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Perceptions of Faculty Using MyMathLab in Traditional, In-Seat Math Classes

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Walden University
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Abstract

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MEA, Virginia Technic University, 1993

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

MyMathLab, an online interactive and educational system by Pearson Publisher, was implemented in 2 lower-level, traditional in-seat algebra courses to provide supplemental, instructional support to students in the fall of 2015 at the college under study. After the first year of use, no significant change in student success was reported, although more students passed intermediate algebra without first taking elementary algebra. The problem addressed in this study was that student results suggested there might be benefits to using MyMathLab that should be investigated. Knowles' theory of andragogy was used in this qualitative case study to gather perceptions of 7 2016-2017 faculty selected through stratified purposeful sampling. The research questions explored the benefits and challenges of using MyMathLab to support students in understanding math concepts and the effect on classroom time for instruction. The 3 major themes that resulted from analysis of the data collected through semistructured interviews were additional practice, immediate feedback, and ownership. Student data were used to triangulate and substantiate the findings. The resulting project was a professional development program for faculty using available resources in MyMathLab. Formative and summative evaluations were recommended to collect feedback from participants. The project contributes to positive social change by increasing faculty confidence in using the product to improve student success and increase student graduation rates. The findings of this study may also contribute to positive social change by supporting existing results from previous studies on the use of digital technology in traditional, in-seat math courses.

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Dedication

This work is dedicated to my family and friends for their support and love.

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Table of Contents

List of Tables

Section 1: The Problem

The Local Problem

MyMathLab, an online interactive and educational system by Pearson Publisher, has been used in two lower level, in-seat math courses at the local college under study for 3 years. Beginning in the fall semester of 2015, MyMathLab was implemented at the local college in elementary algebra, a developmental level math course, and intermediate algebra, a college level math course. The local college has a high admission acceptance rate and accepts students who may not be adequately prepared to begin taking college level courses. Math is a common deficiency for incoming students. If students do not have credit for a required math course, they enroll in a class based on scores earned on placement exams (i.e., Accuplacer or Compass). A large number of students completed the two lower-level algebra courses during the fall, winter, and spring semesters of 2015–2016. The math department recommended the use of MyMathLab after other academic support strategies were tried that would have been costlier to maintain over a long period of time.

In searching for alternative ways to provide academic support to students without increased funding, math faculty and the associate dean of developmental studies acknowledged many factors that can affect student success, especially for adult learners. These factors may include inadequate academic preparation, work, and/or family responsibilities (Bettinger, Boatman, & Long, 2013), low self-efficacy in math, math phobia, and/or test anxiety (Bonham & Boylan, 2011; Boylan, 2011), student learning styles and motivation as well as faculty beliefs and practices (Clayton, Blumberg & Auld, 2010; Sogunro, 2014). The recommendation for using MyMathLab was a way to address some of these issues and give all students access to the same academic resources, if and when needed.

Technology has been used by colleges to increase student success in developmental and remedial courses (Bonham & Boylan, 2011; Long, 2012). Studies have shown that computer-aided instruction software programs can increase academic achievement in math courses by delivering individualized instruction to students, based on each student’s needs (Speckler, 2012; Stewart, 2012; Vezmar, 2011; Witkowsky, 2008). MyMathLab was selected by math faculty at the local college because some of the instructors were familiar with using the program from teaching online classes at the local college or from experience at other institutions. The specific purpose for using MyMathLab was to provide supplemental support to students, not to replace in-seat instruction. Although MyMathLab offers numerous resources to enhance student learning, including delivery options to support different learning styles, an interactive eBook, and help features that provide step-by-step guidance, faculty agreed to a trial use of the program for assigning homework problems only, with implementation left to the discretion of each instructor. For example, the weight for homework assignments depended on the instructor’s opinion on the importance of the homework weight toward the course grade.

By the end of the 2015–2016 academic year, the math department chair and associate dean of developmental studies reported that using MyMathLab did not make a significant difference in improving grades or increasing pass rates when compared with results from the previous year. However, during fall 2016, the first semester of the second year of use, academic leadership reported at a meeting for faculty and staff that more students successfully completed the intermediate algebra course without first taking the elementary algebra course. Based on student data, academic leadership reported the success was attributed to the use of MyMathLab. The problem was that although the results of the two reports seem contradictory and support for using the program was mixed, student results suggested there may be advantages from using MyMathLab that should be investigated. Consequently, I conducted this study to gather faculty perceptions on the benefits and challenges of using MyMathLab for student learning.

Rationale

The math faculty at the local college have first-hand experience on the implementation and integration of MyMathLab in the classroom and its use by students. Faculty are the best resources to discuss pedagogical and technical issues they experienced from using the new program (see Powell & Kusuma-Powell, 2015). In the following subsections, I will explain the reasons for implementing MyMathLab at the local college.

Admission Standards and Student Support

The local college has a higher admission acceptance rate than more selective institutions. The Integrated Post-Secondary Education Data Systems reported the local college accepted 89.2% of all applicants in fall 2015, with a retention rate of 69% for full-time freshmen students, and a retention rate of 30% for part-time students (National Center for Education Statistics [NCES], 2016). Highly selective institutions accept less than 25% of all applicants each year (NCES). The higher acceptance rate at the local college is a great opportunity for students who want a traditional, 4-year college experience rather than take classes at a community college or on a part-time basis. However, not all students may be ready to take college level courses (ACT, 2013). Bettinger et al. (2013) suggested that inadequate academic preparation for college level coursework was the biggest challenge for students and college success; they reported about one-third of high school graduates were adequately prepared to take college level courses and the percentage was lower for older students.

Students at the local college come from diverse socioeconomic backgrounds and many are first-generation college students. NCES (2016) reported that 98% of full-time, first-time, degree or certificate-seeking undergraduate students at the local college received financial aid in 2015–2016; 96% received grants and scholarships. The 6-year graduation rate was 37% for full-time, first-time students who started at the local college in fall 2009, and increased to 45% for students who started at the college in fall 2011 (NCES, 2016). For comparison, the graduation rate was 88% at more selective institutions, while the graduation rate was 32% at institutions with high acceptance or open admission policies for students who stated started college in 2009 (NCES, 2017).

Student readiness and adequate academic preparation are important factors for college success (Bettinger et al., 2013; Perna, 2015). Underprepared students are often required to complete developmental and/or remedial classes in math or other subjects before beginning college level classes (Bonham & Boylan, 2011; Long, 2012). Students may enroll in these courses but do not always finish them (Boatman & Long, 2010).

Bonham and Boylan (2011) reported that developmental mathematics courses “have the highest rates of failure and noncompletion of any developmental subject area” (p. 2). Developmental courses do not earn college credit toward graduation requirements and often cost the same as courses that earn college credit (Bettinger at al., 2013). Depending on the level of unpreparedness, students who enroll in precollege level courses may not need them (Boatman & Long; Long, 2012; Hern, 2012). However, these courses have helped prepare students for college courses but can affect retention and persistence rates if students fail, drop, or withdraw from them. Bettinger and Long (2009) reported that “students in remediation are more likely to persist in college in comparison to students with similar backgrounds who were not required to take the courses” (p. 736). Thus, accurate assessment of academic readiness is critical to help students succeed in college. Perna (2015) stated that “improving college access and completion for low-income and first-generation college students is one of the most important challenges facing our nation” (p. 1). Colleges across the country are trying different academic support strategies to improve college completion rates for underprepared students (Bonham & Boylan, 2011).

The college under study continually looks for ways to provide academic support to students to increase college completion. In 2012, positions were created at the local college to address student preparedness, instruction, retention, and persistence rates. The college hired an associate dean of developmental studies to focus on improving course completion and pass rates in developmental and lower-level courses, a full-time math instructor (former high school teacher) to examine instructional techniques in developmental courses, and supplemental instructors to serve as tutors for students in developmental courses. The algebra courses were reviewed and an option was added to permit some students the chance to complete the two algebra courses in one semester. In addition, college admission acceptance criteria and math placement tests were examined and modified. Mandatory tutoring was required for students in elementary algebra who did not maintain a passing average each week and students had to complete math worksheets during tutoring sessions. Although these efforts improved course completion rates, they came with the cost of salaries for academic support personnel and time to work. In addition, these efforts did little to change how students studied to learn math once the class ended. After a few semesters the support that focused primarily on developmental initiatives began shifting to new, emerging projects. However, the need to continue providing support to incoming, underprepared students remained about the same. The math department selected a group of instructors to investigate alternative, less expensive ways to provide academic support to students in the lower-level math courses, leading to the recommendation of MyMathLab, which was approved as a reasonable approach.

Computer-Aided Instruction Software Programs

Using technology to improve the quality of student learning and reduce costs in higher education has been a subject of study for decades. Twigg (1999) reported that leaders in higher education gathered at a symposium in 1999 to discuss ways to use technology to create more productive learning environments. The group discussed instructional best practices and experiences from major redesigns that occurred in large-enrollment courses at Virginia Tech (linear algebra), University of Wisconsin Madison (chemistry), Rensselaer Polytechnic Institute (many disciplines), and University of Illinois at Urbana-Champaign (intermediate-Spanish). Since then, other colleges and universities have successfully replaced pencil and paper homework assignments with online, computer-based, or web-based assignments in numerous subject areas, including lower-level math courses (see Raines, 2016; Speckler, 2012; Stewart, 2012; Vezmar, 2011; Witkowsky, 2008).

Technology has been identified as a “possible avenue for educational leaders to overcome or address the problem of low achievement in mathematics” (Tienken & Wilson, 2007, p. 181). To increase academic achievement in courses, faculty can use reports and performance results as diagnostic tools to evaluate their students’ understanding of concepts (Tempelaar, Rienties, & Giesbers, 2015). This information can assist faculty in preparing lectures or lessons for the classroom (see Chen, Breslow, & DeBoer, 2018). Ertmer and Ottenbreit-Leftwich (2010) suggested, “Effective teaching requires effective use of technology” (p. 256). Stewart (2012) commented that the automated grading system in instructional software programs can provide faculty with additional time to work one-on-one with students. The University of Memphis and University of Alabama reported improved academic achievement and retention rates after math courses were redesigned using MyMathLab (Stewart, 2012; Witkowsky, 2008).

Computer-aided instruction software programs place emphasis on the learning process, self-direction, independence, and flexibility desired by many adult learners. These programs support learners by providing immediate results and feedback (Cheng, Thacker, Cardenas, & Crouch, 2004). Students receive instruction in a format that supports individual learning styles and at a time that works best for the student (Holt, Holt, & Lumadue, 2012; Law, Sek, Ng, Goh, & Tay, 2012). Furthermore, students became more confident and independent as the learn to work through assignments, without the presence of an instructor (see Chen et al., 2018; Dawson, 2013; Locklear, 2012). Providing students with resources for independent learning can improve retention and persistence rates (see Speckler, 2012). Condelli et al. (2010) suggested developing strategies that "utilize technology to increase system capacity, coordination, and effectiveness" to assist adults in achieving their goals (p. 9).

Faculty Involvement and Selection of MyMathLab

Faculty involvement is important when implementing new technology in the classroom (Powell & Kusuma-Powell, 2015). Some math faculty at the local college were initially against using a computer-aided instructional software program in the lower-level, in-seat algebra courses. However, after discussions on the potential benefits for student learning, running a few pilot classes, and several personnel changes, 50% of the math faculty approved the use of MyMathLab for a 3-year period. MyMathLab was originally selected for the online courses at the local college by the previous math department chair and online math instructors. MyMathLab continues to be the program of choice for online courses because of the quality and the variety of instructional resources contained in the program. Other instructional software programs were considered for the in-seat math courses but faculty decided it would require a huge investment of time to research available products, learn how to use them, select one, and train instructors. In addition, several instructors had experience using MyMathLab at other colleges or from using it in the online classes at the local college.

Faculty agreed to use MyMathLab for homework assignments only, and two teams of in-seat faculty worked almost a year to hand-select problems for each course. During a MyMathLab training session, an instructor recognized the potential for student learning and jokingly commented, “If it works too well, it could replace me.” On the other hand, Larbi-Apau and Moseley (2012) suggested that “some teaching faculty feel intimidated by technology and would rather not explore the potentials for pedagogy and professional advancement” (p. 222). For example, a full-time faculty member commented there are “real drawbacks” to using MyMathLab for homework (i.e., “students can cheat the system by getting help doing the homework without learning the concepts”).

Leadership at the local college accept the position that not all math faculty support using MyMathLab in the classroom. For different reasons, some faculty believe in traditional instruction methods only and are reluctant to use technology in the classroom (see Blin & Munro, 2008; Ertmer & Ottenbreit-Leftwich, 2010; Howard, 2011; Powell & Kusuma-Powell, 2015). Some faculty may even be concerned there will be less contact with students (Stewart, 2012). Furthermore, academic freedom is highly valued by math faculty at the local college. Therefore, inclusion of in-seat faculty was considered absolutely necessary throughout all stages of the process for acceptance and use by faculty (i.e., from initial discussions to implementation of the program in courses). In-seat faculty received training on MyMathLab prior to the start of the school year, and they were provided around-the-clock technical support after MyMathLab was implemented. Lack of participation in the creation of the courses, training, or technical support should not be considered acceptable reasons for not using MyMathLab in courses at the local college.

Definition of Terms

Developmental education: Below college level coursework and support services to help underprepared college students achieve their goals (Bonham & Boylan, 2011; Boylan, 2011).

Nontraditional students: Students typically older than 24 years of age returning to school after a break in education and often with other responsibilities (e.g., family, work, and spouses; Kinsella, 1998).

Remedial courses: Below college level courses (Bettinger & Long, 2009).

Traditional students: Students typically aged 18–24 years old and attending school for the first time (Kinsella, 1998).

Significance of the Study

The problem in this study was noteworthy because the benefit of using MyMathLab for student learning was unclear and further study was warranted. The use of computer-aided instruction software programs has the potential to provide increased instructional opportunities for faculty and increased learning opportunities for students. With the use of computer-aided instruction software programs, students can improve their math skills outside the classroom, without the presence of a live instructor. Findings from this study revealed ways faculty used MyMathLab in the classroom to improve student learning. More important, students' confidence improved because of their increased knowledge and comprehension of mathematics. The adaptability of instructional software programs and the ability to provide individual feedback to each student is a practical way to give underprepared learners skills they need without investing additional time and money in credits for below college level coursework or repeating a course (see Bettinger et al., 2013; Bonham & Boylan, 2011; Boylan, 2011; Hern, 2012; Long, 2012). As federal dollars decrease for developmental coursework, computer-aided software instruction programs can deliver *just in time* remedial instruction to students. Further study is recommended to determine if MyMathLab can provide sufficient remedial instruction to allow all students to enroll in intermediate algebra without first taking the elementary algebra course, and be successful. Finally, the findings from this study contribute to educational research that has already been completed on using computer-aided software instruction programs to supplement student learning.

Research Questions

The purpose of this study was to discover faculty perceptions on using MyMathLab in two lower level, traditional in-seat math courses at the local college. I obtained student data and comments from institutional reports to corroborate findings from faculty interviews. I did not contact students during the research. I developed the following two research questions to guide this study:

RQ1: What are faculty perceptions regarding the benefits and challenges of using MyMathLab to support students with respect to understanding math concepts?

RQ2: What are faculty perceptions regarding the use of classroom time for teaching course content because of inclusion of instructional resources in MyMathLab?

Review of the Literature

Conceptual Framework

I used andragogy, an adult learning theory developed by Malcolm Knowles, as the framework for this study (Knowles, 1980; Knowles, Holton, & Swanson, 2014; Merriam, 2001). As proposed by Knowles (1980), andragogy is the “art and science of helping adults learn” (p. 43). Several assumptions distinguish adult learning from childhood learning. The adult learner is a student who (a) is independent and self-directed in what they need to know, (b) has life experiences and knowledge which may apply to learning new information, (c) has readiness and a reason for learning, (d) is problem centered and interested in the application of new knowledge, and (e) is motivated to learn by internal not external factors (Knowles, 1980; Knowles & Associates, 1984; Merriam & Bierema, 2013; Ozuah, 2016).

As Merriam (2015) stated, “there is no one definition, model, or theory that explains how or why adults learn” (p. 59). Yet, many of the assumptions underlying the theory of andragogy apply to students at the local college. In fall 2015, 54% of students enrolled in courses at the local college were nontraditional age students (i.e., 25 years or older; NCES, 2016). Computer-aided instruction software programs are a viable option for providing all students with flexibly in choosing strategies that work best for them (see Blashki et al., 2007; Cercone, 2008; Knowles et al., 2014; Sternberg, 2012). Student-centered learning and self-directed learning are possible with computer-aided instruction software programs; students can improve their study-skills as well as gain confidence as they work through assignments because of resources in the programs (see Chen et al., 2018; Cheng et al., 2004; Law et al., 2012; Raines, 2016). Course completion and retention rates have improved due to the use of technology in the classroom (Stewart, 2012; Witkowsky, 2008).

