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Examining Math Instructors' Knowledge, Beliefs, and Attitudes of Student Learning Strategies in a Faculty Development Workshop

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EXAMINING MATH INSTRUCTORS' KNOWLEDGE, BELIEFS, AND ATTITUDES OF STUDENT LEARNING STRATEGIES IN A FACULTY DEVELOPMENT WORKSHOP

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Abstract

A faculty development workshop, focused on incorporating universal learning strategies into developmental mathematics courses, was created and utilized in a developmental mathematics department at an open-enrollment, mid-western university to ascertain the best methods for dissemination of essential learning strategies to developmental math students. Successful faculty development programs were studied and utilized in the design of the workshop. The attributes of the workshop were discussed. Faculty were surveyed and qualitative data was analyzed to determine the workshop's efficacy. The research aimed to understand if participation in the workshop changed faculty knowledge, beliefs, and attitudes in the following areas: (a) willingness to include learning strategies during class time; (b) knowledge of learning strategies and the effect of those strategies on students; and (c) application of the learning strategies into their courses. Pre- and post-workshop surveys were given to instructors measuring their knowledge of learning strategies, application of these strategies in their courses, and willingness to incorporate learning strategies into their pedagogy. In the workshop, instructors participated in discussion boards and set goals. The researchers analyzed the discussions and goal statements using thematic coding. The participants' comments revealed that, while the workshop changed all participants' knowledge of learning strategies and potentially changed all participants' attitudes and beliefs, the extent of the change in attitudes and beliefs depended upon the pre-workshop mindset of the instructor.

Keywords: faculty development, mindset, faculty beliefs, faculty attitudes

Introduction

Higher education faculty are most often employed by an institution based upon their expertise in the relevant field. Particularly in mathematics, many instructors enter their mathematics teaching career with sufficient content knowledge but with little to no pedagogical training (Robinson & Hope, 2013). Faculty are largely left to rely on their own experiences and professional development to establish their teaching methods (Oleson & Hora, 2014). Instructors tend to teach their subject in the manner it was taught to them and resist changing that pedagogy (Leinwand, 2007). However, instructors face an environment with increasing changes in technology, work roles, governing policies, student needs, and student levels of preparation (Bound, Lovenheim, & Turner, 2010; Kezar & Eckel, 2004; McClellan, Stringer, & McClellan, 2009; Parrish & Sadera, 2019). These changes facilitate the need for instructors to receive ongoing professional pedagogical training.

Particularly in STEM fields, there is an increasingly urgent call to improve teachers' instructional practices from administrators, lawmakers, national bodies, and individual researchers (Henderson, Beach, & Finkelstein, 2011). This call has been motivated by a general trend of lower completion rates, lower overall percentage of students enrolled in STEM fields, and lower exam scores in STEM education (National Academy of Engineering and National Research Council, 2012). These factors require faculty to continuously learn new instructional skills and methods to improve their teaching expertise, frequently outside their field of study (Sorcinelli, Austin, Eddy, & Beach, 2006).

Pedagogical Professional Development

Faculty development is often overlooked at the collegiate level but is becoming increasingly essential as higher education pedagogies rapidly change. Faculty development is important because it helps ensure consistent quality in all classes (Malvik, 2020). However, training is often resisted by faculty. Resistance comes for a variety of reasons, most commonly for the following reasons (Haas & Keeley, 1998; Lueddeke, 1999; Tagg, 2012; Taylor & McQuiggan, 2008):

- Instructors indicate that innovations are not lasting and have little chance of becoming permanent.
- Instructors feel that the time commitment of the faculty development outweighs the perceived benefit.
- Instructors receive little to no compensation or recognition for participating in faculty development and little emphasis is placed on faculty development in the promotion process.
- Instructors perceive innovations as being meant to control content and change their fundamental responsibilities.
- Instructors indicate after attending a workshop they still lack the knowledge and feel incompetent with the methods they are being asked to implement.
- Instructors have already found something that they think works and would rather not change what they already perceive is working well.

