Looking Back, Looking Forward:
A Retrospective Analysis of a Pre-service Teacher Preparation Course

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This SoTL study aimed to determine thirty-eight teacher candidates' self-efficacy after experiencing semester one of a yearlong residency. Researchers used a pre/post survey, the Teachers' Sense of Efficacy Scale (TSES), and a retrospective pre TSES to determine perceived levels of self-efficacy in three areas: classroom management, instructional strategies, and student engagement. Findings revealed that pre TSES (candidates scored themselves at the beginning of the semester) and retrospective pre TSES scores (candidates scored themselves at the end of the semester reflecting on where they were at the beginning of the semester) were significantly different, with the retrospective pre TSES showing lower self-efficacy than the pre TSES. Post TSES comparisons to the retrospective pre TSES showed a significant increase, whereas, the comparison of the traditional pre/post TSES showed no significant changes. This suggests teacher candidates had an overinflated sense of self-efficacy and that teacher educators should look beyond the pre TSES to provide transformational experiences for teacher candidates. The retro-pre TSES helps teacher educators monitor teacher candidates' change in self-efficacy and gauge program impact.

INTRODUCTION

High teacher turnover rates have long been a problem in American schools. In 2003, the National Commission on Teaching and America's Future (NCTAF) reported that the early exodus of teachers had reached a crisis state (NCTAF, 2003). More than 44% of new teachers leave the profession within their first five years (Ingersoll, Merrill, Stuckey, & Collins, 2018), a decline that has been occurring since the 1980s and exceeds the rate of retirement. In the past two decades there has been a steady upsurge of novice teachers leaving the profession early (Ingersoll, et al, 2018; Santoro, 2021). New teachers' concerns are distinctly different from veteran teachers, as most are confronted with issues they have never encountered, such as balancing classroom management issues, reacting to external policies and events, or delivering content with the appropriate pedagogy (Romano, 2008). Therefore, the onus is on teacher educators to prepare future teachers for the demands, expectations, and often harsh realities of the profession (Wardlow & Osborne, 2010). Earlier and more frequent field experiences, ones that provide a genuine perception of the profession, have been suggested as viable strategies (Miller & Wilson, 2010; Thieman, Marx, & Kitchel, 2014). Additionally, teacher preparation programs need to help teacher candidates understand the nature of their own self-efficacy and its effect on their ability to cope with the pressures of teaching (Rashidi & Moghadam, 2014; Tschannen-Moran & Hoy, 2001; Yost, 2006). This understanding is necessary for them to not only perform well in the classroom, but also to stay in the classroom.

Changes in teacher preparation programs, therefore, can help combat teacher attrition rates. The southeastern state referenced in this article demanded a redesign of teacher preparation programs, and the university in this study redesigned its teacher preparation program around a two-semester residency approach that included a newly created course for secondary education minors. In this new program, most of the course content is delivered through a Problem-Based Learning (PBL) approach to teacher training. After exposure to the problem, teacher candidates identify several topics for individual candidates to research. For the next two weeks they: 1) research the topic, 2) spend two to four days in a school system, 3) make observations related to their topic, and 4) interview individual staff members. Program facilitators design these opportunities in order to increase individual teacher candidate's understanding of real teaching issues. The aim is to promote hard work and perseverance in the face of obstacles (Dweck, 2006), increase resiliency, and thereby improve self-efficacy (Yost, 2006).

STATEMENT OF THE PROBLEM

The problem addressed by this SoTL study is the need to increase teacher candidates' sense of self-efficacy, thereby improving their likelihood of successfully facing and persevering through the challenges of being a novice teacher. Bandura (1989) notes that thought patterns affect a person's actions. Higher levels of self-efficacy cause a person to set loftier goals and make stronger commitments (Bandura, 1989). This same notion can be applied to novice teachers to ensure that they not only succeed in the classroom but also survive beyond the initial years of teaching (Yost, 2006).

When the new course launched in the fall of 2013 (Caukin & Brinthaupt, 2017), professors sought to know if the course experiences caused teacher candidates' self-efficacy to rise, stay the same, or decline on the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001). Initial surveys of teacher candidates, taken during the first three semesters the course was taught, revealed that students' reports of self-efficacy statistically remained the same during the Residency 1 course. These data conflicted with anecdotal data collected during the course. The instructional team hypothesized that a retrospective pretest survey could reveal a more accurate picture of teacher candidates' actual knