A Seminar Paper

The attached research, by Brenda Bunn, entitled, The Impact of STEM Professional Development on Educator Self-Efficacy, when completed, is to be submitted to the Graduate Faculty of the University of Wisconsin-Platteville in partial fulfillment of the requirements for the Master of Science in Education Degree, for which 3 credits shall be allowed, is hereby

Approved __Dale Henze__________________Date: ___March 29, 2017___________________

THE IMPACT OF STEM PROFESSIONAL DEVELOPMENT ON EDUCATOR SELF-EFFICACY

A Seminar Paper

Presented to

The Graduate Faculty

University of Wisconsin-Platteville

In Partial Fulfillment of the

Requirement for the Degree

Masters of Science

in

Education

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by

Brenda Bunn

2015

ACKNOWLEDGEMENT

I want to thank Mr. Jamie Nutter, Dr. Jodean Grunow, and Dr. Timothy Deis for providing me with the opportunity to participate in the STEM Program. Without your vision, this would not have been possible. Together, we are working toward one goal - student achievement.

I also want to thank my husband and children. Your patience, flexibility, and support were just amazing. I could not have devoted the hours necessary to complete this without your positive attitudes! I'm so blessed.

ABSTRACT

STEM activities integrate science, technology, engineering, and math. When these activities are integrated, rather than isolated, students actively learn content while applying the knowledge (Lott, et al., 2013). Research suggests a relationship between teacher's beliefs and the way they teach (cited in Albion & Spence, 2013). Self-efficacy is a huge factor in behavior development. Therefore, teachers who have low self-efficacy in teaching STEM topics will devote far less time to teaching them and are less likely to implement inquiry-based methods. Professional development opportunities can help increase teachers' self-efficacy, which will ultimately increase the amount of time spent teaching and the quality of STEM instruction. The proposed study compares K-12 teachers' self-efficacy regarding their abilities to integrate STEM learning activities into their classrooms before and after one year of participation in a STEM professional development cohort.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Teachers who have knowledge, competence, and efficacy for teaching Science, Technology, Math, and Engineering (STEM) will be able to integrate it in their classrooms. Unfortunately, many teachers did not receive acceptable training in this area and, therefore, are not able to provide their students with adequate instruction (Gillies & Nichols, 2014). This is carrying over to the real world and is evident when looking at the low number of people choosing professions in fields related to STEM (DiFrancesca, Lee, & McIntyre, 2014). These fields are lacking qualified workers. The benefits of integrating STEM into the classroom go beyond employment motivations. The learning that occurs during a STEM lesson is rich and meaningful and students learn real-life skills, including grit and perseverance, that will help them be successful throughout their lives. By providing teachers with professional development, it is believed that they will acquire the skills, knowledge, confidence, and efficacy necessary to effectively teach STEM topics in their classrooms (Baxter, Ruzicka, Beghetto, & Livelybrooks, 2014).

If teachers gain confidence in their ability to teach STEM concepts by participating in professional development opportunities, there will be a positive impact on student learning (Tschannen-Moran & Woolfolk Hoy, 2001). Teachers will be able to capture students' interests and make learning more meaningful (Gillies & Nichols, 2014). I am proposing a study to survey educators taking part in the STEM program at the University of Wisconsin-Platteville at two different times throughout the program to see if there are significant increases in STEM teaching self-efficacy between pre and post-test measures.

Statement of the Problem

Does the STEM professional development program increase K-12 educators' self-efficacy regarding their teaching of STEM topics?

Definition of Terms

Grit: being able to keep interest in and effort toward long tasks (Laursen, 2015)

STEM cohort: a group of X in-service teachers who are participating in a STEM program at the University of Wisconsin - Platteville

STEM lessons: activities that integrate science, technology, math, and engineering (Lott, Wallin, Roghaar, & Price, 2013)

Teacher efficacy: belief of one's abilities to produce a desired outcome in student learning; belief that one has the necessary skills and will be able to use them until a desired result is achieved (Albion & Spence, 2013)

Delimitations of Research

The information gathered is from one cohort of K-12 educators participating in a STEM program at the University of Wisconsin-Platteville, therefore, it may not generalize to other educators who are participating in professional development opportunities regarding STEM. Also, the participants in this group all chose to be a part of the STEM program so they, most likely, have an interest in STEM topics. All of the educators in this study are from Wisconsin, so it may not generalize to teachers in other geographical locations.

Method of Approach

I will survey the teachers in the STEM Program at the University of Wisconsin-Platteville (STEM cohort) early in the 2016 spring semester about their self-efficacy level in teaching STEM topics, implementation of STEM, attitude toward STEM learning, perceptions of student achievement, and professional development opportunities. After one year (Spring of 2017), I will give them a follow-up survey. I will examine the data to see if there is a difference between teachers' self-efficacy levels at the beginning of and after one year in the cohort.

CHAPTER 2

REVIEW OF LITERATURE

The educational practices in the United States are in need of a major revampment. Business, association, and educational studies all agree that the United States is performing so low in the STEM disciplines that it is in grave danger of losing it competitive edge in the workplace (Merrill & Daugherty, 2010). Scientists and the general public agree that K-12 STEM education in the U.S. leaves much to be desired and tests results appear to back them up (Desilver, 2015). Students are not seeking the STEM disciplines in college (Lott, Wallin, Roghaar, & Price, 2013) and STEM related fields need workers to keep them running (Demski, 2009). STEM initiatives are seeing a dramatic rise in the United States. Still, our scores on tests in these disciplines are still lower than other nations' scores (DiFrancesca, Lee, & McIntyre, 2014). It's puzzling that even though employment opportunities in these fields are increasing, students are not seeking these fields (Albion & Spence, 2013).

Passion drives learning. Teachers who love what they teach and are confident in their teaching are better able to help their students learn. Many teachers are not confident in their ability to teach STEM topics (Gillies & Nichols, 2015) or to effectively integrate the concepts in their classrooms (Nadelson et al., 2013). In fact, less than one third of all kindergarten through fifth grade teachers in the United States feel qualified in these areas (Gillies & Nichols, 2014). Teachers avoid teaching STEM topics for various reasons, including inadequate knowledge, lack of experiences, and low confidence (Murphy & Mancini-Samuelson, 2012). Unfortunately, this causes them to teach to the test instead of helping students dive deeper and gain a more thorough understanding of the topics.

This is not promising news considering that students' foundational knowledge develops in their first years of school (cited in Nadelson et al., 2013). The early years are critical to developing a foundation of STEM topics, therefore, it is extremely important that we learn how to teach them effectively (Epstein & Miller, 2011). Also, positive experiences with these topics during childhood are contributing factors when deciding to pursue STEM fields (cited in Albion & Spence, 2013). Placing an emphasis on STEM in the early years has the greatest impact (Murphy & Mancini-Samuelson, 2012), therefore, the teachers who teach at this level need to learn how to provide meaningful instruction.

Our students need to be armed with the necessary skills when they graduate from high school (Dow, 2014). Revamping teacher education programs to include courses relating to STEM that are engaging and relevant is one way to solve this problem (Murphy & Mancini-Samuelson, 2012). Professional development is another way educators can learn methods to improve instruction. By doing so, they will increase their knowledge and confidence, which will ultimately impact their students positively. If teachers are confident in what they teach, they will feel more competent as well.

STEM

STEM activities integrate science, technology, engineering, and math. When these activities are integrated, rather than isolated, students actively learn content while applying the knowledge (Lott, et al., 2013). This requires curriculum to be organized around themes instead of each academic discipline (cited in Nadeslon et al., 2013). Teachers act as facilitators, scaffolding activities to encourage students to think and ask questions (Gillies & Nichols, 2015). Also, teachers use appropriate questioning techniques to guide students without giving them the answers. Students learn best when concepts are integrated (Moomaw & Davis, 2010), which makes STEM a highly desirable learning environment. This also helps students develop grit and perseverance, which are strong indicators of success (Laursen, 2015).

General Benefits of STEM

STEM activities are appropriate and necessary for even the youngest learners. These activities help children focus, increase their vocabularies, learn how to collaborate, and develop scientific relationships (Moomaw & Davis, 2010). In fact, children develop these skills even before entering school (Nadelson et al., 2013). These types of activities also allow some children with limited vocabularies to display higher-level thinking than traditional assessments allow them to do (Moomaw & Davis, 2010).

A STEM unit that was presented to a kindergarten classroom demonstrates how powerful this type of learning can be. Students learned about animals and habitats and then applied what they learned to create a habitat for imaginary hamsters (Tank, Pettis, Moore & Fehr, 2013). They followed the engineering design by identifying the problem, asking questions, researching, and testing their designs to solve the overall problem of creating a habitat based on certain needs. The experience proved to be extremely beneficial to the students! They were able to apply what they had learned when they visited a nature preserve, showing that they had gained a deeper understanding of habitats.