Faculty training, when designed properly, can alleviate faculty resistance to the ever-changing pedagogies and encourage instructors to adopt best practices (Taylor & McQuiggan, 2008). Well-designed faculty development courses can have a positive impact on the beliefs and attitudes of faculty, which will ultimately and, most importantly, benefit their students (Sorcinelli, Berg, Bond, & Watson, 2017; Land, 2004). Cook and Steinert (2013) explained that instructors are more likely to complete a faculty development workshop if the workshop addresses a relevant faculty or student need, facilitates communication and social interaction between other faculty members, and provides time to complete course activities during the workshop. Henderson et al. (2011) suggested that successful faculty development programs seek to change the behaviors, attitudes, and strategies of the participants. Further research has highlighted that faculty are more likely to value training when they can actively apply what they have learned in their classrooms (Elliott, Rhodes, Jackson, & Mandermach, 2015). Any successful faculty development program designed to improve instructional approaches must incorporate pedagogical strategies to improve student learning techniques in faculty teaching of their current and future courses.

The most successful faculty development programs are ones that emphasize collaboration, provide meaningful and relevant lessons that can help faculty positively impact students in the classroom, communicate the goal(s) of the course, provide reflective opportunities, and are time efficient (Cook & Stewart, 2013; Cox, 2006; Steinert et al., 2010; Steinart et al., 2016; Sunal et al., 2001; Tera, 2016). Furco & Moely (2012) specified that the goals of a faculty development workshop must be communicated to instructors and that instructors must have opportunities to try out the ideas presented so that they can gain competence and proficiency without inordinate demands on the instructor's time.

A study conducted by Hanna Teras (2016) on professional development in higher education concluded that profes-

sional development programs that are collaborative and reflective in nature are the most successful and transformative. Teras (2016) explained that a reflective, collaborative, long-term professional development workshop that is seamlessly integrated into instructors' teaching practice has proven to be the most favorable approach. These cohort-type programs extend over longer periods and provide faculty with the time and resources to efficiently integrate innovations into their teaching practices. Faculty are more likely to incorporate innovations in their courses when the faculty development program spans most of the semester rather than isolated, one-time workshops (Teras, 2016).

Methodology

Program Design

The Learning Strategies for Student Success (LS) professional development program was designed with current research in mind. The content of the course resulted from a need identified by math instructors for their students to improve their study skills so that they could be successful in their math classes. The program aimed to acquaint faculty with more impactful learning strategies and provide ideas for incorporating those strategies into their courses. The subject matter for this program was divided into eight modules. Each module provided an in-depth analysis of a specific learning strategy. Every module began with a presentation of the research underlying the learning strategy to be taught. The impactful learning strategies included topics such as decreasing students' math and test anxiety, teaching students about metacognition, and motivating students to learn. The course's research-based characteristics include the following:

- semester-long workshop
- emphasis on collaboration and reflection
- hybrid approach to minimize the impact on instructors' time
- administrative support and incentives to combat resistance
- goal-based methodology
- lesson plans fostering active application, modeling, and reflection (See Appendix A)
- encouraging implementation through smaller, incremental changes in teaching strategies

These following sections discuss the program characteristics in detail.

Semester-Long Workshop

Faculty participated in a semester-long workshop. The workshop asked faculty to learn, reflect and put knowledge into action by setting meaningful short and long-term goals. Research has shown that long-term faculty development courses are more effective than those of shorter duration (Furco & Moely, 2012; Teras, 2016).

Emphasis on Collaboration and Reflection

Collaborative learning was heavily emphasized by enrolling faculty in cohorts and asking them to share personal reflections on changes made in each workshop module with the group. Research has determined that collaboration and reflection foster participant completion and course success (Teras, 2016; Cook & Steinert, 2013).

Hybrid Approach to Minimize Impact on Instructors' Time

The workshop was designed to be completed online with short, in-person meetings to discuss the topics to minimally impact an instructor's time. The workshop required a time commitment of 1–2 hours each week. The workshop led instructors through pedagogical exercises and methods of increasing students' study skills (Cook & Steinert, 2013; Furco & Moely, 2012).

Administrative Support and Incentives to Combat Resistance

Both the Dean and Department Chair promoted the LS workshop and encouraged faculty to enroll. Participation in the workshop met annual review requirements and was compensated. The compensation indicated to instructors that the administration was appreciative and supportive of their efforts. Researchers have concluded that one of the reasons underlying faculty resistance to training is that participants receive little to no compensation or recognition for participating in faculty development and little emphasis is placed on faculty development in the promotion process (Taylor & McQuiggan, 2008; Haas & Keeley, 1998; Lueddeke, 1999; Tagg, 2012).