The use of technology has increased educational opportunities for many students: “central to this work are implications for equitable and inclusive educational practice” (Hoffman & Vorhies, 2017, p. 22). Stewart (2012) reported the use of technology as a way of reducing the “achievement gap” among diverse groups of students (p. 9). In fact, MyMathLab was implemented in the math classes at the local college to give all students an equal opportunity to improve their understanding of math concepts and academic readiness. Adequate academic preparation might increase college completion rates for underprepared students, which is necessary for preparing students for employment in the 21st century (Bettinger et al., 2013; Perna, 2015). Botha, Coetzee, and Coetzee (2015) reported that “life-long and life-wide learning have become imperatives for adult learners in the light of increasing changes in the labour market, uncertain career paths and an evolving knowledge economy” (p. 65). Many students attend the local college for increased career opportunities.

Review of the Broader Problem

I retrieved dissertations and theses for this literature review from the ProQuest database accessed via the Walden University library. Research books were borrowed from local colleges and libraries. ERIC, Education Source, Sage, ScienceDirect, EBSCOhost, and other scholarly databases as well as Google Scholar were searched for peer-reviewed or cited articles using keywords and keyword combinations. After I reviewed the articles, the references in the articles were searched for new items. This process was repeated until no new relevant articles were found and saturation was reached. Keyword and keyword combinations included *adult students/learners, challenges in/barriers to higher education, technology in the classroom, MyMathLab, an online interactive and educational system by Pearson Publisher (also referred to as computer-aided instruction software programs, online, computer-based, or web-based programs), traditional/in-seat learning, homework, motivating adult student learners, post-secondary education, best practices in learning math, learning styles,* and *resistance to technology*.

Characteristics of adult learners. Although the theory of andragogy does not fully address all variables and challenges associated with adult student learning, the theory offers insight into the complexities associated with adult learners (Merriam, 2001). Andragogy is a theory that distinguishes learning needs of adult students to those of children (Cercone, 2014; Knowles et al., 2014; Merriam, 2015). Adult students accept responsibility for their learning because they are independent, self-directed, self-centered, and motivated by internal factors; they prioritize daily tasks as they work through their busy schedules (Knowles et al., 2014; Merriam, Caffarella, & Baumgartner, 2007; Ozuah, 2016; Rabourn, Shoup, & BrckaLorenz, 2015). Botha et al. (2015) commented that “self-directed learners are seen to actively participate in their personal learning journeys, from inception to conclusion" (p. 65). However, adult students often manage multiple responsibilities while attending classes (e.g., work, family, spouse, caregiver, and community involvement) and these tasks can take time away from academic study and involvement in college activities (Boylan, 2011; Ross-Gordon, 2011).

Sogunro (2014) stated that a person is a legal adult in the United States at age 18. For this study, I considered traditional and nontraditional age students as adult learners since the majority of students are at least 18 years old when they are accepted at the local college, and many students have responsibilities outside of the classroom. Adult student learners typically want control over their learning environment, to be independent, and have flexibility when to study (Knowles et al., 2014). Studies have suggested most students prefer the delivery of information in a variety of ways, with immediate feedback on assignments, and the ability to work through individually assigned problems based on specific concepts they do not know (see Blashki et al., 2007; Raines, 2016; Sogunro, 2014; Stewart, 2012).

Effectiveness of computer-based learning strategies. Students' perceived value in using computer-aided software programs for learning can lead to greater acceptance of the technology in the classroom (Zogheib, Rabaa'i, Zogheib, & Elsaheli, 2015). Discovering students' learning preferences, if obtainable, may help improve academic success. Clayton et al. (2010) conducted a survey study based on the input of 132 postsecondary students. Their research revealed the importance of knowing a student's motivation, learning style, and self-efficacy to assist in selecting the best learning environment for the student (e.g., online, hybrid, or traditional format). Using this information in conjunction with available resources in adaptive, computer-aided instructional software programs can greatly increase students' chances for retention and college completion.

Research has been conducted on the use of technology in math courses at postsecondary institutions to support student learning (Barnsley, 2014; Dawson, 2013; Gönül & Solano, 2013; Hodge, Richardson, & York, 2009; Holt et al., 2012; Locklear, 2012; Kuo & Burch, 2012; Law et al., 2012; Raines, 2016; Speckler, 2012; Stewart, 2012; Vezmar, 2012; Witkowsky, 2008; Zogheib et al., 2015). Holt et al. (2012) used a mixed method approach to discover students' views on the pros and cons of using MyMathLab in an intermediate algebra courses at a university in Texas. They sent online surveys to 149 students enrolled in six sections of the intermediate algebra courses. Like the local college, the university in Texas used MyMathLab for web-based homework, with preparation of lectures left to the instructors. Most students believed the use of MyMathLab improved their understanding of math concepts and reinforced the information delivered through in-seat lectures (Holt et al., 2012). In addition, they reported that many students liked doing extra practice problems but disliked working through problems on paper and entering the answers in a specified format in the program. Hauk, Powers, and Segalla (2015) reported similar results when conducting an analysis of covariance study to determine differences in mathematics achievement when students completed web-based homework compared to students who completed the homework on paper. Their study was based on 439 students enrolled in 19 college algebra classes at a large public institution in the United States. Students in their study used open source, web-based homework in the college level math courses. They found that students who completed the web-based homework did as well as students who completed their homework using paper and pencil. However, not all students liked entering their answers in a specified way in the program or using web-based programs (Hauk et al., 2015). The results of Dawson's (2013) study on the impact of using online homework in a traditional college courses also reported no significant overall difference in academic achievement. However, Dawson stated that faculty and students believed using the software was beneficial and faculty reported that student achievement was higher in their courses as a result of using the online homework. Similarly, Raines (2016) found that students believed that completing homework online had a positive impact on understanding and learning the math concepts in a redesigned, elementary algebra course.

The use of online, computer-aided software instruction programs in math courses has made positive contributions to student success and learning. Krupa, Webel, and McManus (2015) conducted a quasi-experimental study and compared the achievement of college students in traditional face-to-face sections and computer-based sections of intermediate algebra. They reported that students in the computer-based, intermediate level algebra class performed better on the final exam than students in a traditional section but were less likely to be able to interpret an equation. Gönül and Solano (2013) conducted an ordinary least squares and fixed effects experiment with a sample of 102 students in a quantitative business course and reported varying results on the completion of the homework. However, they found that "students who score relatively higher in homework tend to score relatively higher in exams and finish in less time than other students" (p. 1). In a matched-pair study, Barnsley (2014) concluded that "consistent with other studies, this study does not indicate that online homework is the panacea for improving achievement. When online homework is used in conjunction with other written feedback it is possible to expect similar results" (p. 133).

The use of computer-aided instruction software programs offers resources that support growth and change in students as they become more independent and self-directed learners. Students' self-confidence may increase from using online resources as they discover how to learn and process information on their own, and successfully master math concepts (see Ally, 2004). Mezirow (1981) believed educators should "assist adults to learn in a way that enhances their capability to function as self-directed learners" (p. 79). Providing students with the skills needed to become independent learners will prepare them for the workforce since many adults enroll in college to increase career opportunities (see Botha, 2014; Botha et al., 2015; Louw, 2014; Perna, 2015).

Implications

Based on the findings of this study, best practices will be shared with faculty on using MyMathLab to improve student learning experiences and academic achievement. Faculty will receive guidance on ways to motivate students to complete assignments and use resources in the program to understand the material. For example, it will be recommended that homework is assigned as required, instead of optional, to improve learning outcomes. Also, it will be recommended that students use the Help features to learn the concepts as they work through their assignments rather than depend on the instructor for all explanations. In addition, faculty will be reminded to review homework assigned in MyMathLab to verify the problems align with the lectures covered in class. Finally, faculty will learn how to analyze reports and review student activity in order to identify concepts in need of instruction or review during the class session.

Summary

Faculty perceptions on the benefits and challenges of using MyMathLab for student learning was the focus of this study. The local college under study implemented MyMathLab in two lower level, in-seat algebra courses beginning in fall of 2015 to provide supplemental instructional support to students. However, student success indicators did not change significantly from the prior year. Computer-aided instruction software programs have been used successfully in developmental and remedial math courses at other institutions. These programs provide students with flexibility in deciding when to access the resources for academic support. Students appreciate the immediate feedback and instruction provided through these programs Examining faculty perceptions on using MyMathLab was the first step in understanding how computer-aided instruction software programs benefit teaching and learning in the math courses at the local college. Section 2 will contain a discussion of the methodology used for this study.

Section 2: The Methodology

Research Design and Approach

I used a qualitative case study approach in this study to discover faculty perceptions regarding the benefits and challenges of using MyMathLab for student learning in traditional, in-seat mathematics courses during the 2016–2017 academic school year. A case study approach is a way to examine a real-life situation when the connection between events and results is not obvious (Yin, 2017). According to Creswell (2012), the case study "is an in-depth exploration of a bounded system (e.g., activity, event, process, or individuals) based on extensive data collection" (p. 465). The bounded system in this study was faculty teaching either one or both of the lower-level math courses at the local college. I used an inductive strategy to gain an understanding of "how participants make meaning of a situation" (Merriam, 2002, p. 6). This research design depends mainly on the participants' experiences and views on the problem in the study (Creswell, 2009). Consistent with a qualitative research design, data on faculty perspectives were gathered through semistructured interviews. I created an interview protocol to have a script prior to the interview to inform participants of the purpose of the study and maintain consistency throughout the interview process (see Lodico, Spaulding, & Voegtle, 2010). A thematic approach was used to provide "quotes and rich details to support the themes" from the qualitative data (Creswell, 2012, p. 274). A limitation of this study is that it cannot be fully generalized to the larger population since it was based on one institution.

I also considered the quantitative and mixed method approaches for this study to compare student success indicators from before to after MyMathLab was adopted. These approaches were not possible due to the way MyMathLab was implemented in all sections of the two courses, across all campus locations, at the same time. For example, how and if MyMathLab was used in the class, the approach to instruction, and all assessments were left to the discretion of each instructor, so the strict standards necessary for a quantitative study were not in place. Therefore, I selected a qualitative approach as the most appropriate method for this study.

The strength of the case study design is based on obtaining a thorough understanding of the situation by using multiple sources (Yin, 2017). Although studies have been completed on using computer-aided software instruction programs for student learning and academic achievement, not as much research has been conducted on faculty perceptions. This study explored the positive and negative aspects of using computer-aided instruction programs to support student learning from the perspective of faculty.

Participants

Criteria and justification. I used stratified, purposeful sampling to select the sample for this study. Patton (2002) suggested “stratified samples are samples within samples” and “the purpose of a stratified purposeful sample is to capture major variations rather than to identify a common core, although the latter may also emerge in the analysis” (p. 240). Stratification was made at the course level, with the selection of potential participants ranked according to the largest number of sections taught overall, or in each course. Participants for the study were math faculty at the local college study site.

Math faculty were, and are, the subject matter experts. They were most familiar with the experiences encountered using MyMathLab in their courses. It was important for this study to include full-time and adjunct faculty representatives from all campus locations because of differences at each location as well as the differences in student populations. The criteria for participation in this study were: (a) faculty who had taught elementary algebra and/or intermediate algebra in the traditional, 15-week classroom during fall and/or winter semester of 2016–2017; (b) faculty who used MyMathLab in courses; and (c) faculty who did not teach either course online.

Setting, population and sample participants. The location of the study was a 4-year, private, not-for-profit, U.S. college in the Midwest. According to the college data, 63 sections of the elementary algebra and intermediate algebra classes were offered during the fall and winter semester of the 2016–2017 school year in the traditional, 15-week format. The number of elementary classes to intermediate classes offered during the two semesters was an approximate 3:5 ratio (24/39). The courses were offered on both the main campus and satellite campus locations. Between the fall and winter semesters, 926 students completed the courses. Enrollment ranged from a high of 28 students in classes on the main campus to a low of four students in classes at locations other than the main campus.

To reflect the 3:5 ratio of elementary algebra to intermediate algebra courses, the target sample size was three instructors who taught elementary algebra and five instructors who taught intermediate algebra. An instructor who taught both courses was considered a potential participant to represent each course. Classes were instructed by 19 different full-time or adjunct instructors. Several instructors taught both courses or several sections of a course during the fall and/or winter semester. I invited all instructors who taught either course in-seat, but never online, to participate in this study. Three instructors were not invited for an interview because they had prior experience teaching one or both lower-level courses online. Therefore, of the 19 faculty that met the sampling criteria, 16 remained as possible participants for inclusion in the study. I sent each of the 16 instructors an e-mail explaining the opportunity to participate in the study; however, only seven faculty consented to participate. Of the seven participants, three participants taught both elementary algebra and intermediate algebra courses, one taught elementary algebra courses only, and three taught intermediate algebra courses only. The 2:3 ratio of elementary algebra instructors to intermediate algebra instructors satisfied the desired 3:5 sample ratio. Participants included four full-time faculty and three adjunct faculty who taught courses on the main campus or at other campus locations.

I excluded spring 2017 classes from this study because additional variables could have been introduced with the inclusion that were not the focus of this study. For example, the length of the spring semester was 12 weeks instead of 15 weeks, sections of each course were not offered at all locations, and enrollment in each section of either course was relatively low. In addition, courses offered in a 7-week, in-seat condensed format or blended format were excluded from this study due to variation in the length of the course, a different philosophy for instruction, and student selection in these classes. However, real-time, virtual classes were included in this study because the format is considered and offered as a traditional, in-seat 15-week course, with a live instructor and required student attendance.

Procedures for gaining access. I received Institutional Review Board (IRB) approval for this study from the IRB of Walden University IRB (IRB Approval Number: 09-12-17-0360137) and approval from the local college. Course related data were not requested from the institutional research department at the local college until IRB approval was received. Names of faculty who taught each course were included with the course data.

I ranked faculty in accordance with criteria for inclusion in this study to systematically contact potential participants. An e-mail was sent to the first 10 potential participants at their college e-mail address requesting a nonwork e-mail address. I used the nonwork e-mail address to send information about the study. Use of a nonwork e-mail address was necessary to offer faculty a degree of separation from their work duties for increased privacy and confidentiality. Once a nonwork e-mail address was received, I sent potential participants an e-mail explaining the nature of the study. Depending on the day the e-mail was sent, a 3- to 7-day return window was requested (e.g., in case individuals did not check e-mails over a long holiday weekend). If no response was received after the given deadline, a second request was sent. If no response was received from the faculty after the second e-mail request, I assumed that the instructor chose not to participate in the study. At that time, the next instructor on the list with the highest number of courses taught was contacted, maintaining the desired 3:5 course ratio.

Unless requested otherwise by the participant, I used the nonwork e-mail address for all correspondence and information pertaining to the study. After receipt of a nonwork e-mail address, I sent the individuals information about the study, an invitation to participate in the study, and a notice of informed consent. Informed consent included the purpose of the study, what to expect as a participant, potential benefits and harm, and the ability to withdraw from the study at any time in order to promote ethical values (Patten, 2014). In addition, participants were informed of their right to privacy and the confidentiality of their responses and that alphanumeric codes would be used to protect their identities. I informed participants that they would be debriefed at the end of the interview and given a tentative date when to expect a copy of the transcript of their interview to proofread and confirm. Participants were also informed that all information and details of correspondence about the study would be maintained and stored on a password-protected, home computer. Finally, I explained my role in the study as well as at the local college. Participants were informed the semistructured interview would take between 30–60 minutes.

Working relationship. I teach classes at the local college and I am a colleague of the participants in the study. I have no supervisory or administrative power over the careers of participants. Furthermore, faculty voluntarily chose to participate in the study. Each participant selected the day, time, and location of the interview in order to feel at ease during the interview (see Elwood & Martin, 2000).

Data Collection

I used a qualitative case study design to gather math instructors' views and experiences using MyMathLab in the traditional, in-seat math classroom. The research questions for this study were constructed on a premise that "focuses on context," "takes place in the natural world" and "is emergent rather than tightly prefigured" (Marshall & Rossman, 2006, p. 3). When conducting a qualitative study, the researcher is considered the "primary instrument for data collection and data analysis" (Merriam, 2002, p. 5). For this study, I collected data through face-to-face, semistructured interviews. I also requested and used aggregated student data to add credibility to the results.