Getting students interested in STEM topics will also increase interest in STEM-related fields (Demski, 2009; cited in Nadelson et al., 2013). When students perform poorly in science as children, they grow into adults with low scientific understanding (Epstein & Miller, 2011). STEM activities allow a teacher to provide the necessary background information and let students utilize that knowledge and see how it applies to the real world. It also provides opportunities for students to be like real engineers and scientists by learning from mistakes and modifying designs just like they do (Tank, et al., 2013).

Even though STEM is getting a lot of attention, engineering is often not included in instruction as often as math and science (DiFrancesa, Lee, & McIntyre, 2014). Because teachers have the wrong perception of engineering, they often are reluctant to expose their students to it. This limited exposure is preventing children from gaining an accurate understanding of the field and, therefore, not pursuing careers in engineering when they are older. By teaching children the five-step process that is a part of the Engineering is Elementary (EIE) Program, students gain a better understanding of how to solve any problem and are more motivated to do so. It also helps them understand the concept of engineering more accurately.

Teacher Efficacy

Students who have teachers with high self-efficacy have higher achievement, motivation, and own self-efficacy (cited in Tschannen-Moran & Woolfolk Hoy, 2001). It appears that teachers with high efficacy are more enthusiastic about teaching, are more committed to teaching, put forth more effort, are more resilient, are less critical of students, set better goals, are more organized, are open to new methods, and aspire to higher achievement. All of these characteristics help teachers to be more effective at teaching, which means better learning for students. Having a school with teachers with high efficacy can be a stronger predictor of student achievement than the socioeconomic status of the students (Tschannen-Moran & Woolfolk Hoy, 2001). Learning the beliefs that contribute to high efficacy and then helping teachers develop those beliefs will be a win-win situation.

Research suggests a relationship between teacher's beliefs and the way they teach (cited in Albion & Spence, 2013). Self-efficacy is a huge factor in behavior development. Therefore, teachers who have low self-efficacy in teaching STEM topics will devote far less time to teaching them and are less likely to implement inquiry-based methods. Professional development opportunities may help increase teachers' self-efficacy, which will ultimately increase the amount of time spent teaching and the quality of STEM instruction.

Perseverance and Grit

In our technological age, some students have a hard time staying committed to a task, are becoming less patient and want immediate results. When students are faced with problems outside of school, solutions aren't always quickly achieved. Pursuing long-term goals by working hard, also known as grit, has been linked to achievements in school, hobbies, and careers. Some studies show that striving for engagement or meaning leads to grit more than striving for pleasure. By getting students interested in a problem so that they work at solving it, so much that they lose all sense of time, teachers can help students gain more understanding of concepts and strengthen grit (Von Culin, Tsukayama, & Duckworth, 2014).

Some researchers feel that grit is as important as cognitive ability when it comes to achieving success (Goodwin & Miller, 2013). Student focus, attendance, assignment completion, willingness to learning from mistakes, and stamina are determined by students' mindsets and perseverance (Laursen, 2015). Also, studies show that students who are able to persevere with everyday problems in high school, achieve more in college.

Professional Development

The need for STEM to be integrated in classrooms is becoming more apparent. However, there are a variety of reasons why teachers are reluctant to do so, including the increased focus being placed on reading and math, as well as the lack of background knowledge, confidence, and self-efficacy (Nadelson et al., 2013). Less than one third of elementary teachers in the United States has efficacy in teaching science (Gilles & Nichols, 2014). Research suggests that teachers' confidence is as significant as content knowledge in influencing their teaching (cited in Baxter, et al., 2014). Teachers' attitudes toward science were found to be predictive of their intent to and practice of teaching science (cited in van Aalderen-Smeets & van der Molden, 2015). Teachers that have a negative attitude toward a subject are less likely to teach it and, ultimately, pass along a positive attitude in regards to it to their students.