Goal-Based Methodology

Each week the participants set goals to incorporate new learning strategies into the math classes that they were teaching. At the end of each module, each instructor was asked to make long-term goals for future semesters. At the end of the workshop, participants were asked to write three long-term goals and explain, in depth, how those goals would be incorporated into the next semester's syllabus.

Lesson Plans Fostering Active Application, Modeling, and Reflection

Lesson plans and "ready-made" activities were included in the LS workshop (see Appendix A). These prepared lesson plans were used as reflective pieces and served as a means for instructors to role-play incorporating learning strategies into their classroom. Role modeling and reflection on pedagogies are significant aspects of the goals in the LS professional development course and are important components of well-designed faculty development (Mann, 2014; Elliott, Rhodes, Jackson, & Mandermach, 2015).

Fostering Implementation Through Smaller, Incremental Changes in Teaching Strategies

The LS workshop focused on helping instructors make small changes each semester. The small changes were designed to greatly increase student success and learning. Change must occur over time and those changes must be "large enough to represent real and significant change but small enough to be manageable." (Leinwand, 2007, p. 582)

Research Approach

The approach for this study is qualitative, explanatory research to better understand the value of the professional development workshop on the participants.

Research Design

To better analyze the types of instructors, the researchers selected a case-study approach by categorizing instructors and analyzing the qualitative data collected on instructors.

Setting and Participants

The Learning Strategies (LS) faculty development workshop and its outcomes were studied for two semesters. Participants were recruited through faculty meetings and invitation emails that were sent to all developmental math faculty and adjunct faculty. A small stipend was offered in the invitations. Participants were notified that their data was being collected and studied, and consent was obtained. The Institutional Review Board was petitioned and they granted approval for this study.

All participants held full-time or adjunct positions in a Developmental Math department; the department specializes in teaching pre-algebra through intermediate algebra courses. Eleven instructors enrolled in the workshop over both semesters: six tenured instructors and five adjunct instructors. Four of the tenured faculty members used participation in the workshop as a service assignment instead of receiving the stipend. During the data analysis, two distinct categories of instructors arose. Due to the relatively low number of enrollees, and to protect the identities of the participants, this paper will focus on two general categories of instructors who completed the workshop and a pre-and post-workshop survey.

Instrumentation

A pre-and post-workshop survey was administered to measure the effect of the LS workshop on the instructors' beliefs and attitudes in the following areas: (a) their willingness to include learning strategies during class time; (b) their knowledge of pedagogical techniques for promoting study skills and learning strategies; and (c) their application of learning strategies and study skills in their classroom (See Appendix B). Discussion boards and reflective goal-setting assignments were a mandatory part of the workshop and analyzed qualitatively.

The surveys were modified from the Transtheoretical Model Learning Survey – Faculty (TTM – F) (2021) and Teaching Strategies Self-Awareness inventory (TSSA) **(2021)** and edited to emphasize the willingness to apply, the application of, and the knowledge of successful learning strategies. While the TTM-F and the TSSA have not been fully tested or validated, they have been through several iterations of revision and testing. They were both modified to fit the scope and intent of the research conducted in the LS workshop (see Appendix B).

The survey instrument contained ten questions that assessed the instructors' previous use and implementation of common learning strategies.

Example questions included:

- *I used in-class active learning techniques (group work, clickers, problem-based learning, etc.)*
- *I asked student peers to answer questions raised in class or on an online discussion board rather than answering them myself.*
- *I explicitly encouraged students to learn and apply academic skills such as note-taking, reviewing for a test, and metacognition.*

Data Collection Procedures

The instructions asked instructors to mark how often certain common learning strategies were used in their courses. This section was scored using a 5-point Likert scale (1 = did not use to 5 = used it daily or several times a week).

The pre-and post-workshop surveys were embedded in the online workshop materials and assigned due dates. There were no points assigned to the surveys and no credit was given for completing the surveys. The results were collected by an unbiased staff member. The workshop evaluation survey was placed in the online workshop materials, and participants were asked to complete the evaluation as part of the workshop requirements.