Interviews. Appendix B contains the interview protocol used for this study. I conducted individual, semistructured interviews with participants to gather faculty viewpoints. The semistructured interviews consisted of 13 open-ended questions and follow-up questions necessary to address the research questions. I asked the first question to verify that MyMathLab was used in the class and to give participants time to reflect on their experiences. I asked the last question to give participants an opportunity to add comments or modify answers already given in the interview. The remaining 11 interview questions were designed for participants to share their views, insights, experiences, and approaches to teaching the in-seat math courses using MyMathLab. Each interview session lasted between 25 to 40 minutes.

Notebook. I maintained a notebook (field journal) throughout the study. Schwandt (2001) stated that qualitative researchers are encouraged to maintain field journals to reflect on "potential sources of bias and their control" since the researcher "is part of the setting, context and social phenomenon he or she seeks to understand" (p. 224). Throughout the interview process, I recorded details of each interview (i.e., date, time, and setting of the interview as well as observations and reactions of the participants during the interview). After the interview ended, I reflected on the interview and wrote personal notes on my thoughts and feelings in the journal. These notes were used to later recall details about the interview. By reviewing personal notes taken during and after the interview, I minimized my personal bias. Maintaining a notebook added dependability and confirmability to results of this study.

Aggregated student data. I requested and received aggregated student data for the two courses from the local college's institutional research department. Course specific details were provided on an Excel spreadsheet, and anonymous student comments, related specifically to the use of MyMathLab, were provided on a second spreadsheet. I used this supplementary student data to add credibility to the study by confirming or countering participants' responses.

Data collection process. I used my Walden University student e-mail account for corresponding with participants in this study. Interviews were scheduled at a time and place agreed upon with the participant. Three interviews were conducted in-person in rooms at the local college, and four were conducted through Google Hangout. I used my personal iPhone to audio record all interviews. All interviews were typed verbatim on my home computer after the interviews ended. Personal notes written at the time of the interview were also typed on my home computer after the interview ended. I am and was the only person with access to the password-protected, home computer and the data stored on it.

Systems for tracking data. Excel spreadsheets were used to track data and maintain details of information related to the study. One spreadsheet contained *faculty information*, one spreadsheet contained *administrative information* (correspondence details), and one spreadsheet contained *aggregated student data*. A fourth spreadsheet was created to separate the alphanumeric *codes* for faculty used in data analysis and reporting.

The faculty information spreadsheet included the instructor's name, semester of course (fall or winter), course(s), section number(s), class size, and location. Columns were created for the total number of sections taught each semester, total number of students taught each semester, total number of sections for the two semesters, and total number of students for the two semesters. This information was used to rank the priority for contacting instructors for possible inclusion in the study. The administrative spreadsheet was linked to the faculty information spreadsheet and contained administrative details of all correspondence pertaining to the study. For example, the instructor's name, work e-mail address, nonwork e-mail address, dates for initial, repeat, and response e-mails, comments, informed consent form date (sent, and accepted or not), interview related information (scheduled date, time, and location), phone number, if given, and preferred method of communication.

The aggregated student data spreadsheet contained the course, section number, name of the instructor, location, students registered (finished course, excluded withdrawals), number passed (higher than F), number failed (F, NF or NC), pass rate by section (pass/registered), number enrolled (started, includes withdrawals), number withdrawn, withdrawal rate (withdraw/enrolled). Aggregated grade counts, by course, were also included on the spreadsheet. After participants were selected, rows were added to separate course data by semester (fall 2016 or winter 2017), by course (elementary algebra or intermediate algebra), and by participant or nonparticipant status (i.e., all classes of the seven participants, and all classes of the nonparticipants).

Role of the researcher. My role in this research was to conduct interviews, record the data, obtain aggregated student data from the college, analyze data, and report results. I did not teach any of the in-seat math classes included in the study. The faculty do not report to me and I have no power or control over their careers. Any instructor who taught either algebra course online, at any time, was not included in this study. For full disclosure, I support the use of computer-aided instructional software programs like MyMathLab. Marshall and Rossman (2006) stated the researcher should view "phenomena holistically" and be "sensitive to her personal biography and how it shapes the study" (p. 3). I respect the opinions of those who do not support or use computer-aided software programs, and I accurately reported findings of the study. I consciously checked for any personal bias that may have surfaced during any stage of the study.

Data Analysis

The data analysis process consisted of organizing the data, transcribing the data, analyzing the data, examining and coding the data, generating themes, interpreting the identified themes, and reporting the data (Creswell, 2012). Based on these guidelines, the study was structured to capture responses that reflected the participants' views on using MyMathLab in the in-seat math classroom in order to make meaning of the data. Information collected from participants through semistructured interviews was examined during data analysis. After participants reviewed and verified their transcripts, each transcript was read separately, many times. The text of each transcript was divided into segments of color-coded information in Word. The color-coded sections were then copied into a separate document to sort through and identify common, recurring ideas that emerged for each question. Eventually, the color-coded sections were labeled with words (i.e., codes, that represented the general idea of the section). This process was repeated until no new codes arose. I used an Excel spreadsheet and Word documents to track the multiple codes, by question. Through multiple readings, numerous codes were reduced to a few themes, using a bottom-up approach until no new themes emerged. Quotes from the interviews were then included in the themes. Throughout this process, the original transcripts and my personal notes were reread many times to assure that codes accurately represented the participant's intention. All data were processed on my password-protected home computer and backed up on an USB drive.

Ethical Considerations

An IRB request was approved by Walden University before data collection began. The local college provided a letter of approval and data use agreement in support of the Walden IRB. Throughout the study, I was respectful of the collaborators at research site. I also maintained truthful communications and interactions with all participants. They were informed of the purpose of the study, assurance of confidentiality, and the role of the researcher. In addition, I used ethical interview practices, honestly reported findings, collaborated and shared information with participants.

Strategies to Ensure Trustworthiness

Strategies were employed throughout the data collection and data analyses stages to ensure trustworthiness. Trustworthiness is a level of quality in the research that makes the study and its findings important to readers (Lincoln & Guba, 1985; Schwandt, 2001). Trustworthiness is necessary to make the investigation believable. Trustworthiness strategies include credibility, transferability, dependability, and confirmability. Credibility, dependability and confirmability were achievable in this study; transferability may not be possible due to the fact that the study was based on one institution. However, Schwandt (2001) suggested that sufficient details are included so others may notice a similarity between the case studied and a situation to which the findings may apply.

Credibility. Triangulation was the major strategy used to ensure the credibility of the study. Interviews with faculty, the primary data source, were triangulated with students' data related to the use of MyMathLab. Student data were requested from the institutional research department at the local college. Data included student comments specifically related to usage of MyMathLab on the end of course evaluations, course completion rates, course withdrawal rates, and average course grade. Student comments were quoted anonymously; no student identification, section, or instructor were disclosed. Students were not contacted or interviewed. All data were collected and reported at aggregated level so individual students could not be identified. All information was handled in a confidential manner and no information was disclosed on any student, section, or instructor. Student data were used to support data from faculty interviews, specifically Research Question 1 (RQ1). Alphanumeric codes were used on student data and aligned with faculty information. Information was summarized on an Excel spreadsheet and stored on a home computer. In addition, member checks were used as a credibility strategy. Each participant had the opportunity to review the transcription of the interview for accuracy and provide feedback or corrections on the transcript.

Dependability. Personal notes were maintained throughout the research process to ensure dependability of the study. After completion of each interview, I took time to reflect on the event. I noted my thoughts and feelings as well as general observations about the participant during the interview session.

Confirmability. Complete and accurate records were maintained throughout the study to establish an "audit trail" of the research to ensure confirmability. To guarantee the results were verifiable, I continuously monitored information to avoid biases. This was accomplished by listening to the interview, reading and rereading the transcripts to be certain they reflected the participants' opinions and were accurate.

Discrepant cases. Morrow (2005) stated that "providing discrepant case analysis involves finding discomforting instances of a phenomenon and comparing them with confirming instances in order to understand the complexities of the phenomenon" (p. 256). Morrow suggested that discrepant case analysis should be repeated so the researcher can "revise key assertations or categories until they accurately reflect the experiences of participants" (p. 256). Discrepant cases were noted, analyzed, reported, and explained in conjunction with the findings in this study.

Limitations

The limitation of this study is that it cannot be fully generalized to the larger population since it was based on one institution. In addition, the findings reflect the views of faculty who chose to participate in the study. The findings do not reflect views and opinions of faculty who may not support the use of MyMathLab, did not use MyMathLab in their courses, or may have taught either course online. Therefore, the findings may not accurately capture all the possible benefits and challenges of using MyMathLab in lower level, in-seat math courses.

Data Analysis Results

After receiving IRB approval from Walden University, and approval from the local college, faculty were identified, contacted and invited to participate in this study. The seven faculty who accepted the invitation were interviewed on their opinions regarding the use of MyMathLab in two lower level, traditional in-seat math courses. One instructor taught elementary algebra courses only, three instructors taught intermediate algebra classes only, and three instructors taught both courses during the school year. Therefore, four participants represented elementary algebra courses and six participants represented intermediate algebra courses. Data were collected through semistructured, face-to-face interviews. Interviews were audio recorded using my iPhone. Personal notes were written to capture my observations and feelings at the time of the interview. Verbatim transcripts of the interviews and personal notes were typed on my home computer after each interview ended. All participants reviewed verbatim transcripts to approve or clarify information through member checking. After all transcripts were verified, I read each transcript separately, many times. The text of each transcript was divided into segments of information, and the information was labeled with codes. Through multiple readings, numerous codes were reduced to a few themes, using a bottom-up approach, and 3 themes and 5 subthemes were identified. A summary of findings and answers to the research questions will be presented in the following section.

Findings

The purpose of this study was to discover faculty observations on using MyMathLab in two lower level, in-seat math courses for student learning. The themes that emerged from the analysis are presented in Table 1. The themes include the importance of addition practice outside of the classroom setting, immediate feedback to students after completing homework assignments, and ownership required by instructors and students. The relationship of the themes with the research questions and the justification for selection of the themes are presented in the section below.

Relationship of Themes with Research Questions

The major themes that emerged from the analysis were additional practice, immediate feedback, and ownership. The number in the parentheses next to the theme and subtheme indicate how many participants mentioned the category. The themes are relevant to the study's problem and they provide answers to the research questions for this study. The relationship between the themes and research questions are presented in Table 1.

Table 1

Themes and Subthemes

Theme	Subtheme	RQ1	RQ2
1. Additional Practice (7/7)			
	1a. Support for using MML (7/7)	x	x
	1b. Frees/saves time (7/7)		x
	1c. Technical issues (7/7)	x	
2. Immediate Feedback (7/7)		x	x
3. Ownership (7/7)			
	3a. Faculty owned (6/7)	x	x
	3b. Student owned (6/7)	x	x

Research Question 1. The first research question explored faculty perceptions regarding the benefits and challenges of using MyMathLab to support students in understanding math concepts. Participants stated the benefits of using MyMathLab included opportunities for students to practice problems outside the classroom setting, with immediate results and feedback, more prepared and engaged students in the classroom, improved performance on assessments, and better grades. In addition, participants felt that students became more self-sufficient and independent once they learned how to use the Help features to understand why an answer was incorrect. Participants and students recognized the benefits of accessing MyMathLab anytime, anywhere. Student performance data in Table 2, Table 3, and Table 4 support participants' views on the benefits of using MyMathLab. However, it is not possible to know if the slightly better performance was due to the use of MyMathLab, more attention by faculty on the delivery and alignment of learning objectives with assignments, better prepared students, or a combination of all these factors. Participants stated the challenges of using MyMathLab included formatting answers, connectivity, and customer support. However, these issues were often addressed by faculty working directly with students. Another issue for faculty was finding ways to motivate students who were less inclined to complete homework assignments. Ensuring students earned points for completing homework assignments may help improve results and continues to be examined each semester. This will hopefully lead to improved persistence and retention rates.

Research Question 2. The second research question explored faculty perceptions regarding the use of classroom time for teaching course content because of inclusion of instructional resources in MyMathLab. Participants stated that lecturing remained the primary means of instruction in the classroom, and MyMathLab was used for assigning homework problems. Participants in the study considered MyMathLab beneficial since it provided students with automatic results and feedback. These features enabled students to receive immediate instruction and learn much of the basic information on their own. In addition, the automatic grading and feedback provided by the program gave faculty more time to work on other course related duties (e.g., planning lectures, creating worksheets, and reviewing student performance through reports offered through MyMathLab). As a result of using MyMathLab, faculty had more time in class to explain difficult concepts, or work through challenging problems. In addition, participants noticed a difference in classroom participation and performance for those students who completed their assignments. When results of pretests and item analysis were used, lessons were structured to focus on concepts that students needed to learn instead of basic topics that students already knew.

Supporting Data for Themes and Subthemes

The themes and subthemes listed in Table 1 were identified as factors associated with using MyMathLab in elementary algebra and intermediate algebra classrooms. Direct quotes from interviews with instructors as well as student data from end of course evaluations are included with the discussion of the themes to provide richness to each topic. To protect the identity of faculty, a letter and number are used to indicate each of the seven instructors who participated in the study (e.g., participant number: P#) P1, P2, P3, P4, P5, P6, and P7. Student comments are referenced as "student" only since comments were shared anonymously to protect the identity of the student as well as the identity of the student's instructor. Further, there was no way of knowing if one student wrote more than one of the comments. It is possible that student comments could have been associated with any section of the traditional in-seat elementary algebra or intermediate algebra classes taught during the 2016–2017 academic year, not exclusively from the sections of the participants in the study.

Throughout the data analysis process, I often reviewed my personal notes to reflect on the context and tone of the participant during the interview to reduce any personal bias or misunderstanding. I noted that participants typically went beyond classroom instruction and helped students after the class period ended. Participants routinely mentioned the value of in-seat instruction for student learning as well as value of the supplemental support provided by MyMathLab. In general, the use of MyMathLab was not viewed as competition to in-seat instruction or replacement of faculty. Rather, participants regarded MyMathLab as a resource to support student learning outside the presence of the instructor. At the end of this process, I felt that all participants were genuinely interested in doing the best job possible to share their knowledge and passion for math with their students. The themes, along with direct quotes, are presented in the following sections.

Theme 1: Additional Practice

All faculty in the study confirmed that MyMathLab was used for assigning homework. Replacing paper and pencil homework with online, computer-based, or web-based homework has been used at other colleges and universities (Speckler, 2012; Stewart, 2012). The first theme that emerged from the study was support for additional practice outside of the classroom. This theme included three subthemes. The first subtheme was endorsement from faculty on the importance of practicing math concepts outside of the classroom. The second subtheme was saving time for faculty that could be used on other duties related to teaching. The third subtheme included technical and technology related issues that were encountered by students and faculty using MyMathLab.

Subtheme 1a. Support for using MyMathLab. All participants stated that practicing problems outside the classroom setting, in the form of homework or worksheets, was beneficial for learning math. Bonham and Boylan (2011) stated, "Students actually learn math by doing math rather than spending time listening to someone talk about doing math" (p. 6). P2 voiced similar beliefs, "Yeah, my little mantra is, that I always use in my class, is that you learn math by doing math, and that it's crucial to practice, practice, practice." P7 mentioned, "Good students are up to date with their

MyMathLab homework…you know they are actually putting their required time in to practice."

After in-class lectures ended, faculty in the study assigned homework to students in MyMathLab. A student commented on the opportunity of "going over problems we struggled with in class." When homework was completed, students knew immediately if their answers were correct, without waiting until the next class period. P6 commented that, "because they [students] got that feedback right away, they didn't have to wait for me to grade everything because it was graded as they submitted it."

Other participants commented on the importance of practicing problems away from the classroom for learning the concepts discussed during class. P1 recommended:

> …and practice makes perfect. For one hour of our lecturing, I tell them, we usually recommend two hours of home study. How do I know if I know the quadratic equation and how to solve it? Well I can solve it on my own. I'm a student, without the instructor, so with the story problem… homework is very important. Homework is very important."

P6 had similar views on practicing problems for increased learning, "that repetition of doing the same concepts over and over and over greatly increases memory of the material and overall scores, and it's easier for them [students] for quizzes and tests having done multiple problems." P3 discussed the availability of additional resources for homework support when students were in a different setting:

> …by having students do homework outside of class, [it] might be a couple days, or a couple hours after class, so this gives students the opportunity to practice the

> material in a different setting, and if they are having problems, they can be addressed [by MyMathLab].

