was necessary to find a middle school to conduct the study. As an ethical consideration to avoid a conflict of interest that arose with my role as the administrator in working with parents, I found a middle school setting where I had no affiliation with either the parents or their children. There were 38 middle schools within the school district. The middle school selected was based on the school's strategic plan for increasing student eligibility in mathematics where all students within each subgroup earned a grade of "C" or higher.

The second stage was to meet with the principal to introduce the research study. After receiving IRB approval for my study, I arranged a meeting with the middle school principal. During the meeting, I discussed how my research study would focus on how middle school parents used EdLine to support their children's progress in mathematics. I explained that the study included parent participants in each grade level. The components of the case study included parent interviews, an EdLine data spreadsheet, and a parent journal reflection log. I also presented the parent participation application, and I discussed the criteria for selecting parents to participate in the research examination. The principal of the middle school requested that parent leaders of the school's parent–teacher association (PTA) also receive my research study presentation. As a result, IRB approved the request and parent leaders from the school's PTA received my research study presentation. During the presentation to

parent leaders, I indicated that the school district did not sponsor my research. I also explained that my research would not take place during school business hours. All data gathering including the (a) parent interviews, (b) the EdLine spreadsheets, and (c) the parent journal reflection entries took place within a two-week period at the end of the fourth marking period for the 2016–2017 school year.

The parents participating in my research case study had an in-depth understanding of ways on how they used EdLine to monitor and supported their children's mathematical achievement. The criteria for parents included having a parent EdLine account and experience with using EdLine for at least one school marking period or 45 days. I presented a form which discussed methods on how to advertise for parent participants. The parent participant recruitment message given to parents was through the school's weekly newsletter and the PTA newsletter. I also suggested allowing a 15-day window as a timeline for advertising and getting parent participants.

For the message included in the school's weekly newsletter and PTA newsletter, I used the same text for all recruitment methods. I asked parents who were interested in contacting me via email or phone call for a parent participant application. I emailed the form directly to the parents. Parents who participated completed a parent participation application and emailed the application directly to me. Criterion sampling, a subset of purposeful selection, was the method I used for selecting parent participants. The nine parent participants included (a) three Grade 6 parents, (b) three Grade 7 parents, and (c) three Grade 8 parents. Criterion sampling added a critical component to an information management system that was typical of quality assurance efforts (Maxwell, 2013; Patton, 2002). Fifteen days later, I reviewed parent participant applications and selected nine parents who regularly used EdLine to support their children's mathematical achievement. Parents who met the criteria and were willing to participate in the research study emailed their applications directly to me.

Parents selected to participate in the study had an assigned EdLine parent login account and minimum experience with using EdLine for one school marking period or 45 days. Unfortunately, this meant that not every parent who volunteered and filled out the application was selected to participate in this research investigation. The first three parent participants selected were from each grade level who sent an application and indicated that they used EdLine features. Examples of EdLine features used included: (a) the combined parent and

student EdLine calendar; (b) the teacher's interactive classroom study guides; and (c) tracking features for their children's grades, attendance, and other reports.

After selecting the nine parent participants, as the third stage of the procedure, I contacted each chosen parent via telephone, or by email if a phone number was not available. I let each parent know they had been selected to be a participant in the research study. I introduced myself and discussed components of the study including an interview lasting 45–60 minutes, an EdLine data spreadsheet, and a parent reflection journal. I also let each parent know that they may elect not to participate in any portion of the study. I set up a time and date for interviewing in an office at the middle school. I gathered each parent's email address for sending a consent form along with the interview questions (Appendix B). Ten days before and one day before each interview, I sent each participating parent an email reminder with the date, time, and school location for the interview. The research for this study was not affiliated with the school, not sponsored by the school district, and did not take place during school business hours.

Parents had the option to email or call me with any questions they had. I also had consent forms available for parents to sign. The interviews took place in one of the school's conference rooms. The nine interviews were arranged to take place during three consecutive days of the 2016–2017 school year. The study explored how each parent used the LMS, EdLine, to support their children's autonomous achievement in mathematics. After the interview session reached the 45-minute mark, parents had the option to end the interview or continue for up to 15 additional minutes.

During the parent-participant interviews, I took field notes and used a software program, Audacity, to record my face-to-face interviews. Afterward, I transcribed each parent participant interview recording. Then, I analyzed the transcription and began assigning codes that aligned with my research questions. Five days after each parent interview, I emailed parent participants a copy of their interview session transcript. The email message also included follow-up questions for parents to answer after they had reviewed their parent interview transcript (Appendix C). The parents were instructed to take 20 minutes to review their interview transcript and 10 minutes to respond to the interview follow-up questions. I asked parents to email me their responses to the follow-up interview questions five days after

they received the follow-up session for the parent interview email. If parents had additional questions, they could call or email me.

After completing each parent-participant interview, I gave each parent participant a copy of the guidelines for recording information on the EdLine data spreadsheet. After completing each parent interview, each parent participant received a self-addressed, stamped envelope for collecting EdLine spreadsheet entries and parent reflection journals. I also emailed a copy of the guidelines for the EdLine data spreadsheet to each parent participant. For 10 days, parents recorded and used the EdLine data spreadsheet every time they logged in to EdLine to gather information regarding their children's progress in mathematics (Appendix D). Each EdLine spreadsheet form took about 10 minutes to complete. After five days, I sent an email reminder to parents, reminding them to complete the spreadsheets. Parent participants completed at least two EdLine spreadsheet forms during the 10-day duration. After 10 days, I sent an email reminder to parents to send me their reflection journal entries. In the parent reminder, I also thanked parents for their participation. After 10 days, parent participants sent me their EdLine data spreadsheet entries via email. I also provided each parent participant a stamped, self-addressed envelope where parent participants could mail their EdLine data spreadsheets directly to me.

After completing each parent-participant interview, each parent participant also received a self-addressed, stamped envelope for collecting EdLine spreadsheet entries and parent reflection journals. I gave each parent participant a composition book which served as a parent reflection journal. For 10 days, each parent participant submitted an entry into their parent reflection journal after logging into EdLine and completing an EdLine data spreadsheet entry (Appendix E). Each parent reflection journal entry took about 10 minutes to complete. After five days, I sent an email reminder to parents, reminding them to complete the two journal entries. Parent participants completed at least two parent reflection journal entries during the 10-day duration. After 10 days, I provided each parent participant a stamped, self-addressed envelope where parent participants could mail their composition books with their parent reflection journal entries directly to me. After 10 days, I sent an email reminder to parents to send me their reflection journal entries. In the parent reminder, I thanked parents for their participation. As the researcher, I gave each parent participant a $10.00 gift card to a department store.

Data Analysis Plan

Creswell (2013) made a set of recommendations for qualitative researchers to include in their study as standards of validation and evaluation. The standards of validation and assessment included triangulation, descriptive writing, and frequent member checking. Triangulation allows researchers to ensure that their research is rich in depth and breadth, inclusive, and well-refined (Creswell, 2013). I included triangulation as a standard of validation and evaluation with the use of parent-participant interviews, an EdLine data spreadsheet, and a parent reflection journal. The dialogue from parent interviews yielded useful information regarding parents' beliefs about an LMS. The spreadsheet contained additional data which also included patterns of LMS usage. The parent reflection journal provided corroborating information on parent beliefs revealed with the use of EdLine as an LMS (Creswell, 2013). Creswell (2013) states that validating the accuracy of a research study is a process that evolves with the research findings and the participants within the study. Qualitative researchers acknowledge, analyze, and interpret their data results to validate the accuracy of their research study. Their ideas translate perspectives and terms that qualitative researchers call validation strategies (Creswell, 2013).

After gathering the information from parent-participant interviews, EdLine data spreadsheets, and parent reflection journals, I transcribed the information. I also began designing a list of codes that aligned with my research questions. Miles, Huberman, and Saldena (2014) suggested that researchers use a priori or provisional codes as they begin their data analysis. The list I used was a form of deductive coding that evolved from the conceptual framework and research questions. The codes changed and developed as the field experience continued. As the process continued, some codes did not work. In other cases, codes flourished because too many phrases were assigned to the same code. As the researcher, I further broke the codes into sub-codes afterward (Miles et al., 2014).

I developed prior codes through the structure for data analysis based on the conceptual framework and research questions. I developed primary codes based on my research questions that described how parents used an LMS to support their children in mathematics. Table 2 listed examples and definitions of primary codes: uses and support, learner autonomy, expectations, social cognitive development, motivation, achievement in mathematics, beliefs in using EdLine, monitoring tool, pros, and cons. I also included sub-

coding as a method for further analysis on my primary codes. The technique is appropriate for a qualitative datum that requires additional indexing and categorizing.

Table 2. Primary Codes and Definitions

Primary Code	Definition
us	The act or practice of employing something with assistance
la	The ability for learners to take charge of their learning
e	The act or belief that something will happen or is likely to happen
scl	Learner focus on the cognitive, behavioral, individuals and environmental factors that affect how people behave and how people are motivated
m	The state or condition of having a strong reason to act or accomplish something
am	The state of or condition of having achieved or accomplished in mathematics
b	Having a strong confidence or opinion regarding the use of EdLine
mt	EdLine use to observe student progress and student academic achievement and performance
p	Affirmative support for using EdLine to monitor student progress
c	An argument against using EdLine to monitor student progress

Notes. *us* = uses and support, *la* = learner autonomy, *e* = expectations, *scl* = social cognitive learning, *m* = motivation, *am* = achievement in mathematics, *b* = beliefs in using EdLine, *mt* = monitoring tool, *p* = pros, and *c* = cons.

It was necessary to assign secondary codes for *learner autonomy*, *social cognitive learning*, and *motivation*. Table 3 displayed a list of secondary codes and definitions that further characterize types of *learner autonomy*, *social cognitive learning*, and *motivation*. Through data analysis, themes would emerge as a competency known as pattern recognition (Patton, 2002). Pattern codes developed into interconnected summaries that included (a) categories or themes, (b) causes and explanations, (c) relationships between people, and (d) theoretical constructs (Miles et al., 2014).

As the qualitative researcher, I linked primary codes and secondary codes to data gathering sources that connected patterns and themes and drew together examples of how parents used EdLine to support their children in mathematics (Miles et al., 2014). Coding the data involved breaking down sources of information from the data gathering sources into units that were grouped according to their characteristics (Miles et al., 2014). The primary codes became organizational categories or "bins" for sorting the data that had been collected for

further analysis (Maxwell, 2013, p. 107). The secondary codes became subcategories that further defined the organizational categories (Maxwell, 2013).

Table 3. Secondary Codes and Definitions

Secondary Code	Definition
la–i	Learners possess competency to take charge of their own learning
la–cr	Learners can analyze and assess the appropriateness of their knowledge and understanding of content
la–sm	Learners are motivated to do or achieve something because of their own enthusiasm or interest
la–sd	Learners can guide their way of thinking
la–dm	Learners make the decision to support their learning
la–sa	Learners have a clear perception of their personality, including strengths, weaknesses, thoughts, beliefs, motivation, and emotions
scf	Factors that influence thoughts and actions
scef	Factors that influence student behaviors with actions
me	Outside factors that influence student learning
mi	Motivation that comes from inside an individual rather than from any external or outside rewards

Notes. *la–i* = learner autonomy–independent, *la–cr* = learner autonomy–critically reflective, *la–sm* = learner autonomy–self motivated, *la–sd* = learner autonomy–self directed, *la–dm* = learner autonomy–decision maker, *la–sa* = learner autonomy–self aware, *scf* = social cognitive factors, *scef* = social cognitive environmental factors, *scb* = social cognitive behavioral, *me* = extrinsic motivation, and *mi* = intrinsic motivation.

As I further coded the data, theoretical categories emerged that placed data into a general or abstract framework (Maxwell, 2013). Theoretical categories were inductively generated and typically represented the researcher's description of concepts (Maxwell, 2013). An example of theoretical categories that further described levels of parental support included (a) involved, (b) neutral, and (c) non-responsive. Substantive categories were descriptive, which included a description of parent participants' concepts and beliefs (Maxwell, 2013). Substantive categories were important for capturing ideas from parent participants with discrepant responses (Maxwell, 2013). I created a matrix as a tool to further display the results of a categorizing analysis of the data (Maxwell, 2013). I structured the matrix according to the case study research questions, categories, and themes (Maxwell, 2013).

In building trust and establishing the relationship with parents, I used pseudonyms and code-names to protect each parent's identity (Creswell, 2013). I stored collected data on

my external hard drive which was kept in a locked, secure location when not in use, and on my password-protected Microsoft Office cloud storage account. As the qualitative researcher, I hand-coded and analyzed the data collected from the interviews, EdLine spreadsheets, and reflection journals.

Issues of Trustworthiness

Creswell (2013) made a set of recommendations that qualitative researchers include validation measures as part of their study. Validation measures in qualitative research attempt to assess the accuracy of the research findings (Creswell, 2013; Miles et al., 2014). Creswell (2013) pointed out Lincoln and Guba's perspectives and terms used in qualitative validation. The perspectives for this study included credibility, transferability, dependability, and confirmability. As a form of credibility, my study was triangulated and included multiple data sources to produce converging or corroborating conclusions (Creswell, 2013; Miles et al., 2014). The data sources from my study included parent participant interviews, an EdLine spreadsheet, and a parent participant reflective journal. The dialogue from parent interviews yielded information regarding parents' beliefs when using an LMS. I recorded the parent participant interview sessions on my laptop through a software program known as Audacity and transcribed the interviews myself. The transcriptions were cross-checked by the parent participants to demonstrate how multiple observers' accounts converge during instances, settings, or times (Miles et al., 2014). The parent participants had an opportunity to review their interview transcript for accuracy and add any additional information after the parent interview. The EdLine data spreadsheet captured other patterns of LMS usage. The parent reflection journal provided further details on the ideas that parents revealed with the use of an LMS (Creswell, 2013).

As a form of transferability, my dissertation research included thick, rich descriptions, to support interpretations. Parent participants from different grade-levels were selected to encourage broader applicability when relevant (Miles et al., 2014). Criterion measures were applied to choose parent participants who were proactive in supporting their children with making decisions (Bauch & Goldring, 1998). My study included parent participants who had a minimum experience with using EdLine for one marking period, which was equivalent to 45 days. The study included a record of methods and procedures that showed enough detail for concluding (Miles et al., 2014).

To support dependability as part of the study, I focused on reliability with an intercoder agreement where hand-coding was applied to analyze data (Creswell, 2013). I hand-coded my interview transcriptions and the findings from the qualitative study to demonstrate significant parallelism across the three types of data sources (Miles et al., 2014). The fundamental paradigms and analytic constructs were explicitly specified (Miles et al., 2014). The intercoder agreement evolved as a form of deductive coding. A set of primary and secondary codes emerged from the conceptual framework and research questions. The methods for data sequencing explain how data is collected, processed, condensed, transformed, and displayed for drawing conclusions (Miles et al., 2014). The data presented in my study was analyzed and linked any prior or emerging abstract patterns (Miles et al., 2014).

Confirmability was applied to the study to confront unforeseen biases. To demonstrate confirmability for my dissertation, I included the actual sequence on how the data was gathered, processed, transformed, and displayed for conclusion drawing (Miles et al., 2014). The study took place in the same school district where I worked but in a middle school setting where I had no affiliation with either the parents or their children. Input gathered was from parent-participant interviews, an EdLine data spreadsheet, and parent reflection journals. The data sources captured each grade level parent's perspective in using EdLine to support their children in mathematics. To minimize bias, as the researcher, I consistently urged parent participants to express both positive and negative reactions when using EdLine to support their children in mathematics. As the researcher, I addressed both positive and negative parent EdLine user endorsements to prevent any shaping to the approach of the study. All parent participants were treated respectfully and equally, regardless of their reactions or perceptions with using EdLine as a resource to monitor and support their children's progress in mathematics (Creswell, 2013).