Several discussion boards were required and graded as part of the workshop. Discussions took place in two parts of the modules: (a) directly after the required readings and videos, and (b) directly after the goal-setting portion at the end of the module, called Goal Boards.

Discussion Boards were prompted. Prompts varied from module to module and were designed to spark discussion by having no "correct" answer. Prompts relied heavily on teacher beliefs and were designed to allow instructors to put their opinions and beliefs into writing.

Example prompts included:

- *What will teaching and education look like in 2050? Does the learning students receive today prepare them for their future?*
- *From what you have learned in this module and from your own experiences, tell why you agree or disagree with the following statement: "Learning how to learn cannot be left to the students. It must be taught."*
- *Which is more important in mathematics learning – procedural knowledge (computation) or conceptual understanding (process)?*

At the end of each module, participants engaged in goal setting. Participants considered all of what they had read and experienced during that module and set a goal. In the discussion, participants reflected on the effectiveness of the strategy that they had incorporated into the class, wrote down any ideas that they felt were particularly powerful on a discussion board, and set a goal for either the current semester or for future semesters and wrote that goal on a goal board. Participants were encouraged to include in their reflection any changes they would like to make to their future courses. Discussion boards and goal boards were automatically collected within the workshop.

Data Analysis Procedures

A comparative mean analysis was done for the pre-and post-workshop survey. The discussion boards were reviewed and coded by themes. The themes were (a) a demonstration of the instructor's knowledge of the learning strategy discussed in each module; (b) the willingness to include learning strategies in their pedagogy and; (c) whether there was a direct application of the learning strategies into their current classes.

Results

A comparative mean analysis was done for the pre-and post-workshop survey. Of the ten techniques framed in the survey, only six showed any noteworthy change. Those six are shown in Table 1. According to this data, a general increase in scores in all but one technique occurred. The three techniques that increased the most by the end of the semester were

(a) active learning techniques, (b) students answering other student's questions, and (c) assessing students' mathematical communication and critical thinking skills.

Table 1. ***Mean scores for the "How often do you use the following techniques?" survey.*** **Note:** ***Questions were scored on a Likert scale where 1 = did not use to 5 = used it daily or several times a week.***

Question	Pre	Post
Allow revision of assignments	1.6	2
Assess communication and critical thinking skills	1	2
Use active learning techniques (e.g., problem-based learning)	1.6	2.6
Teach academic skills (e.g., notetaking)	3.6	3.3
Discuss how learning occurs and how to improve learning	3	3.6
Allow peers to answer questions	3.3	4.3

The discussion boards and goal boards from each module offered a considerable amount of qualitative data. Upon analysis of the thematic coding of the discussion boards and goal boards, two distinct categories of instructors arose. Category 1 (C1) instructors were resistant to change, or instructors with a fixed mindset toward strategies for student success. Category 2 (C2) instructors were open to change, had tried many of the strategies before the workshop, and had an open mindset toward strategies for student success. The categories were determined by similar wording, parallel comments, similar pedagogical changes, and similar classroom results to the implementation of the strategies presented in the workshop. The results of the discussion boards and surveys are presented below within each category.

Category 1

Category 1 (C1) had the following characteristics: resistant to taking the workshop initially, already firm in their teaching practices, or intending to leave the profession. C1 reported several times over the semester that they had no time in class to present learning strategies, that they had systems that worked, and that there was little to no desire to change what they had been doing for many years.

Sample comments from the discussion board analysis for C1 are in Table 2. The discussion boards indicated that C1 were very resistant to change at the beginning of the course, but their resistance lessened during weeks 6 through 10 of the semester.

Table 2. ***Sample comments from the discussion board analysis for the category one instructors.*** **Note:** ***Comments indicate resistance to the workshop throughout the semester.***

Comments
I'm happy with the way I'm doing things now.
I have a good system going now, and I don't want to mess with that.
I put some of the info from how to learn on my homepage... it is up to those students who need it to try out those helps.
If I had more class time, I would like to do more of the activities.
At this point I'm not going to include a mini lesson during class time, but I will refer my students to the link when they need help.