P4 shared a similar view about the importance of working through the homework in elementary algebra:

> It [elementary algebra] is just about repetition. Well, not just about repetition. They [students] need the repetition and they need to do it not just in class…it [MyMathLab] gives them, it gives them another… I don't know what the word is, another platform for practicing. So, they have paper and pencil in class, they use paper and pencil on my in-class worksheets, and they have the computer. It has more built in resources with the *See an Example* and things like that.

P5 agreed that practicing homework improved student performance and went a step further to gather data on the efforts made in completing homework assignments and performance on tests. The instructor reported:

> [Homework] is extremely important. In fact, that's one of the things I do after my first test…is, I do a little bit of a correlation between those that got their homework, and percentage of homework done, to their test scores to try to reinforce to my students, who are not doing their homework, that they should be doing their homework.

Gönül and Solano (2013) also suggested it was beneficial for students to practice homework problems before taking exams. Toppino and Gerbier (2014) commented about the importance of practicing new material for learning to occur, "The hallmark of practice is repetition, and *effective* practice occurs when repeated experiences result in transferappropriate learning" (p. 114). Even though faculty responses on using MyMathLab for homework were positive, student comments captured on the end of course evaluations were mixed. The students' comments on using MyMathLab are presented below.

Positive student comments. Positive student comments were obtained from end of course evaluations from the fall and winter 2016–2017 academic year. Several comments are listed below. Additional positive comments are included throughout this report:

- The homework wasn't [was not] too hard and in my math lab there were options to help you if you didn't know how to solve the problem. The professor taught us exactly what we needed to complete the homework, quiz and test.
- Notes were given to us [and the] professor would go over questions from homework or tests we've [we have] taken.
- The examples, MML videos, and instructor's teaching style.
- All of the group work and in class handouts were very helpful. Being able to interact with the material time and again [in MyMathLab] helped me to be able to remember it easily when the tests came.
- I liked the My Math Lab homework instead of having to write out the homework and turn it in.
- The online homework was nice because it was immediately graded and it showed examples. That, along with the in-seat teaching, was really beneficial for me. Instructor was great at teaching the material in a way that everyone could understand.

Negative student comments. Negative student comments were obtained from the end of course evaluations from the fall and winter 2016–2017 academic year. Additional negative comments are included throughout this report:

- Take away the online homework would rather have worksheets. Instead because it's not an online class. The mymath lab was so inconvenient.
- Eliminate MathLab, it (is) not helpful with the material."
- The teacher was great and very helpful! But I did not find MyMathLab.com to be beneficial.
- Do not care for the math lab.
- Get rid of my mathlab it is awful besides that the court [course] is fine.

The student comments were not a surprise since faculty had shared similar student remarks during interviews. Consequently, faculty mentioned that it was sometimes a challenge to motivate students to complete homework assignments in MyMathLab. All faculty who participated in the study responded to students' concerns with understanding and a willingness to work with students' learning preferences. P3 commented that "some students say they prefer more of a traditional paper homework." A few faculty also suggested that preference for completing homework on paper might be age-related. P4 stated:

> Some [older students] don't like doing math on the computer. They want a paper, a pencil, and an eraser and they don't like trying to put the information in, and they're not comfortable with the formatting. But they usually get there. They just would rather have a textbook and a problem and do it on the paper.

P2 also considered that age might be a factor in not wanting to use MyMathLab for homework but pushed students to keep trying to work through the assignments in MyMathLab. The instructor explained:

> I find that some of the older students, especially in my evening classes, they like paper books and paper homework like me [chuckle]. I mean that's my generation too. So, they don't like it as much but they do it. But, you know, they do it.

P3 had similar experiences and shared tactics for helping students:

> We some have older students who may not be as computer literate, are not as willing to accept doing homework on a computer. They feel they need to be taught to, they are being taught. But they don't want to do it on a computer. So, some of that I think is just a computer phobia, "I don't like computers" but once we show the resources, those students are the ones who need the most help, usually feel, "Yeah, this is a good thing."

P1 was empathetic and often gave students the option of submitting hand-written homework. The instructor stated:

> About 20% of the students say I tried it, and I prefer this and not that. But I tell them, "Guys, if you don't like how it's structured you can write down the problem, do it in writing, and bring it to me and we will take it from there." But then again, the majority of students do like it. Because MyMathLab gives them extra chances to repeat it, do it, and to succeed.

P1 also accepted the possibility that some students may not be able to learn from working on computer assignments. The instructor explained:

> Some students, though, very rare, cannot grasp the material from the screen of a computer. Cannot do it like on the screen. It happens also but this is like a very rare event. Over the several years I've been teaching with MyMathLab it has happened only two or three times. OK…it is very rare. But to those students who cannot do it I say come to my office hours, or for tutoring hours, and we will do it with you. That's what we do.

Although student opinions were mixed on using MyMathLab for homework, all faculty who participated in the interviews stated that MyMathLab provided instructional support to most students. The *Ask My Instructor* was often mentioned as a favorite feature. Further, the automatic grading feature gave faculty more free time to work on other course related duties. These thoughts are presented in subtheme 1b.

Subtheme 1b: Frees/saves time. All participants appreciated the automatic grading feature in MyMathLab because of the amount of time it takes to manually review homework problems and give solid, instructional feedback. P4 stated, "Less grading for me." Participants used their free time in other ways. P5 commented that "it gives me more time to spend planning my class because I don't have to spend time to correct the homework." P6 shared, "I do feel that because of MyMathLab, I have more time to explain certain concepts that I've never had time to do before. I have greater time to go into more details than I ever did before." This aligns with results from other studies on the benefits for faculty and students.

Faculty appreciated saving time by not having to grade homework. In addition, faculty were provided instructional resources in MyMathLab that could be included during classroom lectures. P7 explained how the automatic grading and the resources were beneficial. The instructor stated:

> Well for me, it's that I don't have to grade. And I can also use the homework for reviewing, and perhaps relieve their [students'] fear of technology because I know they won't have the same problems on their actual homework. Because every time you click there are different numbers but similar problems. And for students, for them, I mean it's better than a paper homework. I used to grade those paper homework [problems], and there's a lot of math around the grade. And when I grade, I would just see if it is done, if it makes sense and looks good. Or perhaps I'd pick one problem and whatever they have written, if it makes sense, I say if it looks good. But even looking at one problem, it takes you a while. The main benefit for students is that it [MyMathLab] tells them whether they are correct or not. Knowing that their answers are correct provides reassurance. They like to know if their answer is correct had you given them paper homework, odd numbered problems. And here, not only would they know if it's correct but if something is wrong, they will get hints and instructions, which I think is really beneficial for students.

P2 also valued the instructional materials and used them during lectures:

> … I like to put the eBook up on the overhead. So, like if there are steps to solving a problem I don't have to hand-write it out on the board. I can just have that up and do problems next to it – so that saves some time.

P7 used the multimedia resources when lecturing so students would know about the videos and refer to them when studying, without the presence of the instructor. The instructor showed students where they were located for reference. The instructor said:

> Also, I like to show videos, and I jokingly tell my students as much of a good-looking guy that I am, you may benefit even more from the video. You can stop the video any time, while it may not be as easy to stop me. I do show videos or animations when it's appropriate, and I also show how many ways to get help when you do your homework.

Finally, availability of the eBook in the course provided faculty with an opportunity to have students work through problems during the class if they were unprepared. The instructor explained the convenience associated with using online resources. P1 mentioned:

> Well, it helped, it saves my classroom time…it saves my classroom time. First of all, sometimes students forget or don't have a textbook, OK. But I'm teaching with MyMathLab and this is not an issue because I tell them, you know, we have computers and you can get logged in. And I have an overhead, and I show them where it is in the book. I show them everything.

Although all faculty felt that most students benefited from using the resources in the program, there were some issues. Technical issues associated with using MyMathLab are presented in the following subtheme.

Subtheme 1c: Technical issues. Technical issues related to using MyMathLab included formatting answers, technology, and consistent customer support. The most common problem was how MyMathLab required answers to be entered, which was also reported in a study conducted by Holt et al. (2012). One student commented on the end of course evaluation that, "The online homework was tricky in that you had to have the exact answers." Another student wrote that, "The online mathlab/ebook did not always work correctly."

Formatting answers. Faculty recognized formatting answers as a challenge and patiently worked through situations as they arose. P6 explained that, "sometimes, for me, teaching how they [MyMathLab] want the formatting for the answer was needed." P5 commented, "I usually tell them [students] in those cases to let me know and I can see what's going on and figure out exactly why it's marking it [the problem] wrong, if I need to." P5 also stated that it may take students a little time to get used to using MyMathLab but "this is now the end of week 5, and they [students] seem to be, have…you know, caught on how to do that. But that, that was the first thing that they had to get over that hurdle."

However, sometimes faculty had to learn how answers should be entered in MyMathLab in order to explain the format to students. P2 stated:

> Learning how the program wants things entered…They [students] may put x = 5 and they'll get frustrated when then realize they only need to put a 5, or they [MyMathLab] want a fraction, not a decimal. Or they [students] may need to put an ordered pair enclosed in parentheses. So just getting used to how to enter things is frustrating to them [students]…. Probably one thing, which I'm trying to do more of myself, is to actually go through the homework myself before class

> and enter answers just so when I get to class, and in my lecture, I can incorporate this is how MyMathLab will want you to enter it. I've done that a bit more and I think it is helping students with their frustration level with it. It's just one little thing that I've been trying to do and would suggest that would be helpful to other teachers.

Other instructors shared similar formatting issues using MyMathLab. P5 commented:

> Probably the biggest issue or drawback that I have is sometimes how they want the answer formatted. And if they [students] don't format it the exact way that MyMathLab wants it to, it marks them wrong. I think part of it is that they [students] may have a challenge. Number one, entering answers, or when it's graphing, or being able to move and graph it correctly. They [students] have a challenge making sure it's in interval notation. Where they can work the problem, they can't get the answer in.

Another instructor mentioned an incident where the answer to a problem was marked wrong but the student and instructor did not know why. P4 explained,

> Occasionally, with the formatting of the answers. I had a student, she actually wasn't my student, it was during team tables and she was in intermediate algebra. And she's like, "I don't understand why they're [MyMathLab] is telling me this isn't right." And, so, I went through it with her and I thought it was right, and I said maybe they want it like this. It was like a negative x plus y equals a negative number and they want all the signs switched so it's a positive x minus the y equals the positive answer. And, so, she got it wrong. And I'm like, clearly, I'm a really

> big help [chuckle]….and I said, "I would never in a million years thought that that's what they'd [MyMathLab] wanted." I said, "I don't know, maybe they said that somewhere that that's what they wanted or something." But I would never have caught that. So just again formatting, it's not a big deal, you know.

Faculty tried different approaches to explain to students why precision was important when answering questions in MyMathLab to help reduce student frustrations. P3 related formatting answers in MyMathLab to a life setting. The instructor said:

> So, the challenge is to help the student who is frustrated. That they're trying to enter the answer, and that's probably the biggest problem, is entering the answer the way MyMathLab wants it answered. It's a computer program so if they [MyMathLab] ask for an integer or a fraction and they [students] enter it as a decimal, they get it wrong. But I make that as a positive thing since that's what they asked for. And I say, "In your future job your boss will ask you for something in a certain way, if you don't do it the *certain way* then they [employers] are not going to be happy."

Technology. Even though formatting answers was a technical challenge, technology related issues also occurred. P6 explained that,

> I have had students who said they have not had internet at home so they are not sure how they'll get the homework done at home. I do tell them the campus has access to computers. But that was only an issue like the first semester that we started using it in-seat. Since then I haven't had that issue too many times.

Another instructor shared an experience with a student who did well in the course but never worked in MyMathLab. P7 shared:

> I had this student last year who I don't think she wanted to be in MyMathLab. She tried to log in, and then she couldn't get anyone to talk to her. And I kept calling them [Help Desk] and I gave her some kind of code. She was supposed to return the call within a week and she didn't. So, when she didn't call [the Help desk] in a week, she tried to call again, and, by the time everything was to be resolved, she just was done with the course. She had no problem that she paid for something she didn't use. And she was actually a good student; she got like 98% in the class. But I don't think she should have been in the class because she had enough credits and could have bypassed this course by taking the exam. She was actually coming to every class so the commitment was not a problem.

On the other hand, some students like using technology for their classwork and would prefer having more mobile power than currently available. P1 commented on student expectations and explained the current technology situation:

> Look, right now, especially in the 21^{st} century, many students prefer to work through the computer. OK. And I think it's a good thing. Some of them even try to use their phones. But I say, "Guys, you need to use the big screen."

Customer service. As with any technology, technical support may sometimes be needed. Even though consistent, high quality customer service is expected, it may not be received. Examples of customer support were shared by faculty during the interviews. A positive experience was reported by P3:

> … while MyMathLab has some great support for technology, they can't predict everything. And occasionally, sometimes with the MACs, they need a little tweaking. But I provide the tech support, Pearson has a great tech support, and generally they [Pearson] are able to support the problem, unless it's something on our end. So, I guess the biggest challenge is occasionally not having the technology available, especially if it's an athlete and they're in a hotel somewhere and their WIFI might not be the best. But then it's computer support. But again, if students are willing to take the time to contact tech support or me, they will, you know, they will be able to move on. Again, it's just that effort…any issues have always been dealt with by tech support, or the coordinator of the classes, and so other than a couple hiccups here and there, it's been a great, a great use.

However, P7 had a different experience. The instructor commented:

> The customer support is horrible. And you know, some of these students like, just need to get pushed in the right direction. Perhaps watch a YouTube video. When a technical problem arises, students cannot get a live person on the phone. It took me forever once to resolve a problem in MyMathLab.

P7 added,

> Sometimes they [students] mess up, students mess up something and they insist the system did something to them and they couldn't reach any customer support…and what do you do? They lose a week or two. That's the biggest [challenge], but I think they [Pearson] fixed this problem.

Even with the technical challenges encountered by students and faculty, participants considered the immediate feedback most beneficial for students.

Theme 2: Immediate Feedback

The second theme that emerged from the study was immediate feedback. Although this could have been a subtheme of the additional practice theme, the quality, variety, and quantity of available resources in MyMathLab were considered important for student learning and worthy of theme status. Studies have indicated that immediate feedback is important for motivating students to learn new information on their own and become more confident. Without a clear explanation and corrective feedback, just having a problem marked "incorrect" would have less meaning for students (Epstein et al., 2002). A student commented on an end of course evaluation, "I really enjoyed how well everything was explained and the help received if needed."

All participants acknowledged value in students receiving immediate feedback when working through homework assignments, outside of the classroom setting. These findings are consistent with results from research conducted at other universities where technology was used successfully. P2 stated, "I haven't heard them [students] complain about doing homework because I think they like all the Help features as they go." P5 mentioned that "students have also commented on the immediate feedback."

P7 believed that the positive reinforcement messages, in addition to the correctness of answers, were beneficial. The instructor stated:

> And not only do they [MyMathLab] grade homework but they tell students when they're correct or not. I say getting the correct solution is…I say…is like getting

> love, being loved. They [MyMathLab] tell them [students], "Good Job!", "Excellent!", "Nice Job!", always in a different way.

Faculty also discussed the importance of promptly responding to students when contacted for assistance through the *Ask My Instructor* feature. Faculty commented about providing support to students as they worked through their homework. P5 stated, "I think the biggest benefit is the immediate feedback that the students get. I really think that helps them." The Help features provided instruction to students when they needed it most. P6 mentioned that "a lot of students like it [MyMathLab]. They like that immediate feedback, right away." P7 stated "that there are so many resources to help students." P4 also approved of the immediate feedback and Help features for students:

> I really like that feature for them [students] so they don't get stuck on a problem and they can get help right away…. And those who smart about it know to use the *Ask the Instructor*, *See an Example* and *See a Similar Problem*, which are useful.