Ethical Procedures

Agreements to gain access to interviewing and working with participants came from documents in the IRB application. The proposed study complied with all the related ethical standards as published by the American Educational Research Association (AERA, 2006). The main issues that AERA (2006) addressed included (a) the protection of all participants,

(b) the integrity of the researcher and the research practices, (c) the ethical and scientific accuracy of research, and (d) the research gearing towards making a positive contribution to the educational enterprise.

I submitted the research design and other relevant proposed information to Walden University's IRB. I also obtained documents that described the treatment of human participants through the IRB application. Institutional permissions, including IRB approvals, were acquired, completed, and approved. Granted was final IRB approval contingent on the local school board's approval. The Walden IRB approval number for this study was 01-10-17-0226976. All parent participants' identities remained confidential. The results from the study were available to parent participants and other people who had an interest in seeing how parents used EdLine to support their children in mathematics. I obtained each parent participant's signed consent form. The participant consent forms explained risks and benefits of the study. The participant consent form also emphasized drop-out options that participants could exercise if necessary. As the researcher, I remained available throughout the study and answered any questions that arose.

Summary

This qualitative case study examined how parents of middle school children used EdLine, an LMS, to support their children's autonomous achievement in mathematics. An LMS provided middle school parents with an online tool for monitoring and supporting their children's academic progress. The study intended to examine parents' beliefs regarding the pros and cons of using the EdLine LMS.

The qualitative methodology for the study included a case study approach and the underlying interpretive approach used to analyze the data collected. Data collection sources included parent-participant interviews that revealed how parents used an LMS to support their children's autonomous achievement in mathematics. Other data collection sources included an EdLine data spreadsheet that gave a summary and frequency of ways parents used an LMS to support their children's progress in mathematics, and a parent reflection journal that provided additional information to support parents' beliefs regarding the use of an LMS. The research questions that helped examine parents' beliefs regarding the use of an LMS to support their children in mathematics consisted of:

1. How do parents use an LMS to support their children's autonomous achievement in middle school mathematics?
2. What are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics?
   (a) How do parents describe the pros of using an LMS to monitor their children's progress in middle school mathematics?
   (b) How do parents describe the cons of using an LMS to monitor their children's progress in middle school mathematics?

My study generated multiple data sources about interactive human groups in social settings (Creswell, 2013; Maxwell, 2013). The study included face-to-face interviews and follow-up questions with three Grade 6 parents, three Grade 7 parents, and three Grade 8 parents. The parent interview sessions recorded were digitally recorded and transcribed. Another source of information was an EdLine data spreadsheet that captured features that described how parents used EdLine to support their children in mathematics. The study also gathered information from a parent reflection journal that provided additional information addressing how parents used EdLine features to support their children's autonomous achievement in mathematics.

Agreements to gain access to working with parent participants came from documents in the IRB application. All parent participants' identities remained confidential. The research design and other relevant proposed information was submitted to Walden University's IRB. Chapter 4 gives a presentation of my research findings.

Citation

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CHAPTER 4: FINDINGS FOR PARENTS' BELIEFS REGARDING LEARNING MANAGEMENT SYSTEM USE IN MATHEMATICS

This study examined how the parents of middle school children used an LMS, known as EdLine, to support their children's autonomous achievement in mathematics. The study specifically examined parents' beliefs regarding the use of EdLine and how parents used EdLine as a resource to support their children in becoming responsible for monitoring their grades and managing their progress in mathematics. The following research questions helped examine parents' beliefs regarding the use of an LMS to support their children in mathematics:

1. How do parents use an LMS to support their children's autonomous achievement in middle school mathematics?
2. What are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics?
    (a) How do parents describe the pros of using an LMS to monitor their children's progress in middle school mathematics?
    (b) How do parents describe the cons of using an LMS to monitor their children's progress in middle school mathematics?

In Section 4, I examined the processes by which the data for this qualitative study were generated, gathered, and analyzed. This section explained the study's setting, demographics, data collection procedures and the qualitative findings from parent participant interviews, parent participant EdLine spreadsheet entries, and reflection journal entries from parents.

Setting

In a sizeable suburban county school district, the LMS, EdLine, serves as the web-based communication platform for monitoring student progress. Within the school district for this research case study, there are 40 middle schools and 26 high schools where both parents and

their children could register for an EdLine account (EdLine, 2016; Montgomery County Public Schools, 2016a). In the participating middle school for this research case study, nine parent participants from grades six, seven, and eight shared their beliefs on how they used EdLine to support their children's academic progress in mathematics. Each of the parent participants had experience in using EdLine to help their children in mathematics for at least 45 days or nine weeks.

EdLine is used for monitoring student grades and progress in mathematics and is also used to enhance communication among students, mathematics teachers, and parents (Montgomery County Public Schools, 2016b). Parents could receive an EdLine account to link to their children's account. Mathematical achievement information, including individual assignment and assessment scores, and recent course averages could become available for both students and parents to view (EdLine, 2016; Montgomery County Public Schools, 2016b). If parents did not have internet access from home, they could access their children's grades in mathematics on EdLine by visiting their children's school media center, the local library, or the regional community center (Montgomery County Public Schools, 2016b).

As mathematics teachers used EdLine, they were expected to enter, and update grades every three weeks (Montgomery County Public Schools, 2016b). Both middle school and high school mathematics teachers communicated with both parents and students if circumstances required an extension in the posting of grades (Montgomery County Public Schools, 2016b). Parents were encouraged to contact their children's school for support and help in activating their EdLine account (Montgomery County Public Schools, 2016b).

Demographics

This research study took place in a middle school from a large county school district in a suburban area of a midAtlantic state. The school population included 543 students total with 48.6% Female and 51.4% Male (Montgomery County Public Schools, 2016a). The student enrollment by grade included 195 students in Grade 6, 191 students in Grade 7, and 157 students in Grade 8 (Montgomery County Public Schools, 2016a). The racial composition of students included less than 5% American Indian, 11.4% Asian, 19.9% African American, 33.3% Hispanic, less than 5% Pacific Islander, 30.9% Caucasian, and less than 5% Two or More Races (Montgomery County Public Schools, 2016a). According to Montgomery

County Public Schools (2016a), other student characteristics included 9.4% English Language Learners (ELL), 38.4% Free and Reduced Meals (FARMS), and 11.4% Individual Educational Plans (IEP). Another factor that could impact the demographic diversity within the school is open enrollment. The school district maintains agreements of open registration with several suburban surrounding school districts (Montgomery County Public Schools, 2016a).

Data Collection

As the qualitative researcher, I gathered sources of data from grade-level parent interviews, parent EdLine spreadsheet entries, and parent reflection journal entries within a two-week period. The sample size for my study included nine parent participants including three grade-level six parents, three grade-level seven parents, and three grade-level eight parents with multiple perspectives on how they used EdLine to support their children in mathematics. Table 4 displayed a description of each parent participant by grade-level and gender, the gender of their children, and the type of mathematics course their children are taking.

Table 4. Description of Parent Participants

Grade-Level and Gender of Parent Participant	Gender of Children	Type of Mathematics Course
Parent 1 Grade 6 (Female)	*Female*	*Mathematics 6*
Parent 1 Grade 7 (Female)	*Female Siblings*	*IM 7*
Parent 1 Grade 8 (Male)	*Male*	*Algebra 8*
Parent 2 Grade 6 (Female)	*Male*	*Mathematics 6*
Parent 2 Grade 7 (Female)	*Female*	*Mathematics 7*
Parent 2 Grade 8 (Female)	*Male*	*Algebra 8*
Parent 3 Grade 6 (Female)	*Female*	*Mathematics 6*
Parent 3 Grade 7 (Female)	*Male*	*Algebra 7*
Parent 3 Grade 8 (Female)	*Male*	*Algebra 8*

Note. Description of Parent Participants included Grade-Level of Parent Participant, Gender of Children, and Type of Mathematics Course. Behavioral, *me* = extrinsic motivation, and *mi* = intrinsic motivation.

The first group of parent participants included Female Parent 1 Grade 6 with a daughter taking an on-level mathematics class or Mathematics 6, Female Parent 1 Grade 7 with two sibling daughters taking advanced mathematics investigations classes or IM 7, and Male Parent 1 Grade 8 with a son taking an advanced Algebra class or Algebra 8. The second set of parent participants included Female Parent 2 Grade 6 with a son taking Mathematics 6, Female Parent 2 Grade 7 with a daughter taking on-level mathematics seven class or Mathematics 7, and Female Parent 2 Grade 8 with a son taking Algebra 8. The third set of parent participants included Female Parent 3 Grade 6 with a daughter taking Mathematics 6, Female Parent 3 Grade 7 with a son taking an advanced Algebra seven class or Algebra 7, and Female Parent 3 Grade 8 with a son taking Algebra 8.

My data gathering took place within a 20-day window during the months of late-May until mid-June of 2017. The parent participant interviews held were in the middle school's conference room. A sixty-minute time-limit allotted was for the nine parent participant interviews. Each parent participant interview took between 20 minutes – 45 minutes to complete. Five days after each parent participant interview, I sent each parent participant a copy of their interview transcript to review for accuracy and respond to the follow-up questions. Parent participants also completed two EdLine spreadsheet entries that were emailed or mailed directly to me. Each parent participant also completed two parent journal reflection entries in a composition book that was mailed directly to me. To establish a positive relationship with parent participants, I used pseudonyms to protect each parent's identity (Creswell, 2013). The data collected was stored on my external hard drive and my Microsoft Office cloud storage account. A log-on password-protected access to my external hard drive and cloud storage account was in a locked, secure location. As the qualitative researcher, I hand coded and analyzed the data collected from the parent participant interviews, follow-up questions, parent participant EdLine spreadsheet data entries, and reflection journal entries for parent participants.

Data Analysis

After transcribing the parent participant interviews along with the follow-up questions, the parent participant EdLine data spreadsheet data entries, and the reflection journals entries for parents, I began designing a list of codes that aligned to my research questions. Miles et al. (2014) suggested that researchers use provisional or prior codes as they analyze their

data. The list I used is a form of deductive coding that evolved from the conceptual framework and research questions (see Table 2). As the codes emerged, I further broke the codes into sub-codes afterward (see Table 3).

As the qualitative researcher, I linked primary codes and secondary codes to data gathering sources that connected patterns and themes and drew together examples of how parents used EdLine to support their children in mathematics (Miles et al., 2014). As I further coded the data, theoretical categories emerged which placed data into a general or abstract framework (Maxwell, 2013). I created a matrix as a tool to further display the results of a categorizing analysis of the data (Maxwell, 2013). I structured the matrix according to the case study research questions, categories, and themes (Maxwell, 2013). The data collected was from the parent participant interviews and follow-up questions, parent participant EdLine spreadsheet data entries, and reflection journal entries from parent participants.

Parent Participant Interviews

The theoretical categories that emerged from the parent participant interview responses on how parents used EdLine to support their children in mathematics were learner autonomy and EdLine features and use. The research findings for the parent participant interviews came from the inductive analysis used to address the research questions: How do parents handle an LMS to support their children's autonomous achievement in middle school mathematics? And what are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics? During the parent participant interviews, participants were asked to answer the following: (a) As a parent, how do you use EdLine to support your children's achievement in middle school mathematics? (b) As a parent, what are your beliefs regarding the use of EdLine as a resource to monitor your children's progress in middle school mathematics? (c) Could you describe the pros of using EdLine to monitor your children's progress in middle school mathematics? (d) Could you describe the cons of using EdLine to monitor your children's progress in middle school mathematics?

What the analysis revealed was that parent participants believed their children should become autonomous learners by taking ownership and responsibility for using EdLine to check and manage their progress in mathematics. The parent participants described methods they use to motivate their children, support their learning environment in

mathematics, and monitor their children's progress. The analysis also revealed that parent participants found EdLine to be a useful resource that had features for monitoring their children's progress in mathematics, provided that their children's mathematics teacher posted grades promptly.

Learner autonomy. Learner autonomy referred to a student's ability to set appropriate learning aims for themselves. During the parent participant interviews, all nine parent participants indicated that EdLine provided a useful resource for allowing middle school students to become independent for checking their progress and grades in mathematics. The parent participants stated they encouraged their children to review their grades in mathematics through EdLine. Three of the nine parent participants also indicated that promoting the use of EdLine allowed parents to create an environment where parents and their children could analyze grades, discuss progress, and make decisions regarding their children's academic progression in mathematics. Five of the nine parent participants indicated that EdLine in mathematics promoted student learning.

The review of the parent participant interview transcripts showed that all nine parents indicated they believed EdLine provides a useful resource that allows middle school students to become self-motivated and responsible for checking their progress and grades in mathematics. Three of the parent participants expressed their expectation with the use of EdLine in mathematics for their children. During the parent participant interviews, Parent 1 Grade 6 stated, "I have a behavioral expectation where my daughter is self-aware in checking and self-directed in using EdLine to monitor her progress in mathematics." Both Parent 1 Grade 8 and Parent 2 Grade 6 believed that parents should establish an expectation and create a home learning environment where their children are encouraged to become decision-makers in using EdLine for monitoring their grades. Also, Parent 1 Grade 8 stated, "By setting an expectation, my son became responsible for monitoring and managing his mathematics grades on EdLine." Thus, parent participants believed that EdLine provided a resource that supported middle schoolers in becoming self-motivated and responsible for checking their progress in mathematics.

In reviewing the parent participant interview transcripts, three of the parents indicated they log-on to EdLine to make sure their children are using EdLine as a resource for monitoring their grades in mathematics. During the parent participant interviews, Parent 2 Grade 6,

Parent 2 Grade 7, and Parent 3 Grade 7 stated they use EdLine to see if their children are using EdLine to check their progress in mathematics. Parent 2 Grade 6 believed, "Having an EdLine account establishes a learning environment for my son where behaviorally, he knows his mom is invested and cares about his progress in mathematics." Parent 2 Grade 6 also stated that she would have a critically reflective conversation with her son if he had any failing grades in mathematics. Parent 2 Grade 7 expressed as a pro and awareness factor, "My daughter knew when I would check grades through EdLine." Parent 3 Grade 7 added, "As a parent, EdLine allowed for me to reinforce my son's self-esteem by letting him know he was performing well in mathematics when he claimed that he was not doing well." As a result, while parent participants checked to see if their children were using EdLine to monitor their grades, their children could become self-directed in checking and managing their grades in mathematics.

The review of the parent participant interview transcripts revealed three of the nine parent participants indicated that EdLine use supported an environment where parents and their children could analyze grades, discuss progress, and make decisions regarding their children's progression in mathematics. During the parent participant interviews, Parent 1 Grade 8 said, "If there was a discrepancy with my son's mathematics grades on EdLine then I would have a conversation with my son regarding the discrepancy." The conversation Parent 1 Grade 8 had with his son would help determine if any missing homework assignments or tests in mathematics on EdLine needed to be turned in.

Parent 2 Grade 6 stated that if she noticed any missing or failing grades in mathematics on EdLine, she would have a conversation with her son where her son explained why he had an absent or failing grades from his mathematics class on EdLine. Also, Parent 3 Grade 6 further added, "After checking my daughter's grades in mathematics on EdLine, I noticed that my daughter was diligent about turning in assignments but performed poorly on tests and quizzes." This parent had a conversation with her daughter regarding her performance on mathematics assessments and discovered that her daughter became nervous before taking tests in mathematics. After the discussion, Parent 3 Grade 6 decided to contact her daughter's mathematics teacher to discuss strategies for supporting her daughter with mathematics assessments. Thus, EdLine use promoted an environment where parents and their children could analyze grades, review progress, and make collaborative decisions regarding their children's progression in mathematics.