Common themes found in the discussion and goal board analysis for C1 instructors indicated that they believed their teaching styles, pedagogy, and course design worked for them and their students. They shared that their students were doing well enough, and they were happy with how their courses were going. Without seeing a need to change, these instructors were reluctant to try new things. C1 indicated that they believed that the success strategies presented in the faculty development course would add little value to their courses.

C1's comments within the first two modules indicated that they believed to have already incorporated some of the learning strategies organically. To them, their courses already contain the necessary instruction for students to learn.

The comments also indicated that C1 believed students are the responsible party in learning. They felt that their role as instructor was not to assist students in learning how to learn, but as a guide through the course content. The discussion board comments indicated C1 instructors believe that students were unwilling to change their study skills and that the efforts of incorporating LS into courses was futile. This is illustrated by a quote from a C1 participant, "I truly believe that students will do as little as possible because [learning] is not a priority for them."

In the goal-setting pages, C1 instructors used conditional language and lacked specifics: "I think I will try," "maybe next term," and "I might try a little more." In addition, category one instructors' discussion comments indicated an increase in knowledge of the learning strategies beginning in module 4. "I really enjoyed the [article]. I will try to further nurture them so that they will let go of their fears and learn." They read the articles and watched the videos and demonstrated through their comments that they had attained an understanding of why the strategies were important. However, they were reluctant to apply the presented techniques in the classroom or use class time to discuss learning strategies. One C1 participant noted, "I have made [study skills activity] available to students. I'm not requiring them to use any of the skills, so most likely very few students will try it."

Table 3. ***Mean scores for the "How often do you use the following techniques?" survey for C1 instructors.*** **Note:** ***Questions were scored on a Likert scale where 1 = did not use to 5 = used it daily or several times a week.***

Question	Pre	Post
Allow revision of assignments	1	1
Assess communication and critical thinking skills	1	1
Use active learning techniques (e.g., problem-based learning)	1	2
Teach academic skills (e.g., notetaking)	3	2
Discuss how learning occurs and how to improve learning	4	2
Allow peers to answer questions	4	4

When considering the pre- and post-workshop survey data with only the C1 instructors considered, the data had two scores that decreased from the pre- to the post-workshop survey. Those questions were: (a) "How often do you spend class time discussing or posting on how learning occurs, how to improve learning, and student success strategies?"; and (b) "How often do you encourage students to learn and apply academic skills?" (i.e., notetaking, mathematical writing skills, etc.). C1 instructors began the workshop with higher scores in these two areas and concluded the workshop with lower scores. C1 instructors scored themselves very low on assessing communication and critical thinking and allowing students to revise assignments, and these scores did not change at all during the course.

Category 2

Most of the instructors fell into Category 2. They had previously tried to improve their pedagogy and instruction and were willing to make changes to try again. Positive experiences with new techniques and recalling their own student experience fueled them to seek out faculty development and use it to increase their teaching efficacy. A quote from a C2 participant: "I believe individual instructors can make monumental changes incrementally that will revolutionize learning."

C2 data from discussion boards show increased knowledge, application, and willingness throughout the entire semester. Sample comments from the discussion boards for C2 are included in Table 3. The data indicated that C2 remained quite positive throughout the semester and wrote of classroom successes more frequently than C1. They often used prior pedagogical attempts to highlight that they had tried the learning strategies in prior courses but repurposed the activities and tried again for the sake of the faculty development workshop. They also indicated that they had personally seen success with individual students and had impacted the lives of more than one person in their careers.

Table 4. ***Sample comments from the discussion board analysis for the category two instructors.*** **Note:** ***Comments indicate an increase in knowledge, application, and willingness to apply throughout the semester.***

Comments
I believe the idea of community and learning together is powerful. I want to get better at incorporating this into my classroom.
I really appreciate this workshop for giving ideas toward the need for student interaction. I've know that it's important, but have struggled to always implement it, especially in classes that won't make a peep.
The idea of developing persistent problem solving is something I really want to focus on. So, I plan to be less helpful – in a helpful kind of a way.
Basically, I plan to incorporate a mini lesson from each module because they all have such great value.
The metacognition, study skills, and active learning modules spoke to me. This is where I could improve the most and where I feel like students could benefit most. I'm very excited about working these topics into my curriculum for upcoming semesters.
I am going to give my students the math study skills quiz. I have taken about 10 minutes during each class period to have a "how to study successfully" conversations.

C2 instructors exhibited prior knowledge in most areas of concentration in the workshop. They wrote of times where they had attempted activities meant to promote the learning strategy being presented. Even with their prior knowledge, they noted that the reminders they received in the workshop improved their instruction and pedagogy. "Overall, I can see the advantages of adjusting my teaching to better engage, guide, and teach students life skills," noted one C2 instructor.

C2 used class time to lead discussions and were willing to incorporate both the ready-made activities they crafted themselves to promote learning strategies to their students. "I am already planning on a few small changes — student lead reviews and a life-driven chapter on percents," noted a C2 participant. The comments included specific and detailed changes they incorporated into their classes after reading or watching videos in the LS workshop. One comment stated, "I took the challenge to ask a question at the beginning of the class on a review day and have them individually assess how much they truly understand as a groundwork for preparation for the exam."

C2 had moments of inspiration for things that they could improve upon and set goals to improve the classroom experience for students. One C2 instructor noted, "It's given me a positive opportunity to see that I can go beyond traditional teaching."

C2 instructors wrote of motivating their students and used learning techniques to help students to develop life skills

in addition to math skills. They wrote of helping students to feel safe and become lifelong learners. One indicated, "I'm definitely going to show them a video or two from this module and have a discussion. It's important for them to understand they aren't stupid, they just haven't had the opportunity to develop this skill in their life."

The language used in C2 goals was firm and specific: "I accept the challenge," "I'll infuse my classes with...," "I'm definitely going to..."

A predominant common theme for the C2 was positivity. C2 instructors wrote of successes and failures from previous courses. They indicated they had further ideas that they felt would make the courses better for students and student outcomes. They wrote of their belief that teaching was an iterative process in attempting new things, assessing outcomes, and trying again. Students were never written about in a negative light. C2 instructors expressed their desire to bring all students along to the point of learning. One noted, "As students look beyond themselves and are willing to share and connect, they strengthen others and the process itself."

Table 5. ***Mean scores for the "How often do you use the following techniques?" survey for C2 instructors.*** **Note:** ***Questions were scored on a Likert scale where 1 = did not use to 5 = used it daily or several times a week.***

Question	Pre	Post
Allow revision of assignments	3	4.5
Assess communication and critical thinking skills	3.5	3.4
Use active learning techniques (e.g., problem-based learning)	4	4
Teach academic skills (e.g., notetaking)	2	3
Discuss how learning occurs and how to improve learning	3	4
Allow peers to answer questions	2	2.5

When considering the pre- and post-workshop survey data for only C2, the data indicated improvement or no change in all areas of the survey. The highest change was in allowing students to revise assignments after feedback, a practice not common among math instructors. C2 instructors also indicated that they feel they already use many active learning techniques in their classrooms, and that the workshop had no real change in their proclivity to use those activities.

Discussion

For both C1 and C2, data indicated that participation in the faculty development workshop changed the instructors' knowledge of success strategies. The data indicated that there was some application of the learning strategies in both C1 and C2 and that willingness to use the learning strategies increased over the duration of the workshop, although willingness only increased slightly in C1.

The application and willingness to implement strategies were more stunted in C1 as compared to C2. C2 were generally more positive about their experience in the workshop and implemented learning strategies either immediately or wrote strongly worded goals indicating that they would incorporate strategies in upcoming courses. C1 did very little in the way of changing pedagogies and implemented some success strategies only virtually without using class time. C1 indicated that they found some of the strategies helpful and would implement them in a future semester, but those goals were worded less convincingly.

C1 and C2 instructors hold starkly contrasting beliefs about student learning. C2 participants wrote about methods

to help students learn metacognition and other learning skills. C2 wrote about helping students change their self-efficacy in learning math and seeing themselves as capable learners and adults. C2 focused on teaching their students to navigate life as well as mathematics. Their focus was more centered on a whole student approach and not just the mathematics they were assigned to teach. C1 wrote that students needed to figure out learning strategies on their own and find their motivation. A particular comment from a C1 instructor stated that students needed to be more "mature" to figure out how to pass a class in college. C1 appeared to place the responsibility for learning entirely on students, while C2 felt that instructors had the power to influence students' ability to learn.