P1 appreciated the ability to interact and connect with students while they were working on assignments and in need of assistance. P1 offered a sincere "anywhere" and "any time" approach to teaching:

> But in case they [students] need help they can always hit the button *Ask My Instructor* and I will be e-mailing them, calling them, or saying I will be seeing you a couple of hours in my office to work it through. Or I will show them a similar example to push them to succeed in homework…Also, MyMathLab helps you by, let's say students cannot do it, the homework. It [MyMathLab] gives you…you click this button *Help Me*, or *Similar Example*. It literally walks you

> through…it really walks you through, and a more or less self-sufficient student can do it with or without an instructor. And when you hit the button, *Ask My Instructor*, immediately, I've gotten e-mails. I don't know about other instructors but I, myself, I'm online 24/7 because I have my cell phone. OK, and I can even, with my cell phone, I can immediately sometimes answer questions right away, on the spot. On the spot! That is great…So you mentioned this word once: good presence. I try to have good presence because students should know their instructor is always there for them, especially if they do part of their work online. Because the worse thing is what? Loneliness…remember that song, *My loneliness is killing me?* [Instructor starts singing a tune.] So, when they're alone, like a mom with three or four children somewhere doing math, and no one can help her. And here you go, I'm there. She can click the *Help* button, *Similar Example, Ask My Instructor* button, and I'm there. If, in case, my answer via e-mail is not understandable, I can say, let's say for example, "Student A, read page this number or that." Or I can call there right now and say, "Student A…" I'll say, "Student A, pick up the phone. It will say 'Private Number' but it's not a sales call, it's me. I will walk you through it." And that's it….

P2 also valued the available Help features in MyMathLab for instructing students in learning the concepts and keep moving forward. The instructor stated:

> One of the big things I like about it is that they [students] can get immediate help when they're doing their homework with the options of seeing a similar problem, or seeing the problem done step by step, or click *Ask Your Instructor*…[students]

> have less frustration, and they're able to move on because if they are able to get feedback and learn they can go on to the next step because it keeps building, and if they don't get this, they can't do anything after that if it's building. So, I really like that aspect and the videos and the eBook and all that.

P3 shared a similar view about the benefits of the Help features in MyMathLab and stated:

> I think students are learning the materials a little better. When they have paper homework they may do it at home. They can seek tutoring but if it's a time outside of regular tutoring, if they get stuck, they're stuck. With MyMathLab there are many resources that the students can use for them to complete a particular problem. So, I think it puts the onus on the students to actually seek out help. And the help that they seek is available, via the various features that are incorporated in MyMathLab. So, I think student learning is a little better than with a traditional paper homework assignment.

P5 explained that students often completed assignments at all hours and were supported by the features in MyMathLab. The instructor observed:

> Some [students] that were very leery of using online homework came to appreciate it, and what they appreciated was the fact that they can be corrected early. They don't have to wait until I've corrected it and given it back to them. They can learn and correct themselves within their homework. They're told immediately they are getting it wrong and then how to do it right. They like that immediate feedback…they can work on it at midnight, because students stay up a

> lot later than I do. But they can work on it at any time, and they know they can… we use that, Help feature that they e-mail the professor from that particular problem. And they like that…I've had students in the past, when I have taught it without using an online homework, that have basically gotten all their problems wrong on a homework assignment because they missed a concept and I didn't get back to them until, probably you know, another four days because you have turn it in, correct it, maybe three days, and so I can't correct them in a timely fashion. This gets it done immediately. So, as long as students don't put off homework, they get help. I, I think it's a better way to correct them and get them on the right path than doing it hard copy.

However, one instructor shared a concern about not having a better gauge on what students learned. P2 stated:

> I think learning has been affected in a good way by being able to get immediate help and not being frustrated, waiting until the next class period to get help. And, therefore, I think it has affected learning in a negative sense in that they don't have to write problems down, and so maybe, [if] they don't write down the way, they don't know how to do it. Like I have a lot less students coming to class saying, "I didn't know how to do this problem or that problem" and asking for help. It could also be that they are able to get help right away I suppose. So, I don't know…[chuckle]

Providing supplemental support to students outside of the classroom was a major reason for selecting MyMathLab. All faculty in the study considered the ability for students to work independently, and receive immediate instructional support when needed, were important factors for student learning. Participants and students at the local college appreciated the immediate feedback for remediation and learning and was consistent with student feedback from other studies. In addition, MyMathLab provided students with the ability to select the time and place to study. A student comment on the end of course evaluation indicated appreciation for "math lab being easily accessible." This comment supported an observation made by instructor P1 during the interview:

> … yes, the greatest benefit is this, as I said, you can access the eBook, and access, do the homework at any place. You don't have to have the book with you. You can do it in the library, you can do it outside, etc.

Theme 3: Ownership

The third theme that emerged from the study was ownership. Ownership included two subthemes as they related to student learning in the in-seat classroom. The first subtheme acknowledged faculty as the subject matter expert and responsible for delivery of course content in a way that enabled student learning. The second subtheme recognized student responsibilities in the learning process, which includes students going to class prepared to participate in activities and investing time in practicing new information outside the classroom. At the end of this section, data are presented on student performance in the courses where MyMathLab was used and compared to the courses where the use of MyMathLab was unknown.

Subtheme 3a. Faculty owned. In a way, faculty became learners as well as the subject matter expert in the course. MyMathLab provided faculty with new resources to incorporate in their classes. As P1 stated, “I actually became a different person in terms of technology and computers because of teaching online and these classes using MyMathLab. It is good to develop and move forward, you know.” Faculty invested time reflecting on teaching the course objectives and student learning. Faculty examined their teaching styles to make the most of their time in the classroom. P3 commented, “I think we always have to look at the way we teach.” P2 observed, “. . . still trying to figure it out. Always adjusting as teachers.” Without the need to grade homework assignments, faculty were able to spend time analyzing student results and trying different techniques in teaching to support student learning. P5 explained, “it has just freed me up to do a little bit more planning and instruction.”

P3 made similar comments:

> Well it makes me, as the professor, make sure when I assign the homework, which is standardized for everyone in the system, certain that I’m addressing those issues. It makes me, I have to be… more on point. Making sure I’m covering the material that I’m giving them homework over…Oh, I forgot to do that, or make sure I show the students where to find the Help. Once in a while, I’ll give them a few questions and I want to challenge them. How are you going to approach your answers? How are you going to approach the solutions?

Using MyMathLab gave faculty time to consider the best ways to incorporate the new resources in their classes. P6 liked developing new approaches to teaching using MyMathLab. The instructor added:

> I like it a lot. I wish I knew more about it. All the other things that you can do with MyMathLab that I just don't know enough about. But I absolutely love it. It's probably the best thing we've done to in-seat classes in a while.

Time to reflect on teaching. Faculty had time to look critically at the content they taught and became more mindful that course objectives were addressed. P5 commented,

> My biggest challenge, I think, is just making sure I am hitting all of the objectives, being sure I'm covering everything that's going to be covered in their homework, or, you know, keeping up with that. Actually, it's actually a good challenge for me. It keeps me on task. It makes sure that I'm not just letting a section fall by the wayside. It keeps me very scheduled, but I like it. I like the homework site and so it's not a big challenge for me.

P7 stated a similar goal and added,

> I have to admit, maybe it's not good, but I have ended up teaching in a more problem oriented way. I get less and less philosophical. I may take five minutes and talk about a topic and explain some relevance and make some connection. But after I talk after 10 to 15 minutes then I go, and shall I say, talk Skill 1, Objective 1. That's how MyMathLab works. I'm going by objective… So, that is how I go. These are objectives in MyMathLab and I structure my class lecture by objectives. And I may still have some general lecture to give them some idea, then I go by objectives after that.

Faculty also discussed the need to examine and modify techniques typically associated with traditional, in-seat instruction. However, changes were not always easy. P4 stated:

> Well, it’s something new, and you know, I’m old. So of course, what…it was hard for me to figure out what it’s worth, how to do it, and not make it a hassle for me in terms of the dues dates, the points, stuff like that.

P2 stated that abandoning the traditional way of grading homework also included relinquishing some insight into student effort. The instructor explained:

> Yes, I guess it’s because I always did collect and grade homework, and some teachers may not do that, but I can’t see the actual work they [students] are doing. Aside from assessments, I don’t see how much time and effort they’re putting in and, I mean, I can go in there and see how much work they’ve completed, but I have less of a feel for how much they may have struggled with it or not.

As a result, the instructor made changes to in-seat course work to ensure students understood the material before they completed an assessment. P2 shared the changes:

> I guess another way it has changed my approach is that there is no hand-in homework, and therefore, I think students don’t sometimes write down their work, so they don’t necessarily have something to go back to, to study for tests. So, I think I give more take home worksheets and short quizzes so they have actual materials to look at for their review.

P2 also questioned the merit of using the pretest for awarding credit for homework problems. The instructor explained the uncertainty of “not being able to, I guess, see their work, other than assessments.” The instructor stated:

> I feel sometimes they [students] would do the pretest and not really know what they were doing and would google how to do it. I don’t know if you can ask for

> help on the pretest or not. Yeah, that's what I was a little suspicious of that they would really spend a lot of time on the pretest and try to get them all right so that they would have no homework but not understand it.

Traditional lectures continued to be the preferred approach for teaching, even with the availability of resources in MyMathLab. Instructor P7 stated, "it's not technology, you just have to get them [students] to realize they need to value the education that we provide." But the task for instructors, as P4 commented, was "making them [students] do it [homework]." Various approaches were tried for assigning credit for homework completion. Two of the four elementary algebra course instructors required students to do all the assigned homework problems to get as much practice as possible, as compared to four of the six intermediate algebra course faculty who used the pretest to award credit for concepts that students knew. One participant tried each approach in different semesters but was unsure which method produced better results. When the pretest was used for assigning homework, students would earn credit for the concepts they knew. Students could then use their time practicing new concepts that needed to be mastered. An instructor voiced support for using the pretest and other resources in the program. P5 stated,

> Well I know that some teachers don't use this pretest, and opening things up. I would encourage them to try it. I would also encourage them to look at some of the videos that are offered and suggest those for students who are having trouble.
>
> Uh, just becoming more familiar with the site would be my biggest suggestion.

P5 also explained how the pretest option helped to guide what to teach in the classroom:

> It [pretest] very much impacts what I teach and I modify it per semester. I don't modify it that much per class because I try to do the same lectures, but it does modify my lecture for the semester on what I'm going to be teaching….
> What it has done, I…because of the way I use it, I use a pretest to test before I lecture and it had really helped me focus on the concepts and objectives that the students really need help on. Because I use that tool that does the item analysis on the pretest, and I can tell very quickly what concepts I do not have to go over because the students have mastered it. And it helps me focus on the concepts that really need re-enforcement.

A student comment on the end of course evaluation agreed that "the practice tests are helpful."

To encourage and motivate students to complete their assigned homework, P4 stated, "make it [homework] worth enough points where it's worth their while." Thus, weight of assigned homework varied between 10% – 25% of the course grade. In addition, awarding homework points for completed assignments varied by instructor. Some faculty awarded credit for only correct answers only while other faculty used a combination of problem completion points along with effort points (determined by examining the amount of time students worked on their assignments). MyMathLab performance reports could be reviewed by faculty. The data could provide an "in-depth look into how students are learning the concepts and skills instructors want them to master" (Chen et al., 2018, p. 59). In fact, one participant used information generated from MyMathLab reports to prepare the lecture and lessons for class.

Use of class time. Faculty adjusted their teaching styles to make the most of their time in the classroom. P7 shared: “Well, essentially, it [MyMathLab] may give you more time to cover more material. We kind of increased the rigor but we did not add more topics.” P6 commented that,

> The amount of homework questions [asked during class] has greatly diminished from previous semesters. Whereas now they’re able to get the help and get the answer right away versus before they would always wait to turn in the homework and ask a bunch of questions. So, I would spend sometimes spend a half hour to an hour doing homework questions each class period, and now I spend maybe 5–10 minutes tops. Time for explanation on other topics like quiz time, tests and other stuff like that.

P2 admitted there was more time in class to do additional practice:

> Because they’re [students are] using that homework method, yea, I guess I don’t see having to review as much. I feel I always used to spend the first 15–20 minutes of class reviewing, answering questions. You know, I still start class asking that, but now I don’t get as much of that so there’s more time to do in-class worksheets and let them practice. I really like to do in-seat worksheets and let them practice the concepts. At least let them do one or two of each type so they can go home feeling like they did a couple of these and they’re not as intimidated. So, I think it opens up a little more free time to do things.

P3 was able to evaluate the effectiveness of lectures. The instructor shared:

> I can gauge where they [students] are, how effective my lectures are…and I don't want this to sound bad, but I can concentrate more on the advanced material and not have to talk about how to add and subtract fractions in an algebra class, not that I wouldn't do the review.

P5 commented that getting students to complete the assignments early takes effort:

> I don't find it challenging very much at all, but it is just getting students to work on it. You know, in a timely fashion. Reminding them, I spend a lot of time reminding them, you know, that things are due.

Resistance to using MyMathLab. Participants suggested that instructors need to support the use of MyMathLab before students will use it. P4 commented:

> I think the teachers that aren't using it, it's like, you have to own it. And if you come across like, "Ugh, you have to do MyMathLab" or whatever, then the kids aren't going to take it seriously. Where if you buy into the benefits of it then your students will buy into the benefits of it. But if you don't, your students never will.

P3 offered a similar view:

> You [instructors] have to have a positive attitude. If you go into the classroom the first day of class, or anywhere for that matter, and not have a positive attitude, the students are going to see, and you basically are going to have a bad experience. I think you need to go through it when you're assigned the class, and work through a lot of the problems. You can do that as a faculty member then you can see. OK, here's how I need to teach, and you'll find a lot of neat ideas. Even if they were anti about using the technology, you need to be positive, it will be OK. It's not

> going to go away, you're not going to lose everything. It's very easy to find out what the students do, and how long they spent. When students come to class and say "I spent 2 hours on Section 1.4" and you find out they spent two minutes, so, you can say, "No you didn't." It holds them accountable as well. But I think the big thing is to be optimistic, positive; and any system is going to fall flat on its face sometimes, even it's just paper and pencil. Oh my gosh, I gave you the wrong test, or I gave you the wrong chapter. Just be positive and take the time to go through it. It's not that difficult to learn.

P1 offered the following suggestion to faculty to increase student use:

> I think instructors should kind of advertise the benefits and power of this. For example, let's say especially during the first lecture, you go through MyMathLab and say, "Let's say you do the homework and you don't know what to do. Look, this is the Help button, this is the *Similar Example*, this is this, this is this," just to show them [students] the procedure. Sometimes what I do, say like during the first or second class, and I have, frequently suggested, that when students come to my intermediate algebra class, say, who already know me if they took my class, I know if they are good students and already online, and so on. I ask them to open their computer or do it with a projector, and say, "[Student A] show us how you are doing your homework." Very good peer example. I would say it works well. Or I would say….it works well. Or I see somebody struggling, and I ask my good student to help. I may say, "[Student B] can you please take care of [Student C]?" and "[Student D], can you please take care of [Student E] like after class, maybe

> 10–15 minutes, and go to the computer and show what you do with this, this or this...?" Like peer tutoring, peer help, peer example. Sometimes it's much more powerful, you know, than my lecturing or teaching, OK. Because some students have this, not kind of resentment, maybe not what they say, but how they feel it. Of course, the instructor can say this is simple, simple but when the students say this, they listen.

Although faculty who participated in this study made conscious efforts to verify course lectures and assessments agreed with the MyMathLab homework assignments, some faculty did not. Student comments from end of course evaluations indicated that some faculty did not align homework assignments in MyMathLab with course lectures or assessments. One student stated, "Get a different online homework system. My math lab uses questions that do not relate to many questions on tests and exams." Another student commented, "What I did not like about the course was the MML online homework, I felt like it was just busy work and most of what we were tested on wasn't even on the test that we took in seat." Another student advised, "I would suggest not using my math lab because it doesn't always correspond to the class and it is very picky on the formatting of the answers so it makes it very difficult."

A few student comments on the end of course evaluations suggested that MyMathLab was not used in the class. One student stated, "I would say you could have some my math lab assignment[s] to improve math skills." Another student recommended, "More interactive homework." A third student stated, "they [instructors] could incorporate the use of technology e.g. youtube channel. Though I felt the instructor was at best given that the course was one day a week of lecture. Also showing the example and including the check to the examples could be helpful as well."

Subtheme 3b: Student owned. Adult learners have a reason for learning and no one way works for all students (Knowles, 1980; Merriam, 2015). Using MyMathLab provided students with multiple ways of learning course content, in addition to receiving live lectures from faculty. Faculty noticed that some students became more independent and self-directed learners by realizing they could find information on their own. A student comment on the end of course evaluation revealed how one individual managed his/her schedule by taking the initiative to complete assignments before the due date. The student wrote: "Paying attention in class, [and] completing the exam reviews that were placed on blackboard. I started MML very early and completed it a while before it was due to take the work load off." Instructors recognized the importance of student initiative and maturity for success in the class. In fact, P7 commented, "Well, those properly motivated students, they solidify their skills by doing problems." The instructor added:

> I mean, it's depending how mature the students are. They realize they have to sit and study and put the time into it, then MyMathLab is a good place to put the time in, and those students report being more motivated because of MyMathLab.

But faculty also noticed behaviors of students who were less successful. P3 commented:

> Students who don't do their homework, are not, I personally don't think they're really invested in the class. Oh, they just say they "Gotta take the class for credit" and as long as they pass, they're happy. The students who know they're going to have to take more math have a more vested interest, so they will do the

> homework. I, as a professor, can do everything I can to involve any student. Like some students are afraid and if they've done the homework and not done well on it, they're afraid to ask for help. I try to encourage them to talk in class. If one student has a problem, guess what, I'm sure three or four others do as well. That's how you learn, but if they don't do the homework they're really not prepared for class, or for the rest of the class.

Participation and performance. Faculty noticed a difference in classroom participation and performance when students invested time and effort in working through assignments. P6 shared:

> I think it was last winter semester…winter semester, I had about five students who went through all the study guides in MyMathLab, for all the chapters and concepts and really took, on their own initiative, did a lot more than what I require in MyMathLab. And those students did exponentially better than the rest of the students that just did the homework that was assigned.

P6 also noticed that the students who completed their assignments asked fewer questions and took less time on assessments, "The ones that are doing the work, I mean the ones who are doing the homework before class, the volunteers, they seem to not have as many questions and they also take less time on the quizzes, I noticed."

P4 commented that students were more prepared for class when their assignments were completed:

> When I go through and check MyMathLab periodically, if I had to predict ahead of time who has done it, and done it well, and who hasn't, I would be about 95%

> accurate. I can tell. The ones who are engaged, doing the examples and answering the questions, and participating are the ones who have done MyMathLab. Now whether it's due to MyMathLab or just the fact that they're the stronger students, I don't know. I don't know how I would necessarily tell that.

P7 stated that faculty were able to obtain up-to-date data in MyMathLab on the amount of time students invested in their assignments:

> There are always students who just brush off their learning, but a teacher always knows how much work the students put into their homework recently. The MyMathLab provides proof that good students who are dedicated and committed put enough time into the practice and are up to date with their homework. These students do tell me that it does help them, doing all those practice problems… When students have the proper maturation and when they are using it. Sometimes they [other students] say, "OK, now I have done what I needed to do for my course and now I can go ahead to parties." MyMathLab doesn't help with these students. You kind of have to mean it, want to learn, then MyMathLab is a great help.

Participation. Faculty noticed that students who completed their homework assignments participated, and were more engaged, in classroom activities. P1 observed:

> Well, those who do the work in MyMathLab, they usually participate much better, and learn. And those who do not, well, they do not participate because they do not know what's going on, you understand. And those who do not do work in MyMathLab they usually have kind of a poor attendance, they come late, and so

on, so on, so on. In this case it's like the tip of the iceberg of a different problem, OK?

P5 shared a similar experience, "Oh, they're [students] much more verbal. They're much more engaging, they'll ask more questions. Those that don't do homework don't really know what to ask. You know?"

P7 noted that,

> They [students] seem to be more active. I mean, they ask questions, and know what to do. I mean, you sometimes have these quiet classes, it is like pulling their teeth. But, those who are active, do their work on time, then they are more apt and willing to talk.

Another instructor agreed that student effort and class participation were related but was uncertain to the degree. P2 commented:

> I don't know if there is really a direct correlation, but I do know that students who attempt their homework are more involved, somewhat. But I also know there are students who do it all, get 100s, and don't talk much either. So, because there are some students who just get it quickly then sit back in class and don't participate because they can…[chuckle]. Yes, there are just so many different types of students.

Performance. Faculty also noticed that students who completed their assignments did better in the course. P1 explained:

> I can see it. Let's say, especially when, I mean, when I go to MyMathLab and I see them having performed and I grade them. Let's say those who completed 90–

> 95% of homework in MyMathLab, their grades on final end scores are usually B, B+, A-, A. Those who do not like it, and those who completed lower than 80%, those grades are usually like B's and C's. But obviously MyMathLab is just a special tool to complete the homework and obviously if they don't do it they don't succeed. Yes…

P3 shared a similar observation but added that instructors share the responsibility by making sure students are tested on what they practiced:

> Students who complete the homework are going to do better on the exams because they've had the practice. I make sure the exams align closely with the homework. It's not fair to the students to give them homework and then ask them questions that have nothing to do with the homework, or even at least to just complete it. If students do the homework they do have a better chance of doing better on the assessments.

P4 shared an observation on students who are not invested in their learning:

> It's hard in [elementary algebra] with it being a pass/fail class because they cannot do any MyMathLab at all and still pass the class. So, because, it's only worth so much percent, right? So unfortunately, and it's true with anything, not just MyMathLab, is the students who need it the most and are the ones least likely to take advantage of it.

P3 shared a personal opinion on the characteristics of students who did not make an effort to complete assignments. The instructor stated:

> I think the students who do not like it [doing homework in MyMathLab], are, I'm going to say this delicately, they're just a little lazy. They don't want to work to do the work. So, if I give them paper homework, if I give them computer homework, if I would just ask them to put their name on a piece of paper, they're not going to do it. They're not going to make the effort. But students who really want to learn, or students who really want to get a good grade, they will do whatever homework that I ask. I would say that overall the reactions from the students, once they know we can talk if they disagree with an answer, I…I'm always willing to talk, once they realize that, that, they feel more comfortable. And once they start using the Help available within the Pearson MyMathLab, then I think they realize that, "Wow, I can do this on my own." So, they do take it positive.

Course performance. Faculty observations on student use of the software, performance and class participation corroborate results from other studies on students using computer-aided instructional software programs. Student data obtained from institutional research for the 2016– 2017 academic year support faculty observations. Table 2 and Table 3 present the pass, fail and withdrawal rates for in-seat elementary algebra and intermediate algebra courses, by semester. The pass rates were slightly higher, fail rates were lower, and withdrawal rates were usually lower for the courses of the participants included in the study (with the exception of Elementary Algebra in Fall 2016, Table 2). This performance data indicate there may be benefits for improved student performance from using MyMathLab in courses.

Table 2

Average Pass, Fail, and Withdrawal Rates for Elementary Algebra

Group: Fall 2016	Pass Rate (#pass/#registered)	Fail Rate (#fail/#registered)	Withdrawal Rate (#withdraw/#enroll)
All sections	66.67%	33.33%	12.02%
Participants	70.37%	29.63%	12.90%
Nonparticipants	65.12%	34.88%	11.64%
Group: Winter 2017	Pass Rate (#pass/#registered)	Fail Rate (#fail/#registered)	Withdrawal Rate (#withdraw/#enroll)
All sections	80.46%	19.54%	17.92%
Participants	89.47%	10.53%	13.64%
Nonparticipants	73.47%	26.53%	20.97%

Table 3

Average Pass, Fail, and Withdrawal Rates for Intermediate Algebra

Group: Fall 2016	Pass Rate (#pass/#registered)	Fail Rate (#fail/#registered)	Withdrawal Rate (#withdraw/#enroll)
All sections	87.50%	12.50%	8.40%
Participants	89.89%	10.11%	5.46%
Nonparticipants	84.24%	15.76%	12.12%
Group: Winter 2017	Pass Rate (#pass/#registered	Fail Rate (#fail/#registered)	Withdrawal Rate (#withdraw/#enroll)
All sections	86.36%	13.64%	13.73%
Participants	88.71%	11.29%	10.14%
Nonparticipants	85.09%	14.91%	15.56%

Finally, Table 4 presents the course means for in-seat sections of elementary algebra and intermediate algebra, by semester. The data indicate students performed slightly better in the sections where participants stated they used MyMathLab for assigning homework. Further investigation is recommended to determine the reason and combination of factors that may have contributed to the difference, especially in elementary algebra courses.

Table 4

Course Mean – Course and Semester

Group: Fall 2016	Elementary Algebra*	Intermediate Algebra
All Sections	1.99	2.59
Participants	2.24	2.75
Nonparticipants	1.88	2.37
Group: Winter 2017	Elementary Algebra*	Intermediate Algebra
All Sections	2.56	2.45
Participants	2.95	2.47
Nonparticipants	2.27	2.44

Note. The local college does not report a course mean for elementary algebra since it is a pass/fail, foundation level class. However, students earn a letter grade but it is not factored into the student's Grade Point Average (GPA). The course means were calculated based on the earned grades by section from the raw data.

Evidence of Research Quality

Measures were taken throughout the research to ensure trustworthiness. Before beginning the research, IRB approval was requested and approved from Walden University, and approval was granted from the local college. Member checking was used to allow participants a chance to review and verify interview transcripts for credibility. Participants' opinions were triangulated with student performance data for increased creditability. An audit trail and personal notes were maintained to increase dependability and confirmability of the study. In addition, personal reflections minimized bias in the study by continuous examination of personal and theoretical preferences (Schwandt, 2001). Finally, the study was reviewed by Walden University chairperson and committee members.

The data sources used for this study included audio recordings, interview transcripts, personal notes, aggregated student performance data, and student comments. All data are stored on my password protected, home personal computer, and backed-up on a USB drive. Data will be securely maintained for a period of 5 years as required by the university. The following section presents an explanation why professional development (PD) workshops were chosen as the project for this study.

Proposed Project

All participants supported the use of MyMathLab for student homework. However, not all faculty had the same level of experience or confidence using the resources contained in MyMathLab. For example, a few participants commented they did not know enough, and others wished to know more. A couple of participants mentioned reviewing homework completion rates, or pretest results to estimate their students' understanding of the concepts. One participant used item analysis to structure classroom instruction. MyMathLab has many resources that could be beneficial to students and faculty. However, maintaining and improving the course content takes time and effort. As P7 commented at the end of the interview, "I think it should be standardized…once we start using it, well on the one hand, it's kind of a sad place to manage it, but I think it's a good idea we use it."

After initial training was given to faculty prior to the roll-out of the program, minimal training has been provided and the content not been updated. Therefore, a content-focused, PD program was chosen as the genre of the project that will implement the findings resulted from this research study. Professional development programs focus on teachers already in the classroom (Barrett, Butler, & Toma, 2013). The project will address training to ensure all instructors have the required knowledge and confidence that proved to be beneficial for student learning as resulted from the research study. It will also create a way to review, maintain and update the course content based on student results and faculty feedback. In addition, participants who do not currently use MyMathLab in the classroom will benefit from learning about resources, experiences and support provided in the PD training program.

Summary

Section 2 presented the methodology, research design and approach, and data analysis for this research study. A content-focused, PD program is proposed as the genre of the project. Section 3 will contain a discussion of the recommended project study, project objectives, a justification for the project, and a description of how the project focused on the problem.

Section 3: The Project

Introduction

According to the findings of the research study I discussed in Section 2, there was a need to fill a gap in knowledge and the usage of resources contained in the MyMathLab program. I chose a PD program to address this gap. This section will contain the description, rationale, literature review, implementation and evaluation of the project. In addition, I will discuss the implications for social change at the end of the section.

Description and Goals

The deliverable project equates to three, 8-hour days of content-based training designed for full-time and adjunct faculty who use MyMathLab for in-seat math classes at the local college. In the PD program, presentations and videos will be used in conjunction with collaboration through hands-on activities, group discussions, and reflection. The training will focus on understanding, using, analyzing, and maintaining resources in a typical course in which MyMathLab is used. The PD program will be called the MyLab Algebra Partnership.

The goal of the PD program is to provide knowledge and skills to faculty so they are competent and confident using the resources in MyMathLab. By working collaboratively through the training sessions, I expect that faculty will develop a shared sense of purpose and create a community of support that will continue throughout the academic school year. Attebury (2017) commented that “increasing time spent interacting with others in a quest to find new ideas and perspectives can lead to both small and profound shifts in thinking and behavior” (p. 234). The PD program has four objectives for its faculty participants: (a) learn about the available resources in MyMathLab, (b) apply knowledge and skills through hands-on activities, (c) analyze student performance and item analysis to present recommendations for use, and (d) build a community of support for yearlong interaction among faculty.

Rationale

Based on analysis of the research data, I chose a PD program for the project rather than an evaluation report, curriculum plan, or policy recommendation. The following reasons are offered to support my selection of a PD program. First, the findings from the study indicated that student performance and completion rates were slightly better in classes where MyMathLab was used. In addition, 6 of the 7 participants expressed a desire to know more about available resources in MyMathLab. Moreover, participants expressed the importance of examination of and reflection on their teaching practices for improved student learning. Participants alluded to instructors who do not use MyMathLab in their courses. Lastly, maintaining and improving the content associated with the use of MyMathLab requires time and resources not supported by budgetary constraints but could be adequately managed by the faculty in the core group of users.

Kennedy (2016) suggested that, “questions about what teachers need to know are typically prefaced by stipulations about what teachers actually do” (p. 946). Positive aspects of PD “refer to content: It is important to focus on the daily teaching practice, more specifically, the subject content, the subject pedagogical content knowledge, and the students’ learning processes of a specific subject” (Kooy & Klaas, 2012, p. 17). The training will be delivered through lectures, videos, group discussions, and hands-on activities coordinated by the lead facilitator, experienced faculty, and product trainers. Training will focus on the resources in MyMathLab and how to use them. Faculty will have the opportunity to apply their knowledge by creating and modifying course materials, using techniques to evaluate student learning, and mentoring less experienced faculty. The training will include collaboration and hands-on activities to increase teamwork, confidence, and continued collaboration. Garet, Porter, Desimone, Birman, and Yoon (2001) reported the following components of PD activities "have significant, positive effects on teachers' self-reported increases in knowledge and skills and changes in classroom practice: (a) focus on content knowledge; (b) opportunities for active learning; and (c) coherence with other learning activities" (p. 916). To provide support for this genre and develop content of the project, I reviewed literature on strategies for creating PD training, selecting of content for the project, and evaluating the project.

Review of the Literature

I selected PD as the genre for this project to address the problem identified in the research study. Guskey (2017) suggested, "we must begin with the student learning outcomes we want to affect" (p. 37). With this in mind, the purpose of the literature review was to find information on successful PD programs that would support math faculty using digital technology in the lower-level algebra classroom, including faculty who may not use the technology. Articles were obtained via electronic searches through the Walden University library, using EBSCOhost, and also through Google Scholar. Dissertations and theses were retrieved from ProQuest, accessed via the Walden University library. To search for peer-reviewed or cited articles, I searched the databases of ERIC, Education Source, Sage, and ScienceDirect. After articles were reviewed, the references in the articles were searched for new leads. This process was repeated until no new relevant articles were found and saturation was reached. The keyword and keyword combinations used were *professional development training programs*, *learning technology by design*, *teaching with technology*, *faculty as learners*, *learning communities*, *learning networks*, and *teaching strategies with technology*. Older references were included in the literature review because of their historical influence on the topics. The project was informed by the theories of technology, pedagogy, and content knowledge (TPACK) and transformational learning.

Professional Development

All participants in the study used MyMathLab to supplement student learning, and the majority of faculty expressed a desire to know more about the resources available in the program. In addition, faculty recognized the importance of reflecting on their teaching practices to improve student learning. I took these factors into consideration when searching the literature in order to develop training that would be meaningful and beneficial to faculty at the college. Roesken-Winter, Schüler, Stahnke and Blömeke, (2015) suggested that a crucial factor in planning PD is the educator's beliefs about teaching since this affects what is implemented in the classroom. Over the last several decades, researchers have conducted numerous studies on effective PD training programs for educators (Barzel & Selter, 2015; Blair, 2016; Conole, Dyke, Oliver, & Seale, 2004; Ebert-May et al., 2011; Hill, Beisiegel, & Jacob, 2013; Lindvall, Helenius, & Wiberg, 2018; Maass, Swan, & Aldorf, 2015; Roesken-Winter et al., 2015; Yoo, 2016). In addition, multiple researchers have focused on the integration of technology in the classroom (Davis, 1985; Earle, 2002; Ertmer & Ottenbreit-Leftwich, 2010; Koehler & Mishra, 2009; Lindevall et al., 2018; Margerum-Leys & Marx, 2002; Mishra & Koehler, 2006; Niess et al., 2009; Pierson, 2001). Davis (1985) proposed the technology acceptance model to gauge user acceptance and motivation for using technology. Although some faculty at the local college may be reluctant to use technology in the classroom, topics will be included in the PD training that will motivate instructors to support using MyMathLab to help their students learn math.