Professional development is one way to strengthen teachers' confidence and attitudes and make STEM easier for them to integrate. In order for teachers to teach STEM concepts, they need to understand the topics themselves. Learning content is not enough. Professional development needs to include ways to adjust teaching to the students and provide practice with inquiry-based methods (van Aalderen-Smeets & van der Molden, 2015). Researchers have found that in order to change teachers' confidence, knowledge, and practice, professional development must be long-term and focus on student learning, along with teaching content (Baxter, et al, 2014). Also, teachers need to be comfortable with organizing their curriculum into themes instead of by disciplines. When undergraduate students are given more experiences with creating and implementing integrated lessons, they are more confident in their abilities and are more likely to continue this practice when they have their own classrooms (DiFrancesca, Lee, &

McIntyre, 2014). Providing current teachers with professional development experiences like this should have a similar effect. By increasing teachers' confidence, showing them how the disciplines are connected, and providing them with time to explore the concepts, they will be more likely to integrate (Baxter, et al, 2014).

I am currently participating in a STEM cohort with the University of Wisconsin-Platteville. This cohort will meet multiple times over the course of three years to learn about and practice STEM concepts. I am able to collaborate with teachers in other school districts who teach the same grade level as I do. This has been a wonderful experience so far and it has helped give me the background knowledge, resources, and support that I need to integrate STEM into my classroom. Up to this point, I was not integrating STEM in my classroom and I was very apprehensive to do so. Based on my personal experiences, I feel that professional development is a very powerful tool when delivered appropriately. My experience in this cohort led me to propose this study.

The proposed study will use a pre-post design to assess a cohort of K-12 teachers who are part of a STEM education professional development cohort at the University of Wisconsin-Platteville. If this professional development opportunity provides teachers with the necessary skills, resources, and motivation, then participants should report improved levels of efficacy and confidence regarding their abilities and an increased intent to integrate STEM into their classrooms.

CHAPTER 3

METHOD

Participants

The participants will be teachers who are members of a STEM professional development cohort at The University of Wisconsin-Platteville. This group includes educators from a variety of school districts. Of the approximately 50 cohort members 8 are men and 42 are women. All participants are K-12 educators. Cohort members will be recruited by email and invited to participate.

Materials

The survey consists of a demographic portion, questions pertaining to attitudes and experiences related to teaching STEM topics, and a survey of efficacy beliefs regarding the teaching of STEM (see Appendix A). Demographic questions address certification levels, age, sex, and experience (see items 1-4). Items 5-6 address attitudes about teaching STEM topics, while items 7-8 assess experiences with teaching STEM topics.

Efficacy beliefs are assessed using a modified Science Teaching Efficacy Belief Instrument (STEBI - modified, Enochs & Riggs, 1990; Riggs and Knochs, 1990) in which the wording was adapted to include all STEM topics instead of just science (Items 9-31). The STEBI is a 25-item assessment using 5 point Likert type format with responses ranging from strongly agree to strongly disagree. Thirteen items were stated positively and 12 were worded negatively. STEBI includes two sub scales. The first subscale asks teachers to respond to items regarding their beliefs about their ability to teach science, (Personal Science Teaching Efficacy Belief; PSTE). The second subscale asks teachers to respond to items concerning their anticipated results of teaching science (Science Teaching Outcome Expectancy; STOE).

Design and Procedure

A Pre-Post Within-Subjects design will be used to compare responses over the course of one year. Participants will complete the survey using Survey Monkey. For the pre-test, the participants will be given a consent statement (see Appendix B) that describes the study. At the post-test, participants will be given another consent statement (see Appendix C). It is anticipated that participants can probably complete the survey in fifteen minutes or less.

CHAPTER 4

RESULTS

Statistical Analysis

To determine if the self-efficacy of K-12 educators in the STEM professional development cohort increased from pretest to posttest, a two proportions hypothesis test with a significance level of 10% was conducted to test for a difference in proportions. 32 educators completed the pre-test survey and 18 educators completed the posttest survey. The ages of the participants who completed the pre-test ranged from 24 to 59, with an average age of 43. Five were male (16.13%) and twenty-six were female (83.87%). One person chose not to answer the demographic questions. Those participants taught for an average of 18 years. Four taught PK-K, five taught 1st-3rd grades, ten taught 4th-5th grades, five taught middle school, and eight taught high school. For the posttest, the ages ranged from 25 to 56, with an average age of 39. Three were male (16.67%) and fifteen were female (83.33%). The posttest participants taught for an average of 14 years. Four taught PK-K, two taught 1st-3rd grades, seven taught 4th-5th grades, two taught middle school, two taught high school, and one person taught something not listed.