The C1 instructors' data could indicate a fixed mindset in teaching. They felt their teaching could not improve or that any changes in their teaching would not make a difference in their students' ability to learn. They indicated that the responsibility of learning rested solely upon the students and any student failure was not a symptom of teaching but an indication of a lack of student maturity or motivation. The collaborative nature of the workshop convinced the C1 instructors to try different methods, although the attempts were minimal and involved no real pedagogical changes.

The C2 instructors demonstrated a growth mindset toward teaching. They often commented on things they had tried in the past, and what changes they would make moving forward. Their perspective showed that they were willing to learn new pedagogies and implement them in their classrooms. Their attitudes indicated positivity and they saw themselves as learners in the teaching profession.

The data indicated that C1 instructors declined in two areas of the survey. Interestingly, the decline in scores and the C1 instructors' comments revealed that they came into the workshop with a higher view of their teaching efficacy and noted that their classes were doing great. C1 instructors repeatedly stated that they were satisfied with their teaching, their students were successful, and they saw no need for change. This view may have caused the initial high scores on the survey, but as their knowledge increased and as they saw their peers incorporating the strategies, their scores decreased. This change could also be a result of an increased understanding of student success strategies and their implementation of them in their courses.

Limitations

One limitation of this study is the small number of participants. Over the two semesters that data was collected, 11 professionals completed the workshop. A further limitation of this study was instructor selection. Most of the instructors exhibited C2 qualities, which could be a direct result of the self-selection process. Most professional development opportunities involve volunteers only, and instructors are not necessarily sought out to participate. This could mean that instructors who would fall into Category 1 were less likely to participate in the workshop and other development opportunities.

Conclusion

The faculty workshop had a positive impact on the participants' knowledge, their willingness to incorporate strategies into their courses, and the actual application of student success strategies. Drawing on Sorcinelli, Berg, Bond, & Watson (2017), Land (2004), Cook and Steinert (2013), and Henderson et al. (2011), the workshop was designed to impact instructors' beliefs and attitudes, encourage and facilitate communication between the instructors, make faculty development more accessible, and conduct activities during the workshop. The attributes used in the design were flexibility, collaboration, research-based, and peer-led. Drawing on Elliott, Rhodes, Jackson, & Mandermach (2015), Cook and Steinert (2013), Cox (2006), Steinert et al. (2010), Steinert et al. (2016), Sunal et al. (2001), Teras (2016), and Furco

and Moely (2012), the semester-long workshop offered concrete solutions to current teaching challenges, provided time for reflection, discussion, and collaboration, had goal-based outcomes, provided active, real-time application of strategies focused on efficiently integrating what was learned into the instructors' teaching practices, and provided tools to minimize the time impact on instructors who implement the strategies.

Faculty members who participated could be generally grouped into two distinct categories: those who were resistant to altering their pedagogy and those who were open to trying new success strategies. Anticipating resistance, and addressing the underlying reasons for resistance highlighted in Haas and Keeley (1998), Lueddeke (1999), Tagg (2012), and Taylor and McQuiggan (2008), the workshop design minimized the time impact on the participants, bolstered recognition and compensation for participation, presented strategies as research-based tools to supplement instructors' methodology, provided opportunities to experience positive outcomes from integrating, aimed at highlighting the efficacy of learning strategies, and focused on ensuring participants gained a working knowledge of the strategies.

Those who were more willing to try new strategies already exhibited qualities that enhanced the experience from the beginning of the course. They wrote of previous experiences where they had incorporated study skills or other success strategies, assessed those strategies, and set goals to further alter activities to be more effective. The knowledge, willingness, and application of student success strategies saw a greater gain in these participants.

The more resistant faculty did experience positive change in gaining knowledge and a slight increase in their willingness to apply and the ultimate application of student success strategies in their courses. Some indicated that they were unwilling to change due to several factors. The most prevalent factor was that the current method of instruction was successful enough, and they saw no need to make any changes. Other factors included: the onus of metacognition was on the student, they lacked the class time to make changes, and they did not believe the strategies would encourage any change in student behavior. Faculty development is a positive endeavor by institutions to aid higher education faculty in becoming dynamic teachers in an educational environment that is ever-changing. This research demonstrates that providing faculty with workshops increases their proclivity for change in their classroom. The workshop provides a case study of a successful faculty development activity that can possibly be recreated at other institutions for faculty benefit. Further research into the areas of how to change instructor mindset would greatly benefit the field of higher education and teacher training.