Implementing new technology in a class can be a special challenge for many educators since it involves more than just adding a software program to a course (Earle, 2002; Marcelo, Yot, & Mayor, 2015; Powell & Kusuma-Powell, 2015). Koehler, Mishra, and Cain (2013) suggested that it is difficult for many educators to use technology well in teaching. Earle proposed that “technology involves the tools with which we deliver content and implement practices in better ways” (p. 7). Often using technology is beyond the experience and comfort levels of experienced, subject confident faculty who may not see a need to use technology, nor have time to learn to use it properly (Marcelo et al., 2015). Koehler et al. (2013) noted that “many teachers earned degrees at a time when educational technology was at a very different stage of development than it is today” (p. 14). Sabzian, Gilakjani, and Sodouri (2013) commented that PD is vital for educators to understand the benefits of using technology for student learning with technology to occur. However, educators are unlikely to use any technology unless it supports their current teaching habits (Koehler et al., 2009). Ferrini-Mundy and Breaux noted that “in the absence of professional development on instructional technology and curriculum materials that integrate technology use into the lesson content, teachers are not particularly likely to embed technology-based or technology-rich activities into their courses" (as cited in Niess et al., 2009, p. 6). Therefore, getting faculty at the local college to recognize the benefits of using MyMathLab is an important component of the PD program.

While it is unknown why some faculty and students may not use MyMathLab as a supplemental resource to improve learning, it is expected that attitudes may change over time, if they, as P4 suggested, "own it." However, Roesken-Winter et al. (2015) suggested faculty may have to be strongly encouraged to try something new. Attebury (2017) suggested that transformational change may occur "but it will likely involve some period of critical reflection" (p. 233). As P1 stated, "I actually became a different person in terms of technology and computers because of teaching online and these classes using MyMathLab."

The goal of the PD program is not to convert all instructors into digital technology champions as changes happen slowly. Maass et al. (2015) suggested that PD is an opportunity for instructors to change their way of teaching. Changing or developing an instructor's beliefs requires time and short-term PD programs are not as effective or long lasting as those that occur over a longer period (Pehkonen & Torner, 1999; Roesken-Winter et al., 2015; Schommer-Aikins, 2004). However, longer programs require allocated resources which are not funded at this time. Providing a PD program that is scalable, useable, and available to new faculty members is important for continued use of MyMathLab.

Finally, even though faculty recognized that using MyMathLab to assign homework in the in-seat math classes at the local college was beneficial, more can be done to improve student learning and faculty experiences. In 2007, Mishra and Koehler presented a technology, pedagogy, and content knowledge concept for teaching with technology called TPACK (originally called TPCK) at the annual conference of the Society for Information Technology and Teacher Education (Koehler & Mishra, 2009). The framework was built on Shulman's (1986) concept of pedagogical content knowledge (PCK). Shulman considered PCK as "the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations" (p. 9). PCK is teaching subject matter in a way that is understandable to learners (Niess et al., 2009; Shulman, 1986, 1987; Wilson, Shulman, & Richert, 1987). All participants in the study commented on the benefits derived from using digital technology to increase student learning. Earle (2002) believed that the integration of technology "is defined not by the amount or type of technology used, but by how and why it is used (p. 7). To show support for these sentiments, participants mentioned going through the homework sections to assure lectured topics aligned with assigned problems. This practice reduced student complaints and motivated students to want to work through assignments to learn the concepts. The alignment of instruction with assignments in MyMathLab will be a topic discussed during one of the PD training sessions.

Project Description

Resources Needed and Existing Supports

The PD program will be offered at an accepted, central campus location to minimize driving time for faculty who teach at each location. The maximum time traveled for most attendees should be less than 90 minutes, and carpooling will be recommended. As the lead facilitator, I will investigate reimbursement of travel expenses for faculty who live outside the recommended driving distance set by college policy.

The sessions will be held in a meeting space that can comfortably accommodate about 10–20 individuals (e.g., a class or conference room). The area will require Wi-Fi or Internet access, projector, table, and chairs. As the lead facilitator, I will provide necessary handouts, sample course data, writing paper, pens, sticky notes, markers, drinks, and snacks. Lunch will be paid for with college funds. Faculty will bring laptops or notepads to access sample course data and other resources.

Potential Barriers and Possible Solution

A potential barrier to offering a 3-day PD program might be obtaining approval from the college since money has not been budgeted to pay faculty or to pay for lodging to stay overnight (for out-of-area individuals). In addition, finding a 3-day block of time for training might be a challenge for many instructors during the academic year; therefore, I recommend that the sessions should be offered during the 10-month period when full-time faculty are required to be on campus for college duties but not during the academic semester when courses are running (i.e., August – May). Also, the training sessions will be delivered on 3, nonconsecutive days to eliminate the need to pay for lodging for out-of-area attendees. Adjunct faculty will be invited to attend the sessions on a voluntary basis; however, I expect that adjunct faculty who attend the training will have taught either course during the prior academic semester and/or will be scheduled to teach at least one of the courses in the following semester. If faculty cannot attend the PD sessions for any reason, materials will be made available for their review with a trained mentor.

Implementation Plan

The sessions will be delivered on 3 nonconsecutive, 8-hour days. The first and second day will be offered during the month of May, and the third day will be offered in late August. Full-time faculty are expected to be available for college related duties during that time (August to May). All training sessions will be offered in a live, face-to-face format to build camaraderie among faculty as well as offer encouragement and support to less confident or experienced faculty. After the first year, delivery options may be modified to offer training sessions virtually or in a blended format.

Roles of Participants and Trainer

As the lead facilitator, I will be responsible for inviting faculty and coordinating all logistics for the PD sessions (e.g., the day, time, place, and resources). I will ensure the program stays on schedule. Experienced faculty will serve as presenters, group leaders, mentors, and activity coordinators. Attendees will be encouraged to come to the training sessions ready to participate in group activities and open to learn about the resources in MyMathLab.

Table 5

Overall Project Schedule

Schedule	Approx. time	Section title
Day 1 (Session 1)	8:00 – 8:30	*Opening remarks/announcements*
	8:30 – 9:30	*Overview*
	9:30 – 10:45	*Why use MyMathLab?*
	10:45 – 12:00	*How MyMathLab was used.*
	12:00 – 1:00	Lunch Break
Day 1 (Session 2)	1:00 – 2:00	*The basics (available resources).*
	2:00 – 3:00	
	3:00 – 4:00	
	4:00 – 4:45	*Reflections & Possibilities*
	4:45 – 5:00	*End of day critique*

Schedule	Approx. time	Section title
Day 2 (Session 3)	8:00 – 9:00	*Introductions/Announcements/Day 1 Recap*
	9:00 – 10:00	*The Power of Reports.*
	10:00 – 11:00	
	11:00 – 12:00	
	12:00 – 1:00	Lunch Break
Day 2 (Session 4)	1:00 – 2:00	*Using information in reports.*
	2:00 – 2:30	
	2:30 – 3:00	*Maintaining and updating course materials.*
	3:00 – 4:00	
	4:00 – 4:45	*Reflections & Possibilities*
	4:45 – 5:00	*End of day critique*

Schedule	Approx. time	Section title
Day 3 (Session 5)	8:00 – 9:00	*Introduction/Announcements/Day 2 Recap*
	9:00 – 10:00	*Ownership!*
	10:00 – 11:00	
	11:00 – 12:00	*Using MML "Learning Catalytics"* (interactive program in MML).
	12:00 – 1:00	Lunch Break
Day 3 (Session 6)	1:00 – 2:00	*Communication Portal and Process.*
	2:00 – 3:00	
	3:00 – 4:00	
	4:00 – 4:45	*Reflections & Possibilities*
	4:45 – 5:00	*End of day critique*

Project Evaluation Plan

Both formative and summative evaluations will be used to evaluate the effectives of the PD program. A formative evaluation plan will be used during the 3 days to determine if the PD program is meeting the needs of faculty while the training is in progress (Caffarella & Daffron, 2013). Attendees and facilitators will complete a short critique of the activities at the end of each day to make recommendations for subsequent sessions. At the end the 3 days, attendees will complete a summative evaluation to ensure the program outcomes have been achieved (Lodico et al., 2010). The summative data will be collected to measure the outcomes and their relationship to the overall objectives of the PD program (see Appendix C).

Project Implications

At the local level, this project will deliver knowledge and skills on using resources in MyMathLab. It will also create a foundation for continued collaboration among math faculty throughout the academic year. In addition, results from implementing the PD program could be shared with other departments at the local college as well as other colleges that are considering the use of digital technology in the classroom. Sharing the results might increase chances of a smooth adoption of the new technology for continued support and use by faculty and students.

Summary

Section 3 provided a description of the PD program, the rationale for implementation, the literature review, implementation procedures, and the evaluation protocol. The section on project implementation contained details about potential resources, barriers, timetable, and the roles and responsibilities of the stakeholders. The project fills a gap in the faculty's knowledge, skills and confidence using MyMathLab in the in-seat classroom at the local college. In addition, faculty will build a community of support to encourage collaboration of teaching practices throughout the academic year.

Section 4: Reflections and Conclusions

Project Strengths and Limitations

The PD program provides training and information on the resources in MyMathLab to faculty at the local college. Through hands-on application of resources in the PD program, I expect that faculty will acquire skills and gain confidence using the technology for teaching. In addition, faculty will have a chance to reflect upon approaches to teaching and student learning using MyMathLab.

Project Strengths

The principal strength of the project is that it addresses the findings of the research study. The PD program provides information and training on how to effectively use the resources in MyMathLab. Faculty will acquire knowledge on the basic resources in MyMathLab by participating in hands-on activities, working together to share ideas, and recommending strategies to improve materials in the lower-level algebra courses. An additional strength of the project is the potential creation of a collaborative, support network for faculty, which will include one-on-one guidance for new or reluctant users (see Vandenhouten, Gallagher-Lepak, Reilly, & Ralston-Berg, 2014). A third strength of the project is the design of the PD units. The modules are created in 4-hour blocks of stand-alone, content-focused material. This will allow flexibly in delivery options and the opportunity to add, remove, or replace units, as needed.

Project Limitations

The primary limitation of the project is not having enough time to affect change in those who may need it the most (see Attebury, 2017; Mezirow, 2000; Pehkonen &

Torner, 1999; Powell & Kusuma-Powell, 2015; Roesken-Winter et al., 2015; Schommer-Aikins, 2004). Three, 8-hour days is not much time, but it is a place to start. All faculty will be encouraged, but cannot be required, to attend the PD training, regardless of compensation.

Recommendations for Alternative Approaches

An alternative approach to the three, 8-hour days of the PD program would be to deliver it in an online or blended format, in 4-hour, stand-alone sessions of training. Fishman et al. (2013) noted there were no significant differences between live, face-to-face training and online formats. Each session would require smaller blocks of dedicated time as well as fewer resources. This option would increase flexibility, so faculty could work through the modules as needed with the guidance of a mentor. In addition, new modules of content-focused training could be developed as needs arise.

Scholarship, Project Development and Evaluation, Leadership, and Change Learned from the Research Process

By the end of the study, I understood the importance of each stage of the research process and its influence on the development of the project (i.e., from the proposal stage to the completion of the final study and results). I learned that each section had to be created in a prescribed way to produce a well-designed study. I also learned that the standards had to be strictly enforced for acceptance as legitimate research by scholars.

It was during the design phase that I learned a most valuable lesson. In choosing the research design, I believed a quantitative approach would be more suitable since I could request institutional data to support the research. In addition, I thought a quantitative approach would be more rigorous and the results would be indisputable since they were based on numbers, not opinions. Perhaps in doing a quantitative study I was "perceiving truth as something that can be objectively verified" (Boeren, 2018, p. 64). I also considered a mixed method approach since there were many human factors involved with the problem that could not be captured by numerical data alone. But it was the numbers, not opinions, that seemed more important to me. However, the data could not be used as I proposed, so a qualitative design was explored and eventually selected.

Through this process, I developed a genuine appreciation and respect for qualitative research. I discovered that qualitative designs are often used in educational studies, and the findings can lead to a deeper understanding of the problem (see Creswell, 2012; Yin, 2017). I learned that well-designed qualitative research takes careful planning and attention to details (see Creswell, 2012; Lodico et al., 2010). For my research, meaningful and thought-provoking responses were recorded during the interviews that would not have been captured through a purely objective, quantitative design. I found the opinions of the individuals, when transcribed, coded, and analyzed, provided richness, details, and depth to the study. From this research, I discovered that words, more than numbers, were important. The student data were used to support the findings of the research and add credibility to the study.

Analysis of Personal Learning as Scholar, Practitioner, and Project Developer

As a result of reading and processing vast amounts of research conducted by individuals in the field of education, my perspective on how to use the findings from my research study has changed. My goal at the start of this doctoral program was simple. I wanted to discover ways to help my students be successful. As an educator with more than 20 years of experience, I believed that by learning and applying best practices in the classes I taught, my students would have a greater chance of completing their courses and ultimately earning a degree.

Like other adult students, I had a reason for learning and, like most adults, I had time constraints due to work, family, classes, and other responsibilities. I realized I was searching for ways to help students who wanted an education to be better at their chosen profession, just like me. And now, as a student/scholar, I was conducting research with faculty. It was during the interviews that I realized the participants had goals similar to mine; they wanted to find ways to help their students learn and be successful. But, like most adults, faculty have limited time and resources to self-learn everything they need to know to do the best job possible. My creation of a PD program for faculty was one way I could share what I learned from this study.

Reflection on the Importance of the Work

The results of this research study are important because they document the opinions of instructors on their experiences using digital technology in the classroom, specifically MyMathLab. The results are also important because they address a need for additional training that was voiced by faculty at the local college. The findings from the research study corroborate results from other teaching and learning studies on implementing digital technology in the classroom, but it is possible that my research findings may add new insight to the knowledge base (see Boeren, 2018).

Without proper training and support, instructors may have some reservations when confronted with a suggestion or requirement to integrate technology or instructional software in a course (see Murthy, Iyer, & Warriem, 2015). This may be due to the fact that instructors are often responsible for the integration of technology in their classroom without the proper support or guidance to use the tools most effectively (see Conole, Dyke, Oliver, & Seale, 2004; Ebert-May et al., 2011). The proposed project will address these issues at the local college and provide training, guidance, and support to faculty, so they feel confident and able to use the software program to support student learning.

Implications, Applications, and Directions for Future Research

The proposed project will provide information and skills on the resources in MyMathLab for traditional math faculty at the local college. Through training and mentoring, faculty will become confident using the software, especially instructors who have not taught with MyMathLab. After minimum standards have been established, I recommend conducting a study to determine if MyMathLab actually does make a difference for student learning, retention, and graduation rates.

Conclusion

The project filled a gap that I identified in the study. Faculty who participate in the PD training will have an opportunity to apply knowledge and skills to supplement instruction to improve student learning and increase teaching opportunities in the classroom. In the PD program, experienced faculty will serve as mentors to more inexperienced faculty. Faculty will also have an opportunity to participate in maintaining and updating course materials. The project can be tailored for use of other instructional software packages so faculty are not required to complete the integration task alone. New approaches to teaching with the resources in the software packages can be explored to determine the best use of technology in the traditional classroom.

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Appendix A: The Project

Training title: MyLab Algebra Partnership (MAP)

Objective: The proposed professional development program is designed to provide information, skills and hands-on training on the use of available resources in MyMathLab. By the end of the training faculty will learn about the available resources in MyMathLab; apply knowledge and skills through hands-on activities; analyze student performance and item analysis to make recommendations for use or changes to the program; and create a community of support for yearlong interaction among faculty. The program contents may be modified in collaboration with college faculty and academic leadership.

Course duration: The program contains six, 4-hour blocks of content specific modules. There is sufficient material to cover 24 total hours of training. The training sessions will be offered between academic school years. Two 8-hour session will be offered in early May, and one 8-hour session will be offered in August, before the new fall semester begins. All training will be delivered in a live, face-to-face format.

Learning outcomes: Attendees will apply their knowledge and skills by working through course materials, aligned with the course learning outcomes. By the end of the program attendees will be able to:

1. Describe available resources contained in MyMathLab
2. Demonstrate use of MyMathLab resources
3. Demonstrate use of MyMathLab reports
4. Identify techniques for using features in MyMathLab

5. Develop strategies for encouraging use of MyMathLab in the classroom
6. Analyze reports for enhancing course instruction
7. Summarize results to make recommendations for course improvement
8. Modify courses based on recommendations
9. Plan mentoring training as needed
10. Update Algebra Partnership Shell (in Blackboard)

Audience: Full-time and adjunct algebra faculty, associate math department chairs, and math department chair at the local college.