The review of the parent participant interview transcripts also revealed that five of the nine parent participants indicated they use EdLine in mathematics to support their children with student learning. After Parent 1 Grade 7 checked her sibling daughters' grades in mathematics on EdLine, she further supported her sibling daughters' in learning and grasping mathematical concepts by providing supplemental self-directed mathematical resources to enhance their learning and metacognition. Parent 2 Grade 7 stated, "For my one daughter, I used the information from her EdLine progress report in math class and worked with her to study for any test retakes." Parent 2 Grade 7 and Parent 3 Grade 8 also supported their children with student learning after checking grades and encouraging their children to get help and additional support from their mathematics teacher or older sibling. Parent 2 Grade 8 supported her son with student learning after he used EdLine to check his grades in mathematics and asked for advice regarding his performance on mathematical assignments. Parent 3 Grade 7 also supported her son with student learning after reviewing his grades on EdLine in mathematics and continually praised and encouraged him to do well. Parent 3 Grade 7 regularly told her son that his performance and his grades were excellent in mathematics. Thus, parent participants could use EdLine to support their children with student learning by working with their children on their mathematics skills, by encouraging their children to get additional tutoring support as needed in mathematics, and by continually praising their children as they made progress with their performance in mathematics.

EdLine features and use. Another theoretical category that emerged from the parent participant interviews was EdLine features and use. During the parent participant interviews, nine of the nine parents indicated that as a pro, EdLine was excellent as a tool for tracking grades and monitoring their children's progress in mathematics. Three of the nine parent participants including Parent 1 Grade 7, Parent 2 Grade 7, and Parent 3 Grade 7 believed that EdLine as an LMS was underutilized. During the parent participant interviews, Parent 1 Grade 7 said, "EdLine has features that the mathematics teacher does not use." As a con, Parent 1 Grade 7, Parent 2 Grade 7, and Parent 3 Grade 7 further believed that mathematics teachers did not update grades on EdLine promptly. The three parent participants also indicated that EdLine use in mathematics was not user-friendly.

In reviewing the parent participant interview transcripts, all nine parents stated that they use or have used EdLine to check their children's progress in middle school mathematics. During the parent participant interviews, three parent participants, including Parent 1

Grade 6, Parent 1 Grade 7, and Parent 3 Grade 8, checked EdLine to see if their children were keeping up with the mathematics curriculum and were checking their grades. Parent 1 Grade 7 stated, "EdLine gives parents a sense of how well their children perform on mathematics assignments, tests, and homework." As a result, parent participants used EdLine to check their children's progress in middle school mathematics.

The review of the parent participant interviews revealed that two of the nine parent participants, including Parent 2 Grade 7, and Parent 3 Grade 6, indicated they checked EdLine to see if their children were missing any mathematical assignments. Parent 2 Grade 7 and Parent 3 Grade 6 stated that if their children performed poorly on a test, they would check with their children's mathematics teacher to see if their children were eligible to retake a test. Parent 3 Grade 6 said that she logged onto EdLine daily. Parent 3 Grade 6 also noted that as a pro, her daughter's mathematics teacher updated grades regularly on EdLine. Parent 3 Grade 6 further stated, "My daughter has an Individual Educational Plan, or IEP, and EdLine has allowed me to keep track with checking her progress in mathematics." As a result, Parent 3 Grade 6 has tracked and identified mathematical concepts where her daughter struggled and needed additional support. Through monitoring her daughter's progress on EdLine, Parent 3 Grade 6 has worked with her daughter's IEP case manager to get her daughter extra mathematical support as needed.

In reviewing the parent participant interview transcripts, parents spoke about EdLine features they used for monitoring their children's progress in mathematics. All nine parent participants indicated that they use or have used the EdLine mathematics report to check their children's achievement in mathematics. Four of the nine parent participants spoke about EdLine features and tools they use which include the EdLine email feature, the EdLine phone application, and the EdLine grade update notification feature. Two of the parent participants including Parent 2 Grade 7 and Parent 3 Grade 7 testified that EdLine has an email feature as an excellent resource for parents to use for communicating with their children's mathematics teacher.

Four of the parent participants, including Parent 2 Grade 7, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8, indicated they had and used the EdLine application on their cell phone to access their children's grades in mathematics. The four parents further commented about the ease of opening the EdLine app on a cell phone "anywhere" to check

progress in mathematics was beneficial. Parent 3 Grade 6 also said, "The phone application on EdLine would improve if it had the same features to access as my laptop computer." Four of the parent participants including, Parent 2 Grade 7, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8, used the EdLine grade update notification feature. The feature allowed parents to receive a notification when their children's mathematics teachers updated grades on EdLine. As a result, parent participants could email their children's mathematics teacher through EdLine regarding their children's progress in mathematics, accessed their children's progress in mathematics on EdLine through the phone application., and received a notification on EdLine when their children's mathematics teacher updates grades.

In reviewing the parent participant interview transcripts, three of nine parent participants expressed their concern that EdLine as an LMS is underutilized. Three of the nine parent participants including Parent 1 Grade 7, Parent 2 Grade 7, and Parent 3 Grade 7 believed that EdLine was a useful resource that was not used to its full potential. During the parent participant interviews, Parent 1 Grade 7 clarified, "EdLine parent usage in mathematics is contingent upon how much emphasis the mathematics teachers placed on updates with grades, information, and EdLine tools they used." During the parent participant interviews, Parent 1 Grade 7, and Parent 3 Grade 7 believed that younger mathematics teachers seemed to be more familiar with using EdLine features and establishing a grading scale for mathematics assignments and assessments. Parent 1 Grade 7 said, "Younger mathematics teachers are more likely to post and upload assignments more frequently than older teachers." Both Parent 1 Grade 7 and Parent 3 Grade 7 also believed that most mathematics teachers tended to use EdLine solely for posting grades. It was Parent 1 Grade 7's belief, "Due to union standards mathematics teachers only have to do the bare minimum on EdLine which is post grades." Because parent participants believed that mathematics teachers tended to use EdLine solely for posting grades, EdLine as an LMS and resource in mathematics was underutilized.

The review of the parent participant interview transcripts revealed that two of the nine parent participants, including Parent 2 Grade 7 and Parent 3 Grade 7, also believed that the level of parent EdLine usage was dependent on how much emphasis mathematics teachers placed on updates with grades and information. Parent 2 Grade 7 pointed out, "Parents could use the EdLine calendar feature to view mathematics homework assignments that

were assigned every night." During the parent participant interviews, Parent 2 Grade 7 and Parent 3 Grade 7 also stated that in previous years, their children's mathematics teachers uploaded or posted worksheets and homework assignments through EdLine promptly. Parent 3 Grade 7 added, "Mathematics teachers no longer posted or uploaded worksheets and assignments through EdLine since schools have introduced Google classroom as a platform." Parent 3 Grade 7 believed that more mathematics teachers uploaded assignments and worksheets through Google classroom. Since mathematics teachers currently uploaded assignments through Google Classroom, Parent 3 Grade 7 stated that she no longer checked EdLine to see if her son's mathematics teacher uploaded worksheets or homework assignments. Thus, parent participants believed the level of parent use with EdLine depended on the level or emphasis mathematics teachers placed on updating grades, uploading assignments, and giving information.

In reviewing the parent participant interview transcripts, five of the nine parents indicated that timeliness with recording grades and providing enough information in mathematics was a con with the use of EdLine. During the parent participant interviews, Parent 1 Grade 7, Parent 2 Grade 6, Parent 2 Grade 7, Parent 3 Grade 7, and Parent 3 Grade 8, stated that as a con, mathematics teachers did not provide curricula and updated information promptly. For example, Parent 1 Grade 7 reported one of her sibling daughters would initially turn in a mathematics assignment, and the grade would show mistakenly as a "C" or "D" on EdLine. Two weeks later when the mathematics teacher updated the grades on EdLine, then the assignment grade changed to a "B." As a result, parent participants testified if mathematics teachers did not post grades promptly, then parents were left to speculate how well their children were doing in their mathematics class.

Parent 2 Grade 6 believed, "Mathematics teachers should provide curriculum progress updates or a syllabus where parents could monitor and know what their children should be able to do in their mathematics class." This parent also expressed her concern, "EdLine did not always provide enough information when grades in mathematics classes were not updated regularly." Parent 2 Grade 6 further clarified that with grade updates on EdLine, "Mathematics teachers would give many grades on assignments as a mass update." As a result, Parent 2 Grade 6 believed it was difficult for her and her son to check his progress in mathematics since grades were not updated and posted regularly.

Parent 2 Grade 7 also believed that mathematics teachers should post grades on EdLine

every day or every other day. If Parent 2 Grade 7's daughter did poorly on a quiz or an assignment, she did not know why. EdLine did not explain as to "why" a student performed poorly on a quiz. Also, because homework assignment posts were not prompt, Parent 2 Grade 7 expressed, "Parents were at a disadvantage because they were unable to see if their children turned in mathematics assignments on time." So, Parent 2 Grade 7 did not know if her daughter turned in an assignment until weeks later when her children's mathematics teacher posted assignments on EdLine. Thus, Parent 2 Grade 7 was unable to help her daughter prepare for a quiz or assessment if the mathematics teacher did not post assignments on EdLine promptly.

Parent 3 Grade 7 stated, "As a con, sometimes there was a lag time between when a zero would stay on my son's EdLine account in mathematics." Parent 3 Grade 7 gave an example where her son had a zero listed on EdLine for a mathematics assignment after her son stated that he turned in the assignment. Parent 3 Grade 7 believed the situation could turn into a "He-said/She said" argument between the teacher and the student. It was only after Parent 3 Grade 7 contacted her son's mathematics teacher, where she learned that the mathematics teacher did not post updated grades on EdLine. Parent 2 Grade 8 had a similar situation with her son and added, "As a parent, I began to second guess if my son's mathematics instructor was recording grades accurately on EdLine." As a result, both Parent 3 Grade 7 and Parent 2 Grade 8 felt it was important for mathematics teachers to record grades on EdLine promptly.

In reviewing the parent participant interview transcripts, three of the nine parent participants indicated that EdLine was not user-friendly. Parent 1 Grade 7, Parent 1 Grade 8, and Parent 3 Grade 8 indicated that EdLine had too many "clicks" to navigate through when using EdLine to find their children's grades in mathematics. Parent 1 Grade 7 reported, "Navigating through EdLine was not intuitive." Parent 1 Grade 8 said, "EdLine was cumbersome because parents could click on several options before they could find their children's grades in mathematics." Parent 1 Grade 8 believed that upgrades for parents to track their children's measurable progress through an LMS were needed. Parent 1 Grade 8 explained, "Teachers seemed unaware of the navigation issue for parents because mathematics teachers using EdLine to check and add grades could visually see all students and their grades displayed on one screen." Parent 3 Grade 8 added, "Even though EdLine defined performance grades on assignments and tests, parents can't navigate

through EdLine nor find the tools needed to show what concepts students grasped and understood." As a result, parent participants indicated that EdLine was not user-friendly due to parents having to navigate and click on several options before they could find their children's grades and locate EdLine features in mathematics.

EdLine Use Follow-Up Questions After Parent Participant Interview

After the parent participant interviews, parent participants reviewed their parent participant transcripts and responded to follow-up questions. Six of the nine parent participants, including Parent 1 Grade 7, Parent 1 Grade 8, Parent 2 Grade 6, Parent 2 Grade 7, Parent 2 Grade 8, and Parent 3 Grade 7, had additional comments and suggestions regarding the use of EdLine in further supporting their children in mathematics. The follow-up responses from parent indicated that three of the parent participants, including Parent 1 Grade 7, Parent 2 Grade 7, and Parent 3 Grade 7, recommended that all mathematics teachers create and adhere to a standard set of rules of parent engagement. Parent 1 Grade 7, Parent 2 Grade 7, and Parent 3 Grade 7, also recommended that all school environments advocate the use of EdLine support and its features. Parent 1 Grade 7 believed, "the set of rules with Edline standards with teacher features has to be consistent and used uniformly among all mathematics teachers to work correctly." Thus, parent participants believed mathematics teachers should create and adhere to a standard set of rules of parent engagement with the use of EdLine in mathematics.

In reviewing the follow-up responses from the parent participants, three of the nine parent participants, including Parent 1 Grade 8, Parent 2 Grade 7, and Parent 3 Grade 7 indicated it would be helpful for mathematics teachers to use EdLine for additional communication with parents. To support further communication efforts, Parent 1 Grade 8, Parent 2 Grade 7, and Parent 3 Grade 7 recommended that mathematics teachers upload all assignments, homework, and worksheets onto EdLine. Even though EdLine as an LMS has this feature, Parent 1 Grade 8, Parent 2 Grade 7, and Parent 3 Grade 7 found that their children's mathematics teachers did not use the assignment upload feature. Parent 2 Grade 7 and Parent 3 Grade 7 expressed that if mathematics teachers uploaded assignments on EdLine, students could look for, access, and download any missing worksheets and mathematics assignments.

Parent 1 Grade 8 also believed that the expectation of including a course syllabus would also be useful in mathematics. According to Parent 1 Grade 8, "The requirement of having a syllabus would allow parents to assess their children's progress on EdLine and anticipate how performance on upcoming assignments could support their grade." Parents could then dialogue with their children to discuss how performance on a formative or summative test could affect their grade. Parent 1 Grade 8 also mentioned that he preferred to email his son's mathematics teacher through the school's website with questions instead of using the EdLine email feature. Thus, three of the parent participants proposed it would be helpful for mathematics teachers to use EdLine as a communicative tool for contacting parents in addition to posting grades. In reviewing the follow-up responses from parent participants, three of the parent participants, including Parent 2 Grade 6, Parent 2 Grade 8, and Parent 3 Grade 7, wrote they would encourage their children's mathematics teachers to update grades on EdLine more regularly. Parent 2 Grade 6, Parent 2 Grade 8, and Parent 3 Grade 7, realized mathematics teachers have many duties and responsibilities which included updating grades regularly on EdLine. As a result, three of the parent participants, including Parent 2 Grade 6, Parent 2 Grade 8, and Parent 3 Grade 7, recommended that parents check EdLine weekly.

EdLine Spreadsheet Entries

Themes or categories that emerged after reviewing the parent participant EdLine spreadsheet entries were monitoring grades and progress checks. Eight of the nine parent participants used EdLine to keep track of student grades and assessed student progress in mathematics. All nine parent participants expected their children to use EdLine for monitoring and managing their grades in mathematics. The research findings for the parent EdLine spreadsheet entries come from an inductive analysis used to address the study's research question: How do parents use an LMS to support their children's autonomous achievement in middle school mathematics? Each parent participant completed two EdLine spreadsheet entries. The parents also responded to the following EdLine spreadsheet requests: date of login entry to EdLine, EdLine features used, briefly assessed their children's progress in mathematics class, and responded or followed-up after reviewing their children's progress in mathematics on EdLine.

Both parent participants in my study and their children indicated they have an EdLine

account. One of the nine parent participants indicated that she did not use her EdLine account and believed it was her son's responsibility to use EdLine to monitor his grades and manage his progress in mathematics. Eight out of nine parent participants except for Parent 2 Grade 8 indicated they regularly used EdLine stated that they used the EdLine assignment and grade tracker features which also included the mathematics current assignment report when monitoring their children's progress in mathematics. As part of the EdLine spreadsheet entry process, each parent participant logged into EdLine twice within a two-week period. During each EdLine spreadsheet login entry, parent participants indicated an entry date, checked EdLine spreadsheet features used, and monitored their children's grades and progress in mathematics on EdLine. After assessing their children's progress in mathematics, parent participants decided if they needed to make a mental note of their children's progress in mathematics, facilitate a conversation with their children regarding the progress in mathematics, or contact their children's mathematics teacher.