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Appendix A

Lesson Plan Example

Module 1 Mini-Lesson—Using the Syllabus

Rationale:

Many of our students do not understand the significance of the syllabus. This lesson will aid the student in their ability to navigate the syllabus and pull out important information (i.e., due dates, homework policy, date and time of the final).

It is best to cover this material at the beginning of the semester. This will help students to understand what is expected in your course. They will also be able to make better decisions in the first weeks of class if they understand your expectations.

Learning Outcomes:

Students will be able to:

State what a course syllabus is.
Explain what information they can find in a typical syllabus.
Answer basic questions about your course, including:

- How to get help
- When and where office hours are
- Instructor expectations
- Deadlines
- Grading scales

Instructional Ideas:

1. Syllabus Search:
    - Have a brief conversation about the course syllabus. Questions can include:

- What is a course syllabus?
- What kind of information can you find in it?
- When do you use the syllabus?

Divide students into small groups and explore the syllabus. You can:

Assign each group a section of the syllabus to explore with a topic specified that they will report back on.
Have each group read the entire syllabus and then discuss the specific topics as a whole, or answer questions as they arise.
Have groups report the information that they found.
When "office hours" come up, ask students if anyone has used office hours before. If so, ask those students to share tips on how to get the most out of office hours. Share tips such as:
Who should attend office hours?
Make sure you are prepared for office hours. If you have specific questions, bring those questions with you. If you are wondering about your grade, look up your grade before you go to meet your professor. Your instructor may have suggestions for you.

2. Syllabus Quiz: Write a quiz or Canvas quiz about the most important things in your syllabus. Here are some suggestions for quiz questions:

Basic Information:

- When are office hours?
- How do I contact my professor?
- What materials do I need to bring to class?
- When is the last day to drop the class?
- More detailed information:
- What is the purpose of my taking this class?
- Where can I go to get help?
- What is the purpose of office hours?
- Does my instructor drop a test?

You can give situational questions, such as:

- Johnny misses class on September 10th. What does he do to find out what he missed and how can he recover from his absence?
- What do I do if I know that I am going out of town on a test day?
- Mary is in a car crash on her way to school. She misses an in-class quiz. Can she make it up?

3. Student-Made Syllabus Quiz

On the first day of class, instead of handing out the syllabus and going through it with the students, put them in groups of 3 or 4. Have each group come up with four questions that they have about the course and/or course policies. Hand out the syllabus to the class, then have groups switch questions and use the syllabus to answer the other group's questions. Have each group share one question and give its answer to the whole class. Go over any questions that the students could not answer using the syllabus.

Resources:

Sample Syllabus Quiz: [*file with an example syllabus quiz included in course]*

Appendix B

Survey Questions

Teaching Strategies Assessment

Instructions:

During the last academic term in which you taught a Developmental Math course at UVU, please indicate how often you used the following methods in at least one of your courses. Please use the following scale and indicate your answer in the space provided.

1	2	3	4	5
Did not use	Used once or twice in the term	Used at least once monthly	Used it probably at least once weekly	Used it daily or several times a week

1. I asked student peers to answer questions raised in class or on an online discussion board rather than answering the questions myself.
2. In class, I spent significant amounts of time discussing or posting on how learning occurs, how to improve learning, and student success strategies.
3. I explicitly encourage students to learn and apply academic skills including notetaking, mathemati-

cal writing skills, group development, metacognition, how to review for a test, finding and correcting errors, etc.

4. I used in-class active learning techniques (e.g., group work, clickers, gamification, problem-based learning, exploration, etc.) to assess student comprehension.
5. I used class time or out-of-class assignments to facilitate student development in individual and group skills in oral communication, written communication or critical thinking.
6. I permitted students to revise assignments and exams following input or feedback from myself and/or their peers.

Instructions:

During the last academic term in which you taught, please indicate if your *course design/syllabus* contained any of the following elements.

Yes or No

1. Incentives or encouragement for students to form study groups or learning groups.
2. A requirement or option that requires students to show work.
3. Assignments or activities designed to increase student reflection on their own learning.