Teaching and learning approach: The program uses live, face-to-face techniques to facilitate a hands-on, collaborative learning experience.

Instructors: The first time the PD program is offered, I will serve as the lead facilitator. In following sessions, the facilitator will be an experienced instructor with experience in design, implementation, and use of technology for learning. College faculty will be encouraged and invited to serve as a facilitators during the training to present information and coordinate activities.

Course delivery method: Application-based learning focusing on the resources and use of MyMathLab.

Course venue: The program will be conducted in a learning space that is suitable for face-to-face interaction (e.g., classroom, small lecture room, or conference area).

Course evaluation: Facilitator will use formative evaluation methods at the end of each 8-hour session. A summative evaluation will be used to evaluate the program at the end of the training to evaluate the program (see Appendix C).

Resources: Individual laptops or desktop computers, if available; access to MyMathLab and access to prior course(s). Handouts and sample student data will be provided.

PowerPoint presentations: First day PowerPoint presentation slides are presented at the end of this section.

General training instruction:

- Short 15-minute to 30-minute publisher prepared videos may be presented before activities begin.
- Experienced faculty will present many of the activities listed in Table A1.
- The format will follow the traditional, in-seat face-to-face format the first time the program is offered.
- Approximately 40-60% of time will be spent on course activities, discussion and reflection.
- Assignment instructions will be delivered as needed.
- Breaks will be announced by the lead facilitator.

Table A1

Schedule of Training

Schedule	Section title	Activities
Day 1 (Session 1)	*Introduction/ Announcements*	Welcoming remarks
		Faculty introductions
		Daily activities plan
	Overview	(PowerPoint) Information on PD program: Outline course content, goals, and outcomes (facilitator)
	Why use MyMathLab?	(Presentation) Background on using MyMathLab (faculty led)
		(Presentation) Impact on student performance (faculty led)
		(Presentation) Impact on teaching (faculty led)
		Group discussion
	How MyMathLab was used.	Sharing best practices using MyMathLab in in-seat courses (faculty led)
		Discussions
	Lunch Break	*Lunch provided.*
Day 1 (Session 2)	*The basics (available resources).*	Short video on available resources in MyMathLab
		a. Discussion of Guided Notebook Handouts to guide student participation and notetaking
		b. Modify assignments: Demonstration - Hands-on activity with MML
		c. Create assignments: Demonstration - Hand-on activity in MML
		d. Modify assessments (tests, quizzes): Demonstration - Hands-on activity in MML
		e. Create assessments and discussion on importance of assessment parameters - Hands-on activity in MML
		f. Using Student Study Plans (for additional practice)
	Reflections & Possibilities.	Group work: Discuss what was learned and possible ways it can be used in the classroom. All attendees: share ideas on ways to apply information and ideas for further investigation. Consider: how to approach working together to improve courses.

	End of day critique.	Evaluation of Day 1: Formative evaluation of Day 1 activities, and suggestions for modifications for next two days of training.

Schedule	Section title	Activities
Day 2 (Session 3)	*Introductions/ Announcements/ Day 1 Recap*	Welcoming remarks and brief introductions
		Daily activities plan
		Recap from Day 1
	The Power of Reports.	Video (approx. 30 mins total)
		Handout (fill-in worksheet)
		a. Create class report (demonstration) - Hands-on activity in MML using sample student data
		b. Explain information contained in various reports - export data
		c. Analyze levels of information contained in reports - identify concepts in need of improvement and concepts mastered by students - identify struggling students: to improve classroom instruction
	Lunch	*Lunch provided.*
Day 2 (Session 4)	*Using information in reports.*	How reports were used to improve classroom instruction (best practice).
		Brainstorming activity: strengths of different reports and applications
		Analyze course performance
		Analyze student performance
	Maintaining and updating course materials.	Discussion on alignment of LOs with MML assignments
		Faculty select group: Elementary Algebra (Group A) or Intermediate Algebra (Group B)
		Review of questions in MyMathLab (Group A / Group B)
	Reflections & Possibilities.	Group work: Discuss what was learned and possible ways it can be used in the classroom. All attendees: share ideas on ways to apply information and ideas for further investigation. Consider: how to approach working together to improve courses.

	End of day critique.	Evaluation of Day 2: Formative evaluation of Day 2 activities, and suggestions for modifications for last day of training.

Schedule	Section title	Activities
Day 3 (Session 5)	*Introductions/ Announcements/ Day 2 Recap*	Welcoming remarks and brief introductions
		Daily activities plan
		Recap from Day 2
	Ownership	Motivation: reasons for faculty to use MyMathLab
		Strategies: to encourage students to use MyMathLab
	Using MML Learning Catalytics.	Short video - Creation of questions - Demonstration of interactive use in classroom
	Lunch	Lunch provided.
Day 3 (Session 6)	*Communication Portal and Process*	Develop communications portal - Faculty create process for continued communication throughout the year
	Reflections & Possibilities.	Group work: Discuss what was learned and possible ways it can be used in the classroom. All attendees: share ideas on ways to apply information and ideas for further investigation. Consider: how to approach working together to improve courses.
	End of day critique	Evaluation of Day 3: Formative evaluation of Day 3 activities. Attendees complete a summative evaluation.

PowerPoint Slides for Day 1

Professional Development

MyLab Algebra Partnership (MAP)

PowerPoint Presentation Slides

Let's Begin…

Professional Development Training

Partnership between MyMathLab and Algebra

What to expect each day…

Overview

This session covers:

- Facilitator & faculty introductions
- PD objectives
- PD format
- Learning outcomes
- Daily training schedules
- Evaluation

Facilitator & Faculty Introductions

Please include:

- Name
- Campus (and how long)
- Course(s) taught
- A little about yourself
- Your goals from this training

PD Objectives

- Learn about available resources in MyMathLab
- Apply knowledge and skills through hands-on activities
- Analyze student performance and item analysis to make recommendations for use or changes
- Build a community of support among users

PD Format

<u>Basic information</u>

- Three, non-consecutive 8-hour days
  - plus one hour for lunch: provided by college
- Two days in May, and one day in August
- Breaks announced (or take when needed)
  - water, coffee and snacks provided

PD Format

Audience

- Full-time and adjunct math faculty
- Associate math department chairs
- Department chair

Teaching and Learning Approach

- Live, face-to-face
- Hands-on, collaborate learning

PD Format

Instructors

- Facilitator *(will introduce all selected)*
- Lead faculty (*will be introduced)*

Course Delivery Method

- Applications based learning

PD Format

Course Venue

- Space conducive for learning
  - Classroom, small lecture or conference room

Course Evaluations

- Formative evaluation (end of each day)
- Summative evaluation at the end of the program

PD Format

Resources

- Laptops or desktop computers, if available
- Access to MyMathLab
- Access to prior courses
- Handouts and sample student data (provided)

PD Format

General training

- Short videos may be included in session
- Experienced faculty may lead activities
- Access to prior courses
- Approximately 40 – 60% of time spent on activities, discussion and reflection

Learning Outcomes

- Describe available resources in MyMathLab
- Demonstrate use of resources
- Demonstrate use of reports
- Identify techniques for using available tools
- Develop strategies for using MyMathLab (discussed for faculty and students)

Learning Outcomes

- Analyze reports to enhance course instruction
- Summarize results to make recommendations (for course improvement)
- Modify courses based on recommendations
- Plan mentoring training
- Update Algebra Partnership shell

Daily PD Schedule

Day 1 (Session 1)

8:00 – 8:30	*Opening remarks, announcements*
8:30 – 9:30	*Overview*
9:30 – 10:45	*Why use MyMathLab?*
10:45 – 12:00	*How MyMathLab was used.*
12:00 – 1:00	Lunch Break

Daily PD Schedule

Day 1 (Session 2)

1:00 – 4:00	*The basics (available resources)*
4:00 – 4:45	*Reflections & Possibilities*
4:45 – 5:00	*End of day critique*

Daily PD Schedule

Day 2 (Session 3)

8:00 – 9:00 *Introductions, Announcements, and Day 1 Recap*
9:00 – 12:00 *The Power of Reports.*
12:00 – 1:00 Lunch Break

Daily PD Schedule

Day 2 (Session 4)

1:00 – 2:30 *Using information in Reports*
2:30 – 4:00 *Maintaining and updating course materials.*
4:00 – 4:45 *Reflections & Possibilities*
4:45 – 5:00 *End of day critique*

Daily PD Schedule

Day 3 (Session 5)

8:00 – 9:00 *Introductions, Announcements, and Day 2 Recap*
9:00 – 10:00 *Ownership!*
11:00 – 12:00 *Using MML Learning Catalytics*
12:00 – 1:00 Lunch Break

Daily PD Schedule

Day 3 (Session 6)

1:00 – 4:00 *Communication Portal and Process*
4:00 – 4:45 *Reflections & Possibilities*
4:45 – 5:00 *End of day critique*

Evaluations

Formative Evaluation *(at the end of each day)*

Program Title: MyLab Algebra Partnership (MAP) / Select one: Day 1 Day 2 Day 3

1. Did the day cover all topics as described? Yes / No
   If not, briefly explain why or what was expected:

2. What would you change about the content of this session, if anything?

3. What recommendations do you have for the pacing of the day?

4. What additional topics would you like covered (*refer to topics covered in PPT*)?

5. Please include additional thoughts or recommendations below:

Evaluations

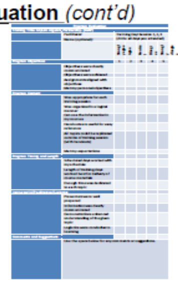
Summative Evaluation *(at the end of the program)*

Attendee Summative Evaluation Form

Program Title: MyLab Algebra Partnership (MAP) Date: ______________
Please complete this form to evaluate your training experience in terms of program objectives, content, timing and duration. Also, rate the facilitators and logistics used during the program.

Evaluations

Summative Evaluation *(cont'd)*



Questions?

The End!

Appendix B: Protocol for Semistructured Interview

INTERVIEW QUESTIONS

Say to participant.

Good (morning /evening). I am interested in how you view the use of MyMathLab (MML) to benefit student learning. I am also interested in how you used MyMathLab in your class. I will be asking you questions as they relate to using MyMathLab; I am interested in your opinions and ideas. There are no right or wrong answers. I have several questions to ask you. Please save any comments that do not pertain to the specific question until the end of the interview. There will be time to include them at the end of our session. The interview should last between 30–60 minutes.

As you can see, I will be recording your responses. I will also be taking side notes as we go along. Please do not let this interrupt your train of thought. Before we start, do you have any questions or concerns?

Wait and answer questions, or proceed.

Let's begin. As you know, the math department has been using MyMathLab in the in-seat classes of elementary algebra, and intermediate algebra since the fall semester of 2015. The questions I will be asking you are aligned with the two research questions for this study. I am interested in hearing your thoughts on the benefits or challenges of using MyMathLab to support student understanding of math concepts. Please be completely honest with your responses.

1. You indicated that you used MyMathLab in your in-seat math course or courses during the 2016– 2017school year. Before beginning this interview and for the record, is this correct? (Yes/No).

> *If yes:*
> 1a. Great! Was MyMathLab used in the elementary algebra course, intermediate algebra courses, or both courses during the 2016– 2017 school year?
>
> 1b. Approximately how many sections of each course did you instruct during the fall and winter semesters?
>
> 1c. Approximately how many students did you teach in the fall and winter semesters?

2. What are your thoughts, in general, about using MyMathLab as a supplemental resource for student learning?

> 2a. I see…If possible, please share an example how using MyMathLab has affected your use of classroom time or your approach to teaching.

2b. Also, please provide an example how student learning was affected by using MyMathLab.

3. From your experience, how important is homework for student learning? *Please explain*.

3a. In planning your teaching lessons for a class period, how important is it for students to complete their homework assignments? *If a reason is not given, ask:* Please provide a reason why it is/is not important to you.

4. Was MyMathLab used for assigning homework in your course?

4a. Were points earned by students for completing the assigned homework problems or offered as optional?

4a(1) *If points were not given:* What type of assignments do you offer students to practice and learn the concepts they reviewed during class period?

4a(2) *If points were given:* what was the homework worth as a percentage of the student's course grade?

4b. *If points were earned:* How were the points earned?

Probing: For example, w*ere points given just for attempting problems but not necessarily completing them, or for working through the problems to obtain the correct answers?*

4c. Was a pretest given to award credit for the concepts that students knew (to reduce their workload), or were all problems assigned for students to complete? Please explain a reason for your approach.

4d. Have you used the students' performance reports in MyMathLab to structure class lessons or lectures?

If yes: how were they beneficial?

If no: why not?

5. What are some of the comments or reactions from your students about using MyMathLab to complete homework assignments?

5a. How does classroom participation differ for students who regularly work through assignments in MyMathLab as compared to those who do not? *If needed:* Please explain your answer or give an example.

5b. Is there any difference in performance on assessments for students who regularly complete their homework in MyMathLab and those who do not? *If needed:* Please explain your answer or give an example.
5c. If MyMathLab was used in both courses: Please comment if there was a difference in student support for, or resistance to, using MyMathLab, by course. *If needed:* Please give an example.

6. Have you ever assigned other types of assignments in MyMathLab in addition to homework? If yes, please share examples.

6a. What were the results of using these assignments for student learning?

6b. How did the additional assignments impact your use of instruction time during the class period?

7. In your opinion, what are the greatest benefits of using MyMathLab?

7a. Please share an example of a benefit for student learning.

7b. Please share an example of a benefit for increased instructional opportunities.

7c. *If both courses were taught, ask:* were the benefits similar for students in elementary and intermediate algebra? *If needed:* Please explain/elaborate your response.

8. In your opinion, what are the greatest challenges of using MyMathLab?

8a. Please share an example of a challenge for students.

8b. Please share an example of challenges for faculty.

8c. *If both courses were taught:* were challenges the same or different for students in the two courses? *If needed:* Please explain or give an example.

9. Think back to the first time you used MyMathLab in your course(s). How has your opinion changed, or stayed the same, with respect to using MyMathLab for providing supplemental instruction to students? *If needed:* Can you support your position with an example?

10. How has your approach to teaching changed since the first time you started using MyMathLab in your courses?

If changed: can you provide/(elaborate on) an example. If it has not changed, please explain why.

11. What suggestions can you offer to faculty about using MyMathLab in the classroom?

12. What would you recommend to students to encourage them to use MyMathLab for learning?

13. Are there any other comments that you would like to add, or possibly go back to an earlier question?

This concludes our interview. Thank you for taking the time to talk with me. Once I type the interview, you will receive a copy of the transcript to verify accuracy of the information.

The current time is ___________. I am now turning off the recorder.

Turn off the recorder.

Walk participant to door.

Take time to reflect on the interview and write notes immediately in the space below.

Appendix C: Evaluations

Formative Evaluation Form

(Attendee feedback at the end of each day.)

Program Title: MyLab Algebra Partnership (MAP) / Select one**: Day 1 Day 2 Day 3**

1. Did the day cover all topics as described? Yes / No

   If not, briefly explain why or what was expected: ____________________

   ____

   ____

2. What would you change anything about the content of this session, if anything?

   ____

   ____

3. What recommendations do you have for the pacing of the workshop for the day?

   ____

   ____

4. What additional topics would you like covered (*refer to topics covered in PPT*)?

   ____

   ____

5. Please include additional thoughts or recommendations below:

   ____

   ____

Attendee Name (optional):____________________

Date: _______________

Attendee Summative Evaluation Form

Program Title: MyLab Algebra Partnership (MAP) Date: ________________

Please complete this form to evaluate your training experience in terms of program objectives, content, timing and duration. Also, rate the facilitators and logistics used during the program.

Program Evaluation					
Training Title: MyLab Algebra Partnership (MAP)					
Facilitator: Name (optional):	Training Day: Session 1, 2, 3 (*circle all days you attended)*				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Program Objectives	1	2	3	4	5
Objectives were clearly communicated					
Objectives were achieved					
Assignments aligned with objectives					
Met my personal objectives					
Program Content					
Was appropriate for each training session					
Was organized in a logical manner					
Had information I can use in my courses					
Handouts are useful for easy reference					
Had topics that could be replicated outside of training session (with handouts)					
Met my expectations					
Program Timing and Length					
Scheduled days worked with my schedule					
Length of training days worked best for delivery of course materials					
Enough time was dedicated to each topic					
Instructor(s)/Facilitation/Logistics					
Presenters were well prepared					
Information was clearly communicated					
Demonstrations enhanced understanding of the given topic					
Logistics were conducive to learning					
Comments and Suggestions					

	Use the space below for any comments or suggestions.