Monitoring grades and progress checks. Each of the nine parent participants completed two parent participant EdLine spreadsheet entries between the dates of May 31, 2017 – June 16, 2017. As parent participants completed each EdLine spreadsheet entry, all nine parent participants indicated that they use or have used EdLine to track their children's grades, attendance, and other reports. The parents indicated they used EdLine to check and monitor the learner's progress in mathematics. After checking their children's grades in mathematics on EdLine, some of the parent participants responded by making a mental note of their children's progress, communicated with their children or their children's mathematics teacher, or took no action.

During the first EdLine entry, all nine parent participants indicated that they logged onto EdLine to check and assess their children's grades and progress in mathematics. Eight of the nine parent participants including Parent 1 Grade 6, Parent 1 Grade 7, Parent 1 Grade 8, Parent 2 Grade 6, Parent 2 Grade 7, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8, made comments regarding their use of EdLine to assess and monitor their children's progress in mathematics. In checking her daughter's progress in mathematics, Parent 1 Grade 6 wrote, "I checked EdLine and viewed to see if my daughter had any missing tests or quizzes in mathematics." As Parent 1 Grade 8 viewed his son's grades in mathematics through EdLine, he noticed, "My son had 86.3% as his GPA in Algebra." When Parent 2 Grade 6 viewed and assessed her son's progress in mathematics through EdLine, she noticed, "My son had a 97.6% GPA and appeared to be current with

homework submissions." In viewing and assessing her daughter's progress in mathematics on EdLine, Parent 2 Grade 7 noticed, "My daughter had a 77.2% GPA." Parent 2 Grade 7 also realized that her daughter was missing two homework assignments that needed to be turned in. Parent 2 Grade 8 viewed her son's progress in mathematics through EdLine and noticed, "My son had a 98.2% GPA in Algebra." Thus, parents could check their children's progress through EdLine to see if mathematics assignments were missing.

As Parent 3 Grade 6 checked her daughter's progress in mathematics, Parent 3 Grade 6 took note of her daughter's ability to complete homework and classwork assignments. Parent 3 Grade 6 wrote "My daughter did well with turning in homework and classwork assignments but did not do well on tests and quizzes." As a result, Parent 3 Grade 6's daughter had a "C" in mathematics. Parent 3 Grade 7 viewed her son's progress in mathematics on EdLine and noticed, "My son had an 'A' in 7th-grade Algebra." Parent 3 Grade 8 also stated that she viewed her son's progress in mathematics and noticed, "My son had a 'B' in Algebra." Because of checking and assessing their children's progress in mathematics through EdLine, eight of the nine parent participants indicated that EdLine helped in monitoring their children's grades in mathematics.

After the parent participants entered and assessed their first EdLine spreadsheet login entry regarding their children's progress in mathematics, they decided if next steps were needed. Four of the nine parent participants commented on the next steps they would take. As a next step, Parent 1 Grade 8 made a mental note that his son was out ill for seven days in the past month. As the next step for Parent 2 Grade 7, she indicated, "I plan to follow up with my daughter regarding her two missing homework assignments in mathematics and discuss the grade of 'D' she made on an assessment." Parent 3 Grade 6 indicated, "I made a mental note of my daughter's test scores and emailed her mathematics teacher about test retakes." Parent 3 Grade 6 also spoke with her daughter to find what issue her daughter had with test taking in mathematics. As a purpose, Parent 3 Grade 6 wanted to get a sense from her daughter about how she felt with retaking mathematics assessments and receiving additional help. As a next step, Parent 3 Grade 7 decided to have a face-to-face discussion to acknowledge her son's hard work and doing his best in mathematics. Thus, according to participants, parents indicated that EdLine use supported their ability to monitor progress in mathematics.

After assessing their first EdLine spreadsheet login entry regarding their children's progress in mathematics five of the nine parent participants, including Parent 1 Grade 6, Parent 1 Grade 7, Parent 2 Grade 6, Parent 2 Grade 8, and Parent 3 Grade 8, indicated, no action was needed. Thus, it appeared that parent participants felt they could rely on EdLine to report their children's progress in mathematics and determined if further action or no action was needed. As the nine parent participants completed their second EdLine spreadsheet entry, all parents indicated that they used EdLine to track their children's grades, attendance, and other reports. The nine parent participants mainly used EdLine to monitor their children's progress in mathematics. As an effort to follow upcoming mathematics assignments, Parent 2 Grade 7 indicated, "I checked the EdLine calendar, but my children's mathematics teacher did not use the EdLine calendar feature." Parent 2 Grade 7 indicated, "I was not able to check my daughter's attendance in mathematics class." Thus, parent participants continually used EdLine as a monitoring tool in reviewing their children's grades in mathematics.

During the second EdLine spreadsheet entry, parent participants again checked EdLine to see if there were any changes regarding their children's progress in mathematics. Eight of the nine parent participants made comments regarding their children's achievement including, Parent 1 Grade 6, Parent 1 Grade 8, Parent 2 Grade 6, Parent 2 Grade 7, Parent 2 Grade 8, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8. Thus, parent participants used EdLine as a resource for monitoring their children's progress in mathematics.

After logging onto EdLine for the second time, Parent 1 Grade 6 indicated, "I checked EdLine to see if my daughter had upcoming mathematics assignments." After Parent 1 Grade 8 checked his son's progress in mathematics on EdLine for the second time, he indicated, "My son earned an 87% GPA in Algebra." After Parent 2 Grade 6 assessed her son's progress in mathematics on EdLine for the second time, she indicated, "My son continued to have a high 'A' in his Mathematics 6 class." Parent 2 Grade 7 reviewed and assessed her daughter's progress in mathematics on EdLine for the second time and indicated, "There were no updates in my daughter's mathematics class since I checked EdLine in late May." Thus, EdLine could at least allow parents to check the status of their children's grades in mathematics.

After checking her son's progress in mathematics on EdLine for the second time, Parent 2 Grade 8 indicated, "My son's progress in Algebra continued to be excellent." Parent 3 Grade 6 assessed her daughter's grade in mathematics for the second time and noticed, "My daughter's grade in the class was one point away from a 'B' in mathematics." Parent 3 Grade 6 also noticed that after checking EdLine for a second time that her daughter received an "A" on a mathematics class project presentation. As parents checked their children's grades in mathematics through EdLine, they were able to see if their children improved their grades.

After checking her son's progress in mathematics on EdLine for the second time, Parent 3 Grade 7 noted, "My son scored a 21/21 on his last exam." The mathematics exam was a required quarterly assessment or RQA. After reviewing her son's grades in mathematics on EdLine for the second time, Parent 3 Grade 8 noticed, "My son's grade increased again to an 88.5% GPA." As a result, parent participants continually used EdLine to check their children's grades and assess their children's progress in mathematics.

After parent participants entered and assessed their second EdLine spreadsheet login entry regarding their children's progress in mathematics, again they decided if next steps were needed. Within a two-week period, three of the nine parent participants took following steps after assessing their children's progress in mathematics on EdLine, including Parent 1 Grade 8, Parent 3 Grade 6, and Parent 3 Grade 8. In looking at next steps, Parent 1 Grade 8 made a mental note, "My son was a few points away from making an 'A' in his Algebra class." Parent 1 Grade 8 believed that his son had an excellent mathematics teacher who was prompt to update grades on EdLine. Parent 1 Grade 8 also noted that if his son made an "A" on his next mathematics assessment, his son could earn an "A" in Algebra.

As a next step, both Parent 3 Grade 6 and Parent 3 Grade 8 decided to contact their children's mathematics teacher. In looking at following steps, Parent 3 Grade 6 wrote that she would contact her daughter's mathematics teacher to see if any last-minute action could help her daughter with earning one point and receive a "B" in her Mathematics 6 class. In looking at next steps, Parent 3 Grade 8 emailed her son's mathematics teacher to see if her son could retake a quiz. Afterward, Parent 3 Grade 8's Algebra teacher responded to the Parent 3 Grade 8's email message. Parent 3 Grade 8 decided not to have her son retake the Algebra quiz because, "The retake quiz would not allow him to earn an 'A,' and he would

still get a 'B' in Algebra." Thus, according to parent participants through their second EdLine spreadsheet entry, it appeared that the continual use of EdLine supported parents in being able to monitor and check their children's progress in mathematics. After reviewing their children's progress in mathematics on EdLine, six of the nine parent participants decided that no further action was needed. Parent 1 Grade 6, Parent 1 Grade 7, Parent 2 Grade 6, Parent 2 Grade 7, Parent 2 Grade 8, and Parent 3 Grade 7, indicated, no action needed after reviewing their children's progress in mathematics through EdLine. Thus, it appeared that parent participants felt they could continually rely on EdLine to indicate their children's development in mathematics and determine if further action or no action was needed.

Parent Reflection Journal Entries

A common theme or category that emerged after examining the parent journal reflection entries was parent strategies in supporting their children in mathematics with EdLine use. In the parent participant reflection journals, parent participants described strategies that were effective and not effective when using EdLine to support their children in mathematics. The research findings for the parent journal entry questions came from an inductive analysis of the study's research questions: How do parents use an LMS to support their children's autonomous achievement in middle school mathematics? What are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics?

Each parent participant was given a composition notebook to complete two reflection journal entries and responded to the following parent reflection journal requests: (a) As a parent, what strategies do you find are effective in using EdLine to support your children's autonomous achievement in middle school mathematics? (b) What strategies do you find are not effective in using EdLine to support your children's autonomous achievement in middle school mathematics? (c) As a parent, have you adjusted your frequency in using EdLine to monitor your children's progress in middle school mathematics? (d) What features and tools on EdLine are useful in allowing you to monitor your children's progress in middle school mathematics? (e) What features and tools on EdLine should change in allowing you to monitor your children's progress in middle school mathematics? (f) After reviewing your children's grades in mathematics through EdLine, how would you describe

your children's progress in a mathematics class? (g) After reviewing your children's progress is any further action needed such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), or no action taken, etc.

All parent participants indicated that they believed their children are responsible for using EdLine to monitor their progress in mathematics. Three parent participants advised that it was not effective to check their children's progress in mathematics on EdLine more than once a week. Three parent participants also indicated that they had adjusted their frequency in using EdLine to monitor their children's progress in middle school mathematics. All nine parent participants indicated what EdLine features they used and what EdLine features they would change to support their children in mathematics within their journal reflection entries. The nine parent participants also further described in their journal entries what strategies they used in supporting their children's progress in mathematics such as making a mental note, following-up with their children's mathematics teacher, or facilitating a conversation with their children, after assessing their children's progress in mathematics.

Strategies with EdLine use. Regarding strategies that are effective in using EdLine to support their children's autonomous achievement in mathematics, all nine parent participants in their first parent reflection journal entry indicated that they believed their children are responsible for using EdLine to monitor their progress in mathematics. Two of the parent participants, including Parent 1 Grade 6, and Parent 2 Grade 8, indicated in their parent reflection journals that students are solely responsible for managing their grades and checking their progress in mathematics. Parent 2 Grade 8 indicated, "EdLine use in mathematics should be between students and their mathematics teacher." The other seven parent participants, including Parent 1 Grade 7, Parent 1 Grade 8, Parent 2 Grade 6, Parent 2 Grade 7, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8, described within their first parent journal entries reflections of their expectations for their children.

In the first reflection journal entry, two of the parent participants, including Parent 1 Grade 6, and Parent 2 Grade 8, believed EdLine use should work strictly between students and their mathematics teacher. Parent 1 Grade 6 would use EdLine to check her daughter's progress in mathematics. But, Parent 1 Grade 6 also wrote, "I support my daughter's autonomy and expect my daughter to use EdLine to monitor her progress in mathematics." Parent 2 Grade 8 indicated that she does not check her son's grades in mathematics on

EdLine because Parent 2 Grade 8 believed, "The most efficient use of EdLine as a communicative tool was between students and their mathematics teacher." As a result, parent participants believed that middle school students are responsible for using EdLine to monitor their progress in mathematics.

In reviewing the parent reflection journal entries, four other parent participants, including Parent 1 Grade 7, Parent 1 Grade 8, Parent 3 Grade 8, and Parent 2 Grade 6, commented that as parents, it was their responsibility to use EdLine to monitor their children's progress in mathematics. As a strategy for the use of EdLine, Parent 1 Grade 7 wrote, "I quickly scanned both of my daughters' mathematics grades on EdLine." Afterward, if the grades were less than a "C," Parent 1 Grade 7 would ask her daughters, "what happened?" As a strategy with the use of EdLine, Parent 1 Grade 8 and Parent 3 Grade 8 also used EdLine to monitor their children's mathematics grades and would follow-up with their children to discuss failing or missing grades. As a strategy, Parent 2 Grade 6 explained, "I scanned my son's grades to note any missing assignments and any grades less than a 'B' on EdLine." As a follow-up, Parent 2 Grade 6 would mention findings to her son where she would ask him to explain any missing assignments and mathematics grades she viewed on EdLine.
In reviewing first parent reflection journal entry, as a strategy with the use of EdLine, Parent 2 Grade 7 commented, "I use EdLine to monitor my daughter's grades and to make sure she was keeping up with her mathematics homework." For example, Parent 2 Grade 7 wrote that after viewing her daughter's progress on EdLine she would ask her daughter:

"What part of a mathematics assignment was hard to do?"

"Why do you think you did poorly on that quiz?"

"How can I help you study for your next mathematics assessment?"

Parent 2 Grade 7 used EdLine as a starting point for conversations with her daughter about how she was doing in mathematics class. The questions allowed Parent 2 Grade 7's daughter to reflect on her progress in mathematics. As a result, Parent 2 Grade 7's daughter could assess her progress and could also make decisions on next steps.

In reviewing the first parent reflection journal entries, three of the nine parent participants, including Parent 3 Grade 6, Parent 2 Grade 7, and Parent 3 Grade 7, made additional comments regarding the strategies they use with EdLine in supporting their children in mathematics. Parent 3 Grade 6's strategy when using EdLine to help her daughter's

achievement in middle school mathematics was, "I check EdLine often and look for any weak mathematics grades and missing grades." Parent 2 Grade 7 and Parent 3 Grade 7 indicated their children knew their parents checked their mathematics grades frequently on EdLine. Since the children of Parent 2 Grade 7 and Parent 3 Grade 7 knew their parents checked their mathematics grades on EdLine, their children were extrinsically motivated to use EdLine to monitor their grades and progress in mathematics. Parent 3 Grade 7 also believed, "EdLine was helpful in helping my son build confidence as a student." Parent 3 Grade 7 also wrote, "I would use EdLine to motivate and help illustrate how my son's hard work was helping him learn math concepts to earn the best grades." Thus, parent participants could expect their children to use EdLine to monitor and check their grades in mathematics. Parent participants could also monitor their children's progress on EdLine and use strategies to support their children's progress in mathematics.

The review of the first parent reflection journal entries revealed that six of the nine parents had not adjusted their frequency in checking their children's grades in mathematics on EdLine. Parent 1 Grade 6, Parent 1 Grade 7, Parent 1 Grade 8, and Parent 2 Grade 7, have not adjusted their frequency in using EdLine and checked their children's progress in mathematics once a week. Also, Parent 3 Grade 7 had not adjusted her frequency in using EdLine and continued to monitor her son's progress in mathematics daily. Parent 2 Grade 8 believed, "It was my son's responsibility to use EdLine for checking his grades in mathematics." As a result, Parent 2 Grade 8 relied on her son to monitor his grades in mathematics and never used EdLine to check her son's progress.