I looked through the survey questions and chose those that I felt most pertained to my topic. I then computed and analyzed the data using a formula and spreadsheet created by Dr. Barbara Barnet from UW-Platteville. Below is a table showing the results:

	pre	#	post	#	SA or SD	reject/ no?	test statistic	propor-tion
My competence level in integrating STEM is higher now than it was before the STEM cohort.	56.25	18	77.78	14	SA	do not	1.522244	0.5625
I am integrating STEM in my classroom.	50	16	55.56	10	SA	do not	0.377426	0.5
When a student does better than usual in STEM topics, it is often because the teacher exerted a little extra effort.	28.13	9	0	0	SA	reject	-2.48471	0.28125
Even when I try very hard, I don't teach STEM topics as well as I do most subjects.	18.75	6	27.78	5	SD	do not	0.739688	0.1875
I know the steps necessary to teach STEM concepts effectively.	9.38	3	22.22	4	SA	do not	1.256673	0.09375
I generally teach STEM topics ineffectively.	21.88	7	38.89	7	SD	do not	1.286129	0.21875
I understand STEM concepts well enough to be effective in teaching.	19.35	6	44.44	8	SA	reject	1.874178	0.193548
I find it difficult to explain the meaning of STEM concepts to my students.	25	8	44.44	8	SD	do not	1.414791	0.25
I am typically able to answer students' questions regarding STEM concepts.	12.5	4	33.33	6	SA	reject	1.767767	0.125
I wonder if I have the necessary skills to teach STEM topics.	21.88	7	33.33	6	SD	do not	0.886636	0.21875
When a student has difficultly understanding a STEM concept, I am usualy at a loss as to how to help the student undersand it better.	34.38	11	22.22	4	SD	do not	-0.9001	0.34375

According to the statistical analysis I completed with Dr. Barbara Barnet, we came to the conclusion that, based on the results, I cannot conclude that there was a significant difference between the two groups. The three items that were rejected offer evidence that my research hypothesis is possibly correct. However, since the other items did not result in the rejection of the null hypothesis it does not mean that my original hypothesis is incorrect, it just means that right now I do not have evidence for those particular questions. If I completed this with a larger group, or for a longer time, then it is possible that I would show more significant results.

CHAPTER 5

DISCUSSION

The data from this research topic does not show what I expected. As an educator, when I learn more about a topic I definitely feel that I have a higher self-efficacy. I am not sure why the results came out the way they did, but I have a few theories. There were many limitations in this project. My sample was very small and from only one cohort. The teachers all teach in similar schools and have similar backgrounds. Had I surveyed educators from a variety of districts all over the nation, I may have gotten different results. I also did not have the same educators complete both surveys. Some may have been the same, but not all. This may also have affected my results. Two of the survey questions that I analyzed show that the educators did feel more effective in teaching STEM topics and they felt more qualified to answer questions regarding STEM topics. This shows that they did, in fact, gain valuable knowledge from the STEM cohort. I would love to have the same 32 educators complete both surveys. That would be interesting to analyze. I am not giving up on professional development. I feel that 99% of what we learn is due to our eagerness to gain knowledge. Being a passive bystander will not help a person learn very much. I take classes because I want to gain knowledge and skills to be a better educator. I have gained both from the STEM cohort. While my research did not show that the STEM professional development program increases educators' self-efficacy, it did not show that it doesn't either. I just don't have enough evidence.

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APPENDIX A - SURVEY

STEM is the integration of science, technology, engineering, and math.

Demographics

1. Sex

2. Age

3. Number of Years Teaching

4. What is the grade level that best fits you?

Attitudes

5. What is the main reason you chose to participate in the STEM cohort?

Please indicate the degree to which you agree or disagree with each statement below by selecting your answer based on the following:

SA	STRONGLY AGREE
A	AGREE
UN	UNCERTAIN
D	DISAGREE
SD	STRONGLY DISAGREE

6. My competence level in integrating STEM is higher now than it was before the STEM cohort.

Experiences

7. I have opportunities for professional development in STEM topics other than the STEM cohort.

8. I am integrating STEM in my classroom.

STEM Teaching Efficacy Belief Instrument

9. When a student does better than usual in STEM topics, it is often because the teacher exerted a little extra effort.

10. I am continually finding better ways to teach STEM topics.

11. Even when I try very hard, I don't teach STEM topics as well as I do most subjects.

12. When the grades of students in STEM topics improve, it is most often due to their teacher having found a more effective teaching approach.