Parent participants changed their EdLine use practices when factors such as attendance could impact their children's grades in mathematics. In the first parent participant reflection journal entry, Parent 2 Grade 6 indicated, "Since my son was doing well in his Mathematics 6 class, I went from checking my son's grades once a week to checking his grades every two weeks." In the first parent reflection journal entry, Parent 3 Grade 6 wrote, "Since it was the end of the fourth marking period, I have adjusted my frequency in checking my daughter's grades in Mathematics 6 on EdLine from once a week to daily since my daughter was struggling with assessments in mathematics." According to the first parent reflection journal entry, Parent 3 Grade 8 also went from checking her son's progress in mathematics once a week to daily since her son was sick and absent from school. Thus, parent participants could adjust their frequency in checking their children's

progress in mathematics on EdLine based on their children's current performance in mathematics or other factors that could impact their children's performance in mathematics such as attendance in school.

According to the review of the first parent reflection journal entries, three of the nine parents prescribed to checking their children's progress in mathematics on EdLine once a week. Parent 1 Grade 7, Parent 1 Grade 8, and Parent 2 Grade 6 explained that it was not practical for parents to check their children's mathematics grades on EdLine more than once a week. In the first parent reflection journal entry, Parent 2 Grade 6 wrote, "I monitored my son's mathematics grades once a week because my son's mathematics teacher did not update assignment and test grades daily." Parent 1 Grade 7 further explained in her first parent participant reflection journal entry, "My daughters' mathematics teacher was not expected to provide daily feedback regarding their student progress on EdLine." Parent 1 Grade 7 also believed, "Mathematics teachers have limited accountability since there was no set number of days where mathematics teachers were required to update student grades on EdLine." Parent 3 Grade 7 added, "If my son's mathematics teacher was not diligent about keeping grades on EdLine up to date, then it became an issue where my son and I were unable to assess his grades and progress in mathematics." As a result, according to the first parent participant journal entries, three parents pointed out that they used EdLine as a monitoring tool and believed that EdLine was only as good as the mathematics teacher inputting the grades in a timely matter.

Since parent participants indicated in their first reflection journal entry that timeliness of having mathematics teachers post grades on EdLine was a concern, four of the parents wrote that they used the EdLine grade update notification feature to know when their children's mathematics teacher had updated grades. Parent 2 Grade 7, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8 indicated they use the EdLine grade update notification feature which allowed parents to receive a notification when their children's mathematics teachers updated grades on EdLine. Parent 2 Grade 7, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8 have added the EdLine grade update notification feature to their electronic devices which included their laptops and cell phones. Parents received a notification when their children's mathematics teacher updated grades on EdLine. By adding the EdLine grade notification feature on their electronic devices, parent participants could know when their children's mathematics teacher updated grades on

EdLine. Regarding useful EdLine features used, in reviewing the first parent reflection journal entries, all nine parent participants indicated that they use or have used the EdLine assignment and grade tracker features which also included the mathematics current assignment report when monitoring their children's progress in mathematics. Two of the four parent participants, including Parent 3 Grade 6 and Parent 3 Grade 7, made comments regarding how they used the EdLine grade update notification feature.

The EdLine grade update notification feature allowed parent participants to receive a notification on their electronic devices when their children's mathematics teachers updated grades on EdLine. Parent 3 Grade 6 and Parent 3 Grade 7 also used the EdLine phone application to view their children's grades in mathematics on EdLine. Parent 3 Grade 6 mentioned, "I used the EdLine phone application and pulled up my daughter's missing mathematics grades." Parent 3 Grade 6 indicated that using the phone application on EdLine to pull up her daughter missing mathematics grades was very helpful because it allowed her to know which of her daughter's mathematics assignments were missing. Parent 3 Grade 7 initially reviewed her son's progress through the phone application on EdLine. Parent 3 Grade 7 further analyzed her son's progress in mathematics on EdLine through a laptop computer. Both Parent 3 Grade 6 and Parent 3 Grade 7 emphasized in the first parent participants' journal reflection entry that it was nice to access their children's progress in mathematics through their cell phones and did not necessarily need a computer. In reviewing responses from parents in the first parent reflection journal entries, four out of nine parent participants also indicated that they would change some of the various features on EdLine. Also, two of the parent participants believed that EdLine would be more useful if their children's mathematics teachers used more of the EdLine features. Parent 1 Grade 7 and Parent 2 Grade 6 reflected that they would make EdLine easier for parents to navigate in pulling their children's grades in mathematics. Parent 1 Grade 7 and Parent 2 Grade 6 believed there were too many clicks and screens on EdLine to navigate through to get to their children's grades in mathematics.

Parent 1 Grade 8 and Parent 3 Grade 6 emphasized a useful feature to add on EdLine would be to have EdLine track children's absences along-side with their assignments. That way, Parent 1 Grade 8 and Parent 3 Grade 6 could see how their children's absences overlapped with missing work. Another feature Parent 1 Grade 8 indicated to add, "I would include a time stamp on EdLine to show when my son's mathematics teacher last updated

my son's grades on EdLine." Parent 1 Grade 8 would also include an EdLine dashboard that displayed all his son's mathematics grades and could also gage and capture if his son's mathematics grade trended up or down. Parent 3 Grade 6 indicated, "I would love to add a feature on EdLine where I could check-off all viewed mathematics assignments on EdLine." Thus, parents indicated that by adding additional features could make EdLine more user-friendly.

Parent 1 Grade 6 and Parent 2 Grade 7 exclaimed their belief that none of the features on EdLine should change. However, both Parent 1 Grade 6 and Parent 2 Grade 7 said that EdLine would be more useful to parents if mathematics teachers used some of the EdLine features. Parent 2 Grade 7 thought, "EdLine would be more useful to parents if my daughter's mathematics teacher used the other features on EdLine such as the calendar feature or news updates feature which could alert parents about upcoming mathematics assignments and assessments." By adding features to EdLine such as a dashboard and a feature that tracked student absences, Parent 1 Grade 6, Parent 1 Grade 8, Parent 2 Grade 7, and Parent 3 Grade 6 believed that EdLine could be more useful to parents. Also, EdLine would be more helpful to parents if their children's mathematics teacher used EdLine features that were available such as the calendar feature and news updates feature.
In reviewing the first parent reflection journal entries, six out of nine parents indicated that they were pleased with their children's mathematical progress after viewing their children's grades in mathematics on EdLine. Parent 1 Grade 6, Parent 1 Grade 7, Parent 2 Grade 6, Parent 2 Grade8, Parent 3 Grade 7, and Parent 3 Grade 8, indicated that their children were making good progress in their mathematics class. Parent 1 Grade 6, Parent 1 Grade 7, Parent 2 Grade 6, Parent 2 Grade8, Parent 3 Grade 7, and Parent 3 Grade 8, indicated that no need to take further action after reviewing their children's mathematics grades on EdLine.

In reviewing the first parent reflection journal entries, three of the nine parents, including Parent 1 Grade 8, Parent 2 Grade 7, and Parent 3 Grade 6, reviewed their children's progress in mathematics and decided further action was needed. According to the first parent participant reflection journal entry, Parent 1 Grade 8 indicated, "I was concerned with my son's absenteeism and ability to get him to follow-up with his teacher on missing mathematics assignments." Parent 1 Grade 8 noted that his son had a low "B" in Algebra and might not be able to bring his grade up to an "A." But, Parent 1 Grade 8 thought it

would be good for his son to try and earn an "A" in Algebra. After reviewing his son's progress in mathematics on EdLine, Parent 1 Grade 8 noted, "I am going to follow-up with my son about his missing mathematics assignments." Parent 1 Grade 8 printed out his son's missing mathematics assignments report as evidence for when he would have a conversation with his son. During the conversation with his son, Parent 1 Grade 8 noted, "My son explained that most of the missing mathematics grades on EdLine were from when he was absent from school." Parent 1 Grade 8's son told his father that he would get copies of the missing work from his teacher.

In pursuing further action, Parent 2 Grade 7 wrote in her first reflection journal entry that after viewing EdLine, "My daughter's progress in mathematics was not great." Parent 2 Grade 7's daughter had a "C" in mathematics which was lower than what her daughter normally had in Mathematics 7. Parent 2 Grade 7 noted, "My daughter had eight missing homework assignments in mathematics and only three mathematics assignments completed with the following grades: 'B,' 'D,' and an 'A' in the 'All Tasks/Assessments category on EdLine." Parent 2 Grade 7 believed her daughter was performing poorly on one assignment in mathematics which hurt her daughter's overall grade. Parent 2 Grade 7 indicated in the parent reflection journal entry that she had a discussion with her daughter regarding the grade of "D" on her daughter's mathematics quiz. Parent 2 Grade 7's daughter told her mother that she struggled with the mathematics topic. Parent 2 Grade 7's daughter also admitted that she did not ask the mathematics teacher for help. Parent 2 Grade 7 also had a discussion with her daughter regarding her daughter's missing mathematics assignments. Parent 2 Grade 7's daughter told her mother that she did not understand how to complete the missing assignments. After Parent 2 Grade 7 had a discussion with her daughter regarding her grades in mathematics on EdLine, Parent 2 Grade 7 reminded her daughter, "Ask for help from your mathematics teacher, or ask your dad for help with solving mathematics problems." Thus, parents could use EdLine to assess their children's progress and determine if further action was needed to support their children in mathematics.

According to the first parent participant reflection journal entry, Parent 3 Grade 6 indicated that after reviewing her daughter's progress in mathematics on EdLine she noticed that some of her daughter's test scores in mathematics were low. Parent 3 Grade 6 noticed that all other assignment scores were exceptional. Parent 3 Grade 6 wrote, "I emailed my

daughter's mathematics teacher to see if previous mathematics assessments could be taught and reassessed." Parent 3 Grade 6 also spoke with her daughter to see how her daughter felt about contacting the mathematics teacher. As a result, parent participants could review their children's progress in mathematics on EdLine and determine if further action was needed such as making a mental note, discussing grades and progress in mathematics with their children, or discussing grades and progress with their children's mathematics teacher. In reviewing the second parent reflection journal entries, seven parents, including Parent 1 Grade 7, Parent 1 Grade 8, Parent 2 Grade 6, Parent 2 Grade 7, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8, continued to use the same strategies. According to the second parent reflection journal entries, Parent 1 Grade 6 and Parent 2 Grade 8 continued to believe EdLine use should be between students and their mathematics teacher.

The review of the second parent reflection journal entries revealed that two of the nine parents including Parent 2 Grade 6 and Parent 3 Grade 8 had added a strategy with the use of EdLine in supporting their children in mathematics. As an additional strategy with the use of EdLine, Parent 2 Grade 6 further reminded her son to check his progress in mathematics on EdLine. Parent 2 Grade 6's son responded to his mother that he had already checked his mathematics grades on EdLine. As an additional strategy with the use of EdLine in mathematics, Parent 3 Grade 8 added that she checked EdLine more often since her son's grade in mathematics was borderline between an "A" and a "B." As a result, parent participants could use additional strategies with the use of EdLine to support their children in mathematics.

In reviewing the second parent reflection journal entries, three of the parents, including Parent 1 Grade 7, Parent 1 Grade 8, and Parent 2 Grade 6, maintained that checking EdLine more than once a week was not an effective strategy for monitoring their children's progress in mathematics. On the second parent participant reflection journal entry, Parent 2 Grade 6 noticed on EdLine, "My son had missing mathematics assignments that he said he had previously submitted." Parent 2 Grade 6 indicated in her journal reflection entry that the mathematics teacher eventually updated the missing assignments on EdLine. However, Parent 2 Grade 6 indicated, "I erroneously got mad at my son because I did not believe him when he said that he had previously turned in the mathematics assignments that were missing grades on EdLine." Parent 3 Grade 7 continued to point out, "If mathematics teachers were not diligent about keeping grades on EdLine up to date, then it became an

issue between parents and their children." Parent 1 Grade 6 and Parent 3 Grade 6 sustained that if their children's mathematics teacher updated grades regularly on EdLine, they did not view any strategies as ineffective when using EdLine to support the learner's autonomous achievement in mathematics.

The second parent reflection journal entries revealed that seven of the nine parents, including Parent 1 Grade 6, Parent 1 Grade 7, Parent 1 Grade 8, Parent 2 Grade 6, Parent 3 Grade 6, Parent 3 Grade 7, and Parent 3 Grade 8, had not made any adjustments. Parent 2 Grade 7 maintained, "I checked my daughter's progress in mathematics whenever I received an EdLine email notification." Parent 3 Grade 6 and Parent 3 Grade 7 continued to check their children's progress on EdLine in mathematics practically daily. Parent 3 Grade 8 had adjusted her frequency and used EdLine daily to monitor her son's progress in middle school mathematics since her son's overall grade was borderline between a "B" and an "A." Parent 2 Grade 8 had not made any adjustments to using EdLine to monitor her son's progress in middle school mathematics. Parent 2 Grade 8 continued to think, "EdLine use by parents was intrusive and undermined the relationship between the mathematics teacher and their student." As a result, parent participants could maintain or adjust their frequency in checking their children's progress in mathematics on EdLine based on their children's current performance in mathematics.

In reviewing the second parent reflection journal entries, all nine parent participants indicated that they use or have used the EdLine assignment and grade tracker features. The features also contained the mathematics current assignment report when monitoring their children's progress in mathematics. Parent 2 Grade 7, Parent 3 Grade 6, and Parent 3 Grade 7, also said that they continued to receive an email notification when their children's mathematics teacher updated grades. In reviewing the second parent reflection journal entries, four of the nine parents, including Parent 1 Grade 7, Parent 1 Grade 8, Parent 2 Grade 6, and Parent 3 Grade 6, mentioned features they would change on EdLine. Parent 1 Grade7 and Parent 2 Grade 6 recommended that Edline's features change to streamline information and parents had fewer clicks to navigate through in getting to their children's mathematics grade report on EdLine. Parent 1 Grade 8 recommended, "EdLine include a feature that explained how the weight of certain assignments impacted my son's grade in mathematics." Parent 3 Grade 6 indicated, "I would like if the features and tools on the EdLine phone application matched the features and tools on the laptop computer." By

making some changes with features on EdLine, parent participants believed they could better monitor and support their children's progress in mathematics.

The review of the second parent reflection journal entries revealed that five parents, including Parent 1 Grade 6, Parent 1 Grade 7, Parent 2 Grade 8, Parent 3 Grade 7, and Parent 3 Grade 8, indicated that they were pleased and impressed with their children's mathematics grades on EdLine. Parent 3 Grade 8 further indicated, "I am not going to communicate with my son's mathematics since his grade is almost an 'A' and it's near the end of the marking period." Thus, five parent participants, including Parent 1 Grade 6, Parent 1 Grade 7, Parent 2 Grade 8, Parent 3 Grade 7, and Parent 3 Grade 8, indicated that no further action was needed.

In reviewing the second parent reflection journal entries, four of the nine parents felt that further action needed to occur after assessing their children's progress in mathematics on EdLine. Parent 1 Grade 8 explained, "After viewing my son's grades on EdLine, I did not understand the weight of grades with certain types of mathematics assignments." Parent 1 Grade 8 noticed that his son only had two grades when he checked his son's grades previously. Parent 1 Grade 8 also noticed that his son's mathematics teacher posted another grade where his son scored a low "B." In viewing the EdLine report, Parent 1 Grade 8 explained that his son's grade in mathematics class went down slightly. Parent 1 Grade 8 expressed that his son's progress in mathematics was okay.

However, Parent 1 Grade 8 also expressed that mathematics was probably his son's most frustrating class especially when his son's mathematics teacher introduced a new unit. Parent 1 Grade 8 wrote, "My son was not confident that he would understand any new mathematical concepts." As a result, the grades for Parent 1 Grade 8's son fluctuated up and down. Parent 1 Grade 8 confirmed on EdLine what his son told his father regarding seven missing mathematics assignments that needed to complete. Parent 1 Grade 8 mentioned to his son, "You have until Monday to complete the seven missing mathematics assignments." As Parent 1 Grade 8 gave his son a Monday deadline date, Parent 1 Grade 8's son told his father that he was prepared to complete all missing mathematics assignments. In the second parent reflection journal entry, Parent 1 Grade 8 wrote that he must always have a conversation with his son about missing work.

In reviewing the second parent reflection journal entries, Parent 2 Grade 6 indicated that she had to follow up with her son's mathematics teacher about erroneously not placing grades on EdLine. The mathematics teacher explained to Parent 2 Grade 6 that he had not updated the grades on EdLine. Afterwards, Parent 2 Grade 6 apologized to her son for falsely accusing him of not completing his mathematics assignments. In the second parent participant reflection journal entry, Parent 2 Grade 7 described her daughter's progress in mathematics as the same with a GPA of 77.2%. Parent 2 Grade 7 also mentioned, "My daughter's mathematics teacher had not updated assignments on EdLine." Parent 2 Grade 7 mentioned that she would continue to monitor her daughter's progress in mathematics when she received an EdLine grade notification to let her know that her daughter's mathematics teacher had updated grades on EdLine.

In reviewing the second parent participant journal reflection entries, Parent 3 Grade 6 noticed that her daughter's grade in mathematics had gone up to almost a "B." The grade was due to Parent 3 Grade 6's daughter receiving an "A" on her class project and presentation. Parent 3 Grade 6's daughter had a mathematics grade that was one point from a "B." Parent 3 Grade 8 mentioned, "My son received an 88% on his quarterly mathematics assessment which meant he would receive a 'B' which was close to an 'A' in mathematics." Parent 3 Grade 6 planned to contact her daughter's mathematics teacher to see if anything could be done for her daughter to earn one point and receive a "B" in mathematics. Parent 3 Grade 6 indicated that she was "Super-Happy" and proud of her daughter's progress in mathematics. Thus, after reviewing and assessing their children's progress in mathematics on EdLine, parent participants could determine if further action was needed. Parent participants sustained that if their children's mathematics teacher updated grades regularly on EdLine then as parents, they could efficiently use strategies to support their children's autonomous achievement in mathematics. Also, parent participants could maintain or adjust their frequency in checking their children's progress in mathematics on EdLine based on their children's current performance in mathematics. Parents could also receive an email notification when their children's mathematics teacher updated grades.

Discrepant Cases

When gathering responses from the nine parent participant interviews and follow-up

questions, EdLine spreadsheets entries, and parent reflection journal entries, two of the nine parent participants, including Parent 1 Grade 6, and Parent 2 Grade 8, held different perspectives. After the parent participant interviews, all nine parent participants received a copy of their interview transcript to review for accuracy along with additional follow-up questions to answer. As a follow-up question, each parent participant was asked to add any further information from their parent participant interview. As a discrepant case, Parent 1 Grade 6 pointed out that as a con she believed EdLine took the responsibility away from students in becoming independent with monitoring, checking, and managing their grades in mathematics.

Parent 1 Grade 6 believed, "Too many parents took on the responsibility in using EdLine to monitor their children's grades and assignment completion in mathematics." Parent 1 Grade 6 also believed, "Parents who continually monitored their children's grade in mathematics through EdLine took the responsibility away from their children in allowing them to be responsible with overseeing their progress." Parent 1 Grade 6 prescribed to the philosophy of Eccles (1993), Froiland et al. (2013), and Jodl et al. (2001) where setting parental expectations and fostering communication between parents and their children supported learner autonomy. Middle school children learned to become responsible for monitoring, checking, and managing their grades in mathematics.

As a discrepant case, Parent 2 Grade 8 expressed her belief, "Effective EdLine use should strictly be among middle school students and their mathematics teacher." During the parent participant interviews, Parent 2 Grade 8 stated, "I used EdLine when my son was in sixth and seventh grade for all subject areas including mathematics." Parent 2 Grade 8's son started struggling in sixth-grade mathematics and believed that as a parent, her use of EdLine was causing a negative reaction with her son. During the parent participant interviews, Parent 2 Grade 8 stated, "After using EdLine to check my son's progress in mathematics, I would start a conversation with my son where my son became upset with me for checking his grades in mathematics on EdLine." Parent 2 Grade 8's son was concerned that he was struggling in mathematics, but he was also upset that his mother was interfering with his mathematics achievement. Parent 2 Grade 8 believed that her actions with checking her son's mathematics grades on EdLine demonstrated that she no longer trusted her son to make decisions, manage his grades in mathematics, and build a relationship with his mathematics teacher.

During elementary school, Parent 2 Grade 8 expressed that her son had a good relationship with all 100% of his teachers. Upon entering middle school, Parent 2 Grade 8 realized that her son had to adapt to middle school with several additional teachers. Parent 2 Grade 8 believed that her son felt as if his mother did not trust him even though he was older and had more autonomy as a middle schooler. Parent 2 Grade 8's intent to monitor her son's grades in mathematics on EdLine mirrored what Froiland et al. (2013) and Patall et al. (2008) found in their research study where continual parental support in middle school mathematics, negatively impacted student performance and achievement.

Parent 2 Grade 8 gained her son's perspective and realized she was interjecting to micromanage her son's mathematics grades on assignments. Parent 2 Grade 8 would now allow her son to manage his mathematics grades with EdLine independently by establishing a cognitive learning home environment. During the parent interviews Parent 2 Grade 8 stated, "My son would come to see me if I had questions regarding mathematics." In establishing an open, communicative, learning environment, when Parent 2 Grade 8 wanted to check on her son's progress in mathematics, Parent 2 Grade 8 indicated, "I would ask my son if I could view his EdLine account and comment on his grades in mathematics." As a result, Parent 2 Grade 8 realized that her son was responsible and could be trusted to monitor his grades and manage his progress in mathematics. By allowing her son to manage his grades through EdLine, he could successfully build a relationship with his mathematics teacher.

Evidence of Trustworthiness

The standards of validation measures for my research study followed Creswell (2013), and Miles et al.'s (2014), recommendations which included validation perspectives: credibility, transferability, dependability, and confirmability. The nine parent participants expressed their beliefs regarding the use of EdLine to support their children in mathematics with learner autonomy and highlighted EdLine features and use during their parent interviews. Each parent participant received a copy of their transcription to review for accuracy and responded to follow-up interview questions. Parent participants captured ways they used EdLine for checking their children's progress in mathematics on the EdLine spreadsheets. The parent participants received a parent reflection journal and described strategies on how they handled EdLine to support their children in mathematics.

Credibility supported if the findings from the research made sense. The triangulated data presented in the study contained data sources from parent participant interviews, EdLine spreadsheet data, and parent reflective journal entries. During the parent participant interviews, parents described their beliefs in wanting their children to take ownership in using EdLine as a management tool to monitor their progress in mathematics. The parents also expressed how they used EdLine and some of the EdLine features. As a result, the theoretical patterns that emerged from the inductive analysis with the parent participant interviews were learner autonomy and EdLine features and use. After the parent participant interviews, parent participants reviewed their parent participant transcripts for accuracy and responded to interview follow-up questions. Parent participants also completed two EdLine spreadsheet entries. The responses from the parent participants on the EdLine spreadsheet entries captured how parents used EdLine to manage and monitor their children's progress in mathematics. As a result, the theoretical pattern that emerged from the inductive analysis with the EdLine spreadsheet entries was progressed checks. Parent participants also completed two parent reflection journal entries. The responses regarding the parent reflection journal entries captured strategies parent participants used to support their children in mathematics. As a result, the theoretical pattern that emerged from the inductive analysis with the parent reflection journal entries was EdLine strategies. The parent participants monitored their children's grades in mathematics with EdLine and provided strategies to support their children's progress in mathematics.

The study included descriptions to support interpretations of transferability. Gathering nine parent participants for the research study with experience in using EdLine was challenging since the data gathering took place at the end of the school year in May and June. Gradually, with IRB approval I worked with the middle school's PTA president to find nine different parent participants with children in various levels of mathematics courses including Mathematics 6, Mathematics 7, IM 7, Algebra 7 and Algebra 8. Each of the parent participants had a minimum experience with using EdLine for one marking period or forty-five days. Each of the parent participants who volunteered was proactive and believed in supporting their children with making mathematical decisions (Bauch & Goldring, 1998). An intercoder agreement included data from the parent participant interviews, the EdLine spreadsheets, and the parent reflection journals hand-coded for analysis (Creswell, 2013).

In supporting dependability, the data analysis included the sequence of data gathered, processed, transformed, and displayed (Miles et al., 2014). The data sources which included the parent participant interviews, the EdLine spreadsheet entries, and the parent reflection journals captured each grade level parent's perspective in using EdLine to support their children in mathematics. The parent interview sessions recordings were on my laptop through a software program known as Audacity and transcribed by me. Parent participants cross-checked their interview transcriptions and responded to follow-up questions to demonstrate how multiple observers' accounts converged during instances, settings, or times (Miles et al., 2014). I also coded the information from the EdLine data spreadsheets and parent reflection journals. I hand coded the interview transcriptions, follow-up questions, EdLine spreadsheet journal entries, and parent journal reflection entries with primary and secondary codes. I recorded the findings on an Excel spreadsheet to demonstrate significant parallelism across the three types of data sources (Miles et al., 2014).

The study included measures to support conformability and confronted biases that could exist. The three data gathering sources allowed parent participants to express both positive and negative reactions when using Edline to support their children in mathematics. I also addressed both positive and negative parent Edline user endorsements to prevent any shaping to the approach of the study. Parent 1 Grade 6 believed that too many parents took on the responsibility in using EdLine to monitor their children's grades and assignment completion in mathematics. All parent participants except for Parent 2 Grade 8 used EdLine to monitor their children's progress in mathematics. Parent 2 Grade 8 expressed during the parent participant interviews, on her EdLine spreadsheet entries, and on her parent reflection journals, her belief that EdLine use should strictly be between the student and their mathematics teacher. Parent 2 Grade 8 believed that parent involvement with the use of EdLine to monitor their children's progress in mathematics was intrusive and detrimental. While EdLine provided a resource where parents could check and monitor their children's progress in mathematics, EdLine use by parents may not have supported learner autonomy. Parent 1 Grade 6 believed that continual EdLine use by parents took the responsibility away from their children in using EdLine to monitor and manage their grades in mathematics. Whereas, Parent 2 Grade 8 believed that parents use with EdLine to monitor their children's progress in mathematics was intrusive and interfered with the relationship and trust between parents and their children.

Results

The theoretical categories that emerged from the parent participant interview responses on how parents used EdLine to support their children in mathematics were learner autonomy and EdLine features and use. The research findings for the parent participant interviews come from the inductive analysis used to address the study's research questions: How do parents use an LMS to support their children's autonomous achievement in middle school mathematics? And, what are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics?

The analysis from the parent participant interviews revealed that parent participants believed their children should become autonomous learners by taking ownership and responsibility for using EdLine to check and manage their progress in mathematics. Several parents stated that, as a pro, EdLine use promoted meaningful, critically reflective conversations that parents could have with their children and mathematics teachers about grades. Parent participants described methods they used to motivate their children, support their learning environment in mathematics, and monitor their children's progress. Parent participants found EdLine to be a useful resource that had features for tracking their children's development in mathematics, provided that their children's mathematics teacher posted grades on EdLine promptly. During the parent participant interviews, several parents spoke about some of the EdLine features they used for monitoring their children's progress in mathematics. All parent participants indicated that they use or have used the EdLine mathematics report to track their children's progress in mathematics.

A theme or category that emerged after reviewing the parent participant EdLine spreadsheet entries was monitoring and progressed checks. All nine parent participants and their children use or have used EdLine to keep track of student grades and assessed student progress in mathematics. The research findings for the parent EdLine spreadsheet entries came from an inductive analysis used to address the study's research question: How do parents handle an LMS to support their children's autonomous achievement in middle school mathematics? The parents mainly used EdLine to check their children's progress in mathematics. After assessing their children's development in mathematics, parent participants decided if they needed to make a mental note of their children's progress in mathematics, facilitate a conversation with their children regarding the achievement in

mathematics, or contact their children's mathematics teacher. Thus, according to parent participants through their EdLine spreadsheet entries, continual use of EdLine supported parents in being able to monitor and check their children's progress in mathematics. Parent participants relied on EdLine to indicate their children's development in mathematics and determine if further action or no action was needed.

A common theme or category that emerged after summarizing the parent journal reflection entries were strategies with EdLine use. In the parent participant reflection journals, parent participants described strategies that were effective and not effective when using EdLine to support their children in mathematics. The research findings for the parent journal entry questions came from an inductive analysis of the study's research questions: How do parents use an LMS to support their children's autonomous achievement in middle school mathematics? And What are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics? All nine parent participants indicated in their reflection journals that their children were responsible for using EdLine to monitor their progress in mathematics. Three parent participants advised that it was not effective to check EdLine more than once a week since mathematics teachers do not update grades promptly. The same three parents adjusted their frequency in using EdLine to monitor their children's progress in middle school mathematics. As a result, EdLine was only as good as the mathematics teacher inputting the grades in a timely matter.

Parent participants indicated in their reflective journals that they use or have used the assignment and grade tracker features which included the mathematics current assignment report when monitoring their children's progress in mathematics. Parent recommendations included making EdLine easier for parents to navigate for pulling grades in mathematics. A couple of parents recommended adding an EdLine feature that could track absences along-side mathematics assignments. One parent further recommended adding an EdLine time stamp to show when their children's mathematics teacher last updated grades and add a feature that checked-off all viewed mathematics assignments on EdLine. Another couple of parents believed that EdLine would be more useful to parents if mathematics teachers used the EdLine features. Other parents indicated EdLine would be more helpful to parents if mathematics teachers used additional features such as the calendar feature or news updates feature to inform parents about upcoming mathematics assignments. Adding features to EdLine such as a dashboard and a student absence tracker feature, parent participants

believed that EdLine could be more useful to parents.

Parent participants further explained in their reflective journals what strategies they used in supporting their children's progress in mathematics. Seven parent participants described expectations for their children. One parent noted he was going to follow-up with his son about his missing mathematics assignments. Another parent indicated she would have a discussion with her daughter regarding her grades in mathematics on EdLine. The parent would also remind her daughter to ask for help from her mathematics teacher, or her dad for help with solving mathematics problems. A parent indicated in her journal entry that she emailed her daughter's mathematics teacher to see if previous mathematics assessments could be taught and reassessed. Another parent noted that she had to follow up with her son's mathematics teacher about erroneously not placing grades on EdLine. Thus, after reviewing and assessing their children's progress in mathematics on EdLine, parent participants could determine if further action was needed.

During the data gathering through the parent participant interviews and the follow-up questions, the parent EdLine spreadsheet entries, and the parent reflection journal entries, a couple of discrepant cases emerged. One parent expressed that too many parents took on the responsibility in using EdLine to monitor their children's grades and assignment completion in mathematics. Another discrepant case emerged where another parent expressed her belief that efficient EdLine use should strictly be among middle school students and their mathematics teacher. The parent's son started struggling in sixth-grade mathematics and believed that as a parent, her use of EdLine was causing an adverse reaction with her son.

Summary

In this study, I examined how parents of middle school children used EdLine, an LMS, to support their children's autonomous achievement in mathematics. The study examined parents' beliefs with the use of EdLine to support their children in becoming responsible for their learning in mathematics. This section explained the study's data collection procedures and the qualitative findings from parent participant interviews and follow-up questions, parent participant EdLine spreadsheet entries, and parent reflection journal entries.