13. I know the steps necessary to teach STEM concepts effectively.

14. I am not very effective in monitoring STEM activities.

15. If students are underachieving in STEM topics, it is most likely due to ineffective teaching.

16. I generally teach STEM topics ineffectively.

17. The inadequacy of a student's background knowledge in STEM topics can be overcome by good teaching.

18. The low achievement of some students in STEM topics cannot generally be blamed on their teachers.

19. When a low-achieving child progresses in STEM, it is usually due to extra attention given by the teacher.

20. I understand STEM concepts well enough to be effective in teaching.

21. Increased effort in STEM teaching produces little change in some students' achievement.

22. The teacher is generally responsible for the achievement of students in STEM topics.

23. Students' achievement in STEM topics is directly related to their teacher's effectiveness in teaching.

24. If parents comment that their child is showing more interest in STEM topics at school, it is probably due to the performance of the child's teacher.

25. I find it difficult to explain the meaning of STEM concepts to my students.

26. I am typically able to answer students' questions regarding STEM concepts.

27. I wonder if I have the necessary skills to teach STEM topics.

28. Given a choice, I would not invite the principal to evaluate a STEM activity in my classroom.

29. When a student has difficulty understanding a STEM concept, I am usually at a loss as to how to help the student understand it better.

30. When teaching STEM topics, I usually welcome student questions.

31. I do not know what to do to turn students on to STEM topics.

APPENDIX B

CONSENT FORM FOR PARTICIPATION OF HUMAN PARTICIPANTS IN RESEARCH UNIVERSITY OF WISCONSIN - PLATTEVILLE

You are being asked to complete this survey to help a researcher better understand the impact STEM programs have on teacher efficacy. Many of the questions ask about your attitudes, experiences, and beliefs regarding STEM. Please be as honest with us as possible and answer all questions to the best of your knowledge. You should be able to complete the questionnaire in approximately fifteen minutes.

Once the study is completed, a summary of the results will be made available through the Education Department office.

Your participation in this survey is entirely VOLUNTARY. By completing and submitting this survey you are giving your consent to be involved in the research.

Your participation should present you with no risks, other than the time and effort involved in completing the materials. Further, you may benefit from your participation by learning about the impact of STEM programs.

Please feel free to ask any questions you may have of the person who is sending you this survey, especially if there is a word or phrase you do not understand.

Thank you for your cooperation and the time that you have put into this research project.

If you should have concerns about your treatment as a participant of this research, please call or write:

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APPENDIX C

CONSENT FORM FOR PARTICIPATION OF HUMAN PARTICIPANTS IN RESEARCH UNIVERSITY OF WISCONSIN - PLATTEVILLE

Two years ago I asked you to complete a survey regarding STEM programs. I am doing a follow up survey now. You are being asked to complete this survey to help a researcher better understand the impact STEM programs have on teacher efficacy. Many of the questions ask about your attitudes, experiences, and beliefs regarding STEM. Please be as honest with us as possible and answer all questions to the best of your knowledge. You should be able to complete the questionnaire in approximately fifteen minutes.

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Thank You,
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APPENDIX D - DEBRIEFING LETTER

THE IMPACT OF PROFESSIONAL DEVELOPMENT ON EDUCATOR SELF-EFFICACY

STEM activities integrate science, technology, engineering, and math. When these activities are integrated, rather than isolated, students actively learn content while applying the knowledge (Lott, et al., 2013). Research suggests a relationship between teacher's beliefs and the way they teach (cited in Albion & Spence, 2013). Self-efficacy is a huge factor in behavior development. Therefore, teachers who have low self-efficacy in teaching STEM topics will devote far less time to teaching them and are less likely to implement inquiry-based methods. Professional development opportunities can help increase teachers' self-efficacy, which will ultimately increase the amount of time spent teaching and the quality of STEM instruction. The study you have participated in surveyed teachers regarding the STEM program at The University of Wisconsin-Platteville.

In this study I expect to find that professional development opportunities, such as the STEM program, increase a teacher's self-efficacy.

Questions regarding the research project can be addressed with Brenda Bunn at (608) 822-3165 or at bunnb@uwplatt.edu.

If you have any concerns about your treatment as a participant in this research project, contact Barb Barnet, UW-Platteville IRB Chair, (608) 342-1942, or at barnetb@uwplatt.edu.

Thank you for your participation.

Brenda Bunn
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