The analysis from the parent participant interviews revealed that parent participants wanted their children to become autonomous learners who took ownership and responsibility for using EdLine to monitor their progress in mathematics. Themes or categories that emerged after reviewing the parent participant EdLine spreadsheet entries was monitoring grades and progress checks. Many parent participants and their children used EdLine to keep track of student grades and assessed student progress in mathematics. A common theme or category that emerged after summarizing the parent journal reflection entries were strategies with EdLine use. In the parent participant reflection journals, parent participants described strategies that were effective and not effective when using EdLine to support their children in mathematics.

Regarding discrepant cases, Parent 1 Grade 6 believed that parents who monitored their children's grades in mathematics through EdLine took the responsibility away from managing their progress in mathematics away from their children. Parent 1 Grade 6 also believed that too many parents were the only people monitoring their children's grades and assignment completion in mathematics. Parent 2 Grade 8, expressed her belief that EdLine use should be among middle school students and their children's mathematics teacher. Parent 2 Grade 8's son monitored his progress in mathematics with the use of EdLine independently.

In Chapter 5, I will present my interpretation of my research findings. The chapter will also explain how these research results with the use of EdLine, contribute to the field of knowledge and any implications for social change. I will also present recommendations for future studies.

Citation

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CHAPTER 5: IMPLICATIONS FOR PARENTS' BELIEFS REGARDING LEARNING MANAGEMENT SYSTEM USE IN MATHEMATICS

This research case study explored how parents of middle school students used EdLine, an LMS, to support their children's autonomous achievement in mathematics. Middle school parents generally would like to increase their children's motivation in learning and support their children's success in mathematics (Fan et al., 2012). The intent of this study examined parents' beliefs, along with the pros and cons of using EdLine. Perspectives were gathered from nine parent participants who provided valuable information that could further increase understanding of their role as parents in supporting their children in mathematics with the use of EdLine. As a triangulated study, I gathered multiple sources of data from nine parent participants which included face-to-face interviews with parents of middle school children along with follow-up questions to explore how they used the LMS, EdLine, to support their children's autonomous achievement in middle school mathematics. The study also included spreadsheet data to capture how parents used EdLine features to support their children's progress in mathematics and parent reflective journals to explore parent's beliefs regarding the use of EdLine further.

Analysis of the data from the parent participant interviews and follow-up questions revealed that parent participants believed their children should become autonomous learners by taking ownership and responsibility for using EdLine to check and manage their progress in mathematics. The parent participant interviews also revealed that parent participants found EdLine to be a useful resource that had features for monitoring their children's progress in mathematics, provided that the learner's mathematics teacher posted grades promptly. The analysis of the parent participant EdLine spreadsheet entries revealed that parents mainly used EdLine to check and monitor their children's progress in mathematics. The analysis of the parent reflection journal entries indicated that parents believed their children were responsible for using EdLine to monitor their progress in mathematics. Throughout this

chapter, I presented the conclusions of my research study and the findings will be examined within the context of existing research. I identified the significance of the results. I also made recommendations for further research in this area of how middle school parents use an LMS to support their children in mathematics will be discussed.

Interpretation of the Findings

Through reviewing the parent participant interviews, EdLine spreadsheets entries, and parent reflection journal entries, parents indicated and believed their children could become autonomous learners as they found task value in using EdLine for checking their grades and progress in mathematics. Learners became stimulated and motivated to begin setting an expectation for task completion in mathematics by monitoring their progress with the use of EdLine. As students adopted the use of EdLine in mathematics, they began to exercise self-directedness as a standard of behavior to guide, manage, self-regulate, and monitor their progress. The parents clarified they could support their children by tracking their measurable strides with grades on EdLine, but parents also encouraged their adolescent children to place value in using EdLine as a guide for checking their grades and achievement in mathematics. Like what Eccles, O'Neill, and Wigfield (2005) found in their research, my study indicated that parental influence could support the assigned value their children attached to the task of checking their grades and progress in mathematics.

Parent Participant Interviews and Follow-Up Questions

The study indicated that parent participants could set a behavioral expectation where their children were expected to manage and monitor their mathematics grades on EdLine. To support learner autonomy, parent participants from the interviews and follow-up questions indicated they had a role as moderators of messages for their children in communicating expectations from their children's mathematics teacher. Parents could also translate their values and beliefs into actions by merely engaging in different mathematical activities with their children. As a similarity to what Mortimer, Lorence, and Kumka (1986) found in their study, my research indicated that the message parent participants gave to their children could enhance their children's self-image and attitude towards work completion and could support their children's ability to choose a subsequent outcome regarding their progress in mathematics.

Regarding EdLine features used, all nine parent participants indicated they used the EdLine mathematics grade report feature. The parents suggested that the grade report feature efficiently allowed parents to keep informed about their children's progress. Parent participants believed that mathematics teachers tended to use EdLine solely for posting grades and stated that mathematics teachers did not provide curricula and updated information promptly. Parent participants indicated that since mathematics teachers did not update grades on EdLine regularly, then parents should only check their children's mathematics grades on EdLine weekly. A few of the parent participants indicated they have added the EdLine notification application to their electronic devices and then knew when their children's mathematics teacher updated grades. The findings from my research study related to what Nasser et al. (2011) also found that a mathematics teacher's reluctance to use and update student grades and assignments on an LMS served as a barrier for both students and their parents.

As a follow-up to the parent participant interviews, four of the nine parent participants recommended that mathematics teachers adhere to a standard set of rules of parent engagement. According to the parent participants, mathematics teachers could upload worksheets and assignments in addition to posting grades regularly on EdLine. That way, parents knew what the mathematical assignments were when they checked their children's progress. Parents could then facilitate a discussion with their children regarding mathematics assignments and how their performance on a task could affect their grade. In conjunction to what Selwyn et al.'s (2011) found, parents from my research study suggested that teachers in a school setting should collaborate to set up and uphold expectations with LMS use.

EdLine Spreadsheet Entries

Responses to the EdLine spreadsheet entries described how parent participants used EdLine to monitor mathematics grades, check progress, and support their children's learning environment. Parents could check EdLine and assess their children's progress in mathematics. Various parenting behaviors supported children's academic achievement in mathematics which included verbal interaction, reviewing progress in mathematics, and parental school involvement. Parents indicated they felt they could rely on EdLine for reporting their children's mathematical development. Parents noted through using EdLine they could determine if further action was needed to support their children in mathematics.

Parents also noted that through using EdLine, they were able to monitor and check their children's progress in mathematics continually. EdLine monitoring also allowed parents to gauge their children's mathematical ability and development. Related to what Jodl et al. (2001) found, my study indicated that with parental home-based engagement, as well as expectations for their children's academic success, could provide students with a positive educational outcome.

Parent Reflection Journal Entries

In the findings from the parent reflection journal entries, each of the nine parent participants described strategies that were effective and not effective when using EdLine to support their children in mathematics. Parents found that giving their children feedback on their progress through reviewing their children's progress report on EdLine provided parents with a way to systematically monitor their children's school performance. Parents could then use EdLine to track their children's mathematics grades and follow-up with their children to discuss failing or missing grades. Similar to what Froiland et al. (2013), Patall et al. (2008), and Riha et al. (2013) found with LMS usage, my study indicated that parental home-based involvement with the use of an LMS, and setting expectancies for their children's progress in mathematics, was connected to real educational success. Two of the nine parent participants wrote that their children knew their parents checked their mathematics grades frequently on EdLine. Since their children knew their parents checked their mathematics grades on EdLine, their children became extrinsically motivated to use EdLine to monitor their grades and progress in mathematics. As a result, parent participants could review their children's progress in mathematics, assessed how well their children were doing and made decisions on next steps to support their children's success.

According to the parent participant interviews, follow-up questions, and parent reflection journal entries, many parents explained that their children's mathematics teacher did not update grades on EdLine on a regular basis. The parents expressed that it was not sufficient for parents to check their children's mathematics grades on EdLine more than once a week. As a result, these parents have adjusted their frequency in using EdLine to monitor their children's progress in mathematics. Since timeliness of posting grades was a concern, four of the nine parent participants began using the EdLine grade update notification feature which allowed parents to receive a notification when their children's mathematics teachers updated

grades on EdLine. The parents did recommend that mathematics teachers set and uphold standards in updating grades on EdLine. The findings from my research support what Olmstead (2013) expressed that keeping parents involved in their children's schooling was just as much a responsibility of the school as it was the parent. The findings from my research also support what Patrikakou (2015) suggested that fostering school-family partnerships with the integration of technological tools become an integral part of helping student learning in mathematics.

Parent participants had the following recommendations for using EdLine features in mathematics which included using the calendar feature and the news updates function, having fewer clicks and screens to navigate through, and adding a feature to track their children's absences along-side with their assignments. The parent participants also recommended adding a time stamp that showed the latest updated grades and even adding a dashboard that displayed mathematics grades and could also gage and capture if grading categories trended up or down. By making changes and adding features on EdLine, parent participants believed they could better monitor and support their children's progress in mathematics. These parent participant recommendations from my research study aligned with Olmstead's (2013) findings which indicated that it was important that mathematics teachers and administrators remained current with LMS tools that families used to communicate with their children's teachers.

Within the study, two of the nine parent participants expressed different beliefs in using EdLine to support their children in mathematics. One of the parent participants believed that too many parents took on the responsibility of handling EdLine to monitor their children's grades in mathematics. The parent thought that parents who continually observed their children's grades in mathematics through EdLine took the responsibility away from their children in allowing them to become responsible for monitoring their progress. The parent from my research study prescribed to what Eccles (1993), Froiland et al. (2013), and Jodl et al. (2001) found, where setting parental expectations supported learner autonomy where middle school children became responsible for monitoring, checking, and managing their grades in mathematics. The parent found that setting expectations for her daughter to check her grades on EdLine in mathematics also allowed her daughter to set an expectation to monitor her progress in mathematics.

Another parent participant expressed her belief that efficient EdLine use should strictly be between middle school students and their mathematics teacher. The parent found that her use of EdLine caused an adverse reaction with her son. The parent's intent to monitor her son's grades in mathematics on EdLine mirrored what Froiland et al. (2013) and Patall et al. (2008) found in their research study where continual parental support in middle school mathematics negatively impacted student performance and achievement. The parent gained her son's perspective and realized she was interjecting to micromanage her son's mathematics grades on assignments. The parent began allowing her son to manage his mathematics grades with the use of EdLine independently. She began to set an expectation where her son had managed his mathematics grades with the use of EdLine independently by establishing a cognitive learning home environment where behaviorally her son would come to see her if he had questions regarding mathematics. By allowing her son to manage his mathematics grades through EdLine, he successfully built a relationship with his mathematics teacher.

Limitations of the Study

Limitations of the case study included the natural occurrence of the phenomenon, or data gathering techniques available (Bengtsson, 1999). The opportunity to find parent participants for the case study was limited to the last two weeks of the fourth marking period of the 2016 – 2017 school year. As a result, limited time was allotted to conduct the parent participant interviews, gather information from the parent participant EdLine spreadsheets, and gather information from the parent reflection journals. Only four out of the nine parent participants indicated they used the EdLine grade update notification feature. The feature allowed parents to receive a notification when their children's mathematics teachers updated grades on EdLine. Also, only two out of the nine parent participants indicated they used the EdLine phone application to view their children's grades in mathematics on EdLine.

The findings from the case study were limited to parents within the middle school setting. EdLine as an LMS had specific access requirements for parents such as a private login account for further comfort with online and written communication use. The cases limited the community of parents who have children attending a particular grade in middle school. The focus of this study emphasized middle school parents' beliefs with the use of EdLine. While high school parents also used EdLine to support their children, this study emphasized how

parents supported their children in mathematics with the use of EdLine as their children transitioned through their adolescent development in middle school.

Recommendations for Further Action

This study examined how parents of middle school children used an LMS, EdLine, to support their children in mathematics. As a recommendation based on the examination, mathematics teachers should create and adhere to a standard set of rules of engagement with the use of EdLine. Although parent participants realized mathematics teachers had many duties and responsibilities which included updating grades regularly on EdLine, a recommendation is that mathematics teacher update grades on EdLine more frequently. The result from this study indicated that three of the nine parent participants recommended that all mathematics teachers created and adhered to a standard set of rules of parent engagement. As a recommendation, mathematics teachers should collaboratively generate and uphold guidelines to support parent engagement with the use of EdLine in mathematics. That way, EdLine use among mathematics teachers would include a standard set of rules that were consistent and used uniformly to work correctly.

Another recommendation is for mathematics teachers to use EdLine for adding additional comments to parents regarding their children's progress in mathematics. In the review of the follow-up responses from the parent participants, three of the nine parent participants indicated it would be helpful for mathematics teachers to use EdLine for adding additional comments. Also, to support further communication efforts, it was recommended that mathematics teachers upload all assignments, homework, and worksheets onto EdLine. That way, students could look for, access, and download any missing sheets and mathematics assignments. If mathematics teachers provided students and their parents with other comments on their progress with the use of EdLine, students could become better in their ability to interpret the evaluative feedback given. The input from mathematics teachers could also allow students to enlist and socially compare activities with other students. Another recommendation was that schools provide a culture that engaged parents in highlighting LMS features they could use to communicate, collaborate, and monitor their children's progress in mathematics. Mathematics teachers should also receive further training on the uses of LMS features to further motivate students into using EdLine tools. These recommendations could support what Louwrens and Hartnett (2015) and Reynolds (2016) also found that trained, efficient teachers

who provided their students with evaluative feedback and appropriate resources to support their academic success, encouraged their students in their ability to engage in their learning cognitively.

Another recommendation was to streamline EdLine and LMS features in general, where parents had fewer clicks to navigate through in getting to their children's mathematics grade report. A recommendation was that EdLine designers add a dashboard as an EdLine feature. That way parents could navigate their way through their children's grades on EdLine. Two of the parent participants indicated they continually had to click and scroll through several computer screens to their children's mathematics grade report on EdLine. A dashboard on EdLine could also include a feature that explained how the weight of specific mathematics assignments impacted grades on EdLine and could also include a feature where parents could check their children's attendance in mathematics. By adding features to EdLine such as a dashboard EdLine, parents could navigate their way through their children's grades to determine their progress in mathematics. Parents could also see the weight of specific assignments and could also monitor their children's attendance in mathematics class through EdLine.

Implications for Social Change

This research study focused on parents' beliefs regarding the use of an LMS, EdLine, to support their children's autonomous achievement in middle school mathematics. Research focusing on LMS integration to support children's autonomous achievement in mathematics could open new implications for the impact of positive social change. At the individual level, this study showed how EdLine as an LMS, allowed parents and mathematics teachers to communicate with each other regarding their children's progress. School staff can teach parents how to use an LMS for supporting and improving their children's outcomes and progress in mathematics. Like what Selwyn et al. (2011) found with LMS usage, my study indicated that EdLine as an LMS fulfilled a role in allowing parents and their children's mathematics teachers to communicate. EdLine also provided a platform for evidence where mathematics teachers could formally and visibly demonstrate their professional competence and expertise to parents. As Eccles and Wigfield (2002), Froiland et al. (2013), and Wood et al. (2011) reported from their research, my study indicated that middle schoolers could

become engaged in task-oriented activities that stimulated their motivation to begin setting expectations for task completion and achievement in mathematics.

At the organizational level, the symmetrical interactive applications among parents and mathematics teachers would allow schools to build and maintain networking relationships within their organization (Blau & Hameirie, 2010; Selwyn et al., 2011). Similar to what Blau and Hameirie (2010) and Selwyn et al. (2011) found in their research, my study indicated that the EdLine use as an LMS provided combined instruction internally and externally from the organization. Progression with the use of EdLine could also address individual assessment, progress monitoring, broadcasting, and attention to instructional requirements. Schools could provide a culture that engaged parents on highlighting LMS features with EdLine use in mathematics to communicate, collaborate, and monitor their children's progress. The culture within the learning organization could allow all parents to gain access to their children's measurable progress with daily data from teachers regarding the mathematics topics, educational materials, homework, and information regarding their children's attendance, discipline, homework preparation, and grades. As indicated by Blau and Hameirie (2010), Selwyn et al. (2011), and Watson and Watson (2007), the school organization promoted direct interactions among mathematics teachers, parents, and students.

EdLine use as an LMS supported online pedagogical interaction and communication between mathematics teachers, parents, and their children to create a society of purposeful discussions regarding individual student mathematical data and achievement. Similar to what Dias and Diniz (2014) and Najmul Islam (2016) pointed out from their research, my study showed that LMS use could facilitate student intrinsic motivation and provide discussion strategies for parents to support student learning. Also, like what Dias and Dines (2014) and Moreno-Murcia (2016) found, mathematics teachers, parents, and students could pragmatically use EdLine to align with students' learning needs.

EdLine as an LMS allowed mathematics teachers to become learning facilitators who planned tasks, supported responsibility for learning, provided students with options and helped students make their decisions and solve problems for themselves. Parents and their children could engage in using EdLine features as the children began to self-regulate their learning progression. EdLine use as an LMS allowed mathematics teachers and parents to support middle school students with learner autonomy. As Kaur and Sidhu (2010) indicated, middle

school students who used an LMS in mathematics, developed self-regulatory processes to monitor their progression in attaining mathematical concepts and become empowered to participate more efficiently in online learning experiences. As indicated by Blau and Hameirie (2010) and Moreno-Murcia (2016) school administrators and LMS designers could support other educational stakeholders with the implementation and support of the technological change (Blau & Hameirie, 2010; Wenglinsky, 1998).

Significance for Further Study

This study focused on parents' beliefs regarding the use of an LMS, EdLine, to support their children in middle school mathematics. What is unknown are how middle school mathematics teachers used an LMS such as EdLine to support their students' progress in middle school mathematics. Further qualitative studies with perspectives from mathematics teachers could provide additional research strategies on how LMS use supported middle school students in monitoring their progress in mathematics. The study could also include perspectives from middle school mathematics teachers who used an LMS such as EdLine to provide their students with synchronous and asynchronous learning opportunities in an interactive online environment that could support student discourse and collaboration. A study with perspectives from middle school mathematics teachers who facilitated online learning could also support each student's intrinsic motivation and provide each student with a discussion platform that allowed students to attain mathematical concepts.

This study revealed a discrepant case where Parent 2 Grade 8's intent to monitor her son's grades in mathematics on EdLine aligned with what Froiland et al. (2013) and Patall et al. (2008) found where continual parental support in middle school mathematics, negatively impacted student performance and achievement. Future parental involvement intervention studies could explore the effectiveness of using interventions defined from social-cognitive theory, expectancy-value theory, and hope theory (Froiland et al., 2013). Fan et al. (2012), O'Sullivan (2014), and Rosen et al. (2008) suggested that additional research on the perspectives of middle school parents could provide valuable information that could further increase understanding of their role as parents who supported their children in mathematics. Similar to what Selwyn et al. (2011) recommended, I also suggest more studies to show how parents used an LMS to promote their children's autonomy and achievement were needed.
This study revealed that timeliness, where mathematics teachers posted grades on EdLine,

was a concern among parents. A future quantitative correlation study could focus on student performance in middle school mathematics versus timeliness on when middle school mathematics teachers posted grades. The research could reveal how timeliness with feedback on EdLine impacted student performance in mathematics.

Conclusion

This study examined how parents of middle school children used an LMS, EdLine, to support their children's autonomous achievement in mathematics. EdLine as an LMS provided middle school parents with an online tool for monitoring and supporting their children's academic progress in mathematics. In middle school, EdLine provided an online tool that supported middle school mathematics teachers and students in the learning process. EdLine as an LMS informed parents of their children's academic progress (Emelyanova & Voronina, 2014; Nasser et al., 2011).

This study was conducted under qualitative methodology using a case study approach. The framework for this study included Eccles and Wigfield's (2002) expectancy-value theory of achievement motivation. As parents instilled values and expectations of success for their children, the children learned to set their expectations for task completion and achievements (Froiland et al., 2013; Wood et al., 2011). The framework also included Bandura's social cognitive theory. Bandura's (2002) theory explored how an individual's environment, cognition, and behavior interacted to support achievement motivation and determine how an individual will function. As a triangulated study, nine parents agreed to participants for methods of data collection which included parent participant interviews, a parent participant EdLine spreadsheet, and a parent participant reflective journal.

The analysis from the parent participant interviews revealed that parent participants wanted their children to become autonomous learners by taking ownership and responsibility for using EdLine to check and manage their progress in mathematics. Many parent participants and their children used EdLine to keep track of student grades and assess student progress in mathematics. In the parent participant reflection journals, parent participants described strategies that were effective and not effective when using EdLine to support their children in mathematics. A parent from the research study indicated that as parents monitored their children's grade in mathematics through EdLine, it took away from their children in

becoming responsible for their learning. Another parent reported her belief that efficient EdLine use should strictly be between middle school students and their mathematics teacher. EdLine as an LMS fulfilled a role in allowing parents and their children's mathematics teachers to communicate. EdLine also provided a platform for evidence where mathematics teachers could formally and visibly demonstrate their professional competence and expertise to parents. Similar to what Selwyn et al. (2011) and Watson and Watson (2007) found, my study showed that LMSs could also provide combined instruction internally and externally from the organization to expand the instructional group to the home and beyond involved parents. My study significantly addressed individual assessment, progressed monitoring, broadcasting, and attention to instructional requirements. EdLine use as an LMS supported online pedagogical interaction and communication between mathematics teachers, parents, and their children to create a society of purposeful discussions regarding individual student mathematical data and achievement. EdLine use as an LMS allowed mathematics teachers and parents to support middle school students with learner autonomy. Like what Kaur and Sidhu (2010) and Moreno-Murcia (2016) found, my study indicated that middle school students who used EdLine as an LMS in mathematics, developed self-regulatory processes to monitor their progression in attaining mathematical concepts and became empowered to participate more effectively in online learning experiences.

Citation

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APPENDIXES

Appendix A. Data Instrument Alignment with Research Questions

Research Questions	Interview Questions	EdLine Spreadsheet	Reflection Journal
Research question 1: How do parents use an LMS to support their children's autonomous achievement in middle school mathematics?	As a parent, how do you use EdLine to support your children's achievement in middle school mathematics?	Date of Login Entry to EdLine EdLine features that were used Briefly assess your children's progress in mathematics class Response after EdLine review	As a parent, what strategies do you find are effective in using EdLine to support your children's autonomous achievement in middle school mathematics? What strategies do you find are not effective in using EdLine to support your children's autonomous achievement in middle school mathematics? As a parent, have you adjusted your frequency in using EdLine to monitor your children's progress in middle school mathematics? What features and tools on EdLine are useful in allowing you to monitor your children's progress in middle school mathematics? What features and tools on EdLine should change in allowing you to monitor your children's progress in middle school mathematics? After reviewing your children's grades in mathematics through EdLine, how would you describe your children's progress in mathematics class? After reviewing your children's progress is any further action needed such as making a mental

			note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), or no action taken, etc.
Research question 2: What are parents' beliefs regarding the use of an LMS to monitor their children's progress in middle school mathematics? (a) How do parents describe the pros of using an LMS to monitor their children's progress in middle school mathematics? (b) How do parents describe the cons of using an LMS to monitor their children's progress in middle school mathematics?	As a parent, what are your beliefs regarding the use of EdLine as a resource to monitor your children's progress in middle school mathematics? (a) Could you describe the pros of using EdLine to monitor your children's progress in middle school mathematics? (b) Could you describe the cons of using EdLine to monitor your children's progress in middle school mathematics?		As a parent, what strategies do you find are effective in using EdLine to support your children's autonomous achievement in middle school mathematics? What strategies do you find are not effective in using EdLine to support your children's autonomous achievement in middle school mathematics? As a parent, have you adjusted your frequency in using EdLine to monitor your children's progress in middle school mathematics? What features and tools on EdLine are useful in allowing you to monitor your children's progress in middle school mathematics? What features and tools on EdLine should change in allowing you to monitor your children's progress in middle school mathematics? After reviewing your children's grades in mathematics through EdLine, how would you describe your children's progress in mathematics class? After reviewing your children's progress is any further action needed such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), or no action taken, etc.

Appendix B. Interview Questions that Examine Middle School Parents' Beliefs Regarding the Use of a Learning Management System in Mathematics

The following interview questions will be used to examine your beliefs regarding the use of EdLine as a learning management tool to support your children in middle school mathematics.

As a parent, how do you use EdLine to support your children's achievement in middle school mathematics?

3. As a parent, what are your beliefs regarding the use of EdLine as a resource to monitor your children's progress in middle school mathematics?
   (a) Could you describe the pros of using EdLine to monitor your children's progress in middle school mathematics?
   (b) Could you describe the cons of using EdLine to monitor your children's progress in middle school mathematics?

Appendix C. Follow-Up Questions After Parent Interview

Please take approximately twenty minutes to review your parent interview transcript. After reviewing your interview transcript, please take ten minutes or approximately ten minutes to answer the following questions that will be used to reflect accuracy of the interview transcript and will examine any additional information to your beliefs regarding the use of EdLine as a learning management tool to support your children in middle school mathematics.

1. How does the parent interview transcript accurately reflect your responses to the interview questions?
2. In what ways does the interview transcript reflect your beliefs as a parent regarding the use of EdLine to monitor your children's progress in middle school mathematics?
3. How does the interview transcript reflect your description of the pros of using EdLine to monitor your children's progress in middle school mathematics?
4. How does the interview transcript reflect your description of the cons of using EdLine to monitor your children's progress in middle school mathematics?
5. Did you notice any aspects from the interview transcript you had forgotten or is their additional information you would like to add?

Appendix D. EdLine Data Spreadsheet

Each parent participant will use the EdLine data spreadsheet for the next ten days when logging into EdLine to support and monitor their children's progress in mathematics. Each EdLine spreadsheet form takes approximately ten minutes to complete. Parent participants should complete at least two EdLine spreadsheet forms during the ten-day duration. Components of the EdLine Data Spreadsheet include (a) date of login Entry to EdLine; (b) any EdLine features used; (c) your assessment regarding your children's progress in mathematics; and (d) after accessing EdLine please briefly explain any response, such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), no action taken, etc.

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1. Date of Login Entry to EdLine: _____
2. Please check any of the EdLine features that were used during your entry:
   The combined parent and student EdLine calendar _____
   Teacher interactive classroom study guide(s) ____
   The ability to track your children's grades, attendance, and other reports ____
3. If you checked your children's progress in mathematics class, briefly assess and describe their grades and progress:
   _____
   _____
4. After accessing EdLine please briefly explain any response, such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), no action taken, etc.
   _____
   _____

1. Date of Entry Login to EdLine: _____
2. Please check any of the EdLine features that were used during your entry:
   The combined parent and student EdLine calendar _____
   Teacher interactive classroom study guide(s) ____
   The ability to track your children's grades, attendance, and other reports ____
3. If you checked your children's progress in mathematics class, briefly assess and describe their grades and progress:
   _____
   _____
4. After accessing EdLine please briefly explain any response, such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), no action taken, etc.
   _____
   _____

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1. Date of Entry Login to EdLine: _____
2. Please check any of the EdLine features that were used during your entry:
   The combined parent and student EdLine calendar _____
   Teacher interactive classroom study guide(s) ____
   The ability to track your children's grades, attendance, and other reports ____
3. If you checked your children's progress in mathematics class, briefly assess and describe their grades and progress:
   _____
   _____
4. After accessing EdLine please briefly explain any response, such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), no action taken, etc.
   _____
   _____

1. Date of Entry Login to EdLine: _____
2. Please check any of the EdLine features that were used during your entry:
   The combined parent and student EdLine calendar _____
   Teacher interactive classroom study guide(s) ____
   The ability to track your children's grades, attendance, and other reports ____
3. If you checked your children's progress in mathematics class, briefly assess and describe their grades and progress:
   _____
   _____
4. After accessing EdLine please briefly explain any response, such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), no action taken, etc.
   _____
   _____

After ten days, parent participants can send me their EdLine data spreadsheet entries via email. Parent participants can also mail their EdLine data spreadsheets. After each parent participant interview, I will provide each parent participant with a self-stamped, sealable, envelope where parents participants can mail their EdLine data spreadsheets directly to me.

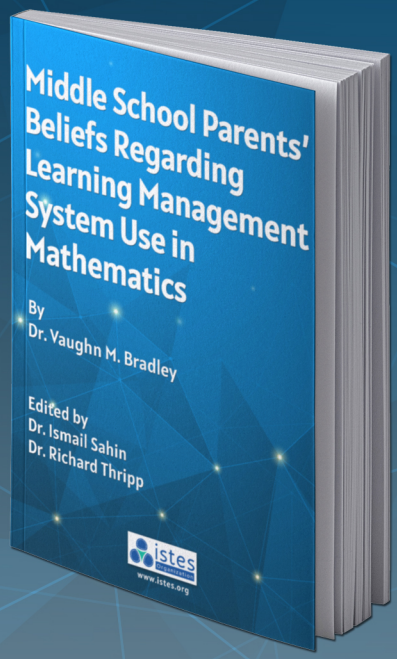
Appendix E. Parent Reflection Journal

Each parent participant will receive a composition book which will serve as a parent reflection journal. Each parent reflection journal entry takes approximately ten minutes to complete. Parent participants should complete at least two parent reflection journal entries during the ten-day duration. For the next ten days, each parent participant will submit an entry in their parent reflection journal after logging into EdLine and completing an EdLine data spreadsheet entry.

Every parent reflection journal entry includes a journal entry date and a parent reflection entry on the strategies and the tools parent participants use to support their children's progress in middle school mathematics. Below are questions for parents to reflect on as they complete their parent reflection journal entry.

1. As a parent, what strategies do you find are effective in using EdLine to support your children's autonomous achievement in middle school mathematics?
2. What strategies do you find are not effective in using EdLine to support your children's autonomous achievement in middle school mathematics?
3. As a parent, have you adjusted your frequency in using EdLine to monitor your children's progress in middle school mathematics?
4. What features and tools on EdLine are useful in allowing you to monitor your children's progress in middle school mathematics?
5. What features and tools on EdLine should change in allowing you to monitor your children's progress in middle school mathematics?
6. After reviewing your children's grades in mathematics through EdLine, how would you describe your children's progress in mathematics class?
7. After reviewing your children's progress is any further action needed such as making a mental note, communicating with your children or their mathematics teacher (text, phone, face to face discussion, etc.), or no action taken, etc.

Middle school is a critical time in students' learning of mathematics, something a Learning Management System (LMS) is designed to help parents support. What remains unknown is how parents use an LMS to monitor their children's progress in mathematics. This qualitative case study explored how parents from one midAtlantic middle school with 543 students used an LMS, EdLine, to support their children's autonomous achievement in mathematics. Expectancy-value theory and social cognitive theory made up the conceptual framework used to evaluate study findings. A criterion-based process was used to select nine middle school parents from grades 6, 7, and 8 as participants. Data sources included structured interviews and follow-up questions, EdLine spreadsheets, and parent reflective journals. Data were analyzed through a priori codes based on the literature review. Themes that emerged from the analysis included reoccurring learner autonomy and parents benefiting from their ability to use EdLine to monitor grades, check progress, and provide strategies to support mathematical achievement. Parents indicated they could encourage their children, teach them, and expect them to use EdLine to monitor and manage their grades and achievement in mathematics. This research contributes to positive social change by explaining how administrators can help middle school parents use an LMS to become engaged with their children's mathematics studies and set expectations for their mathematics task completion and achievement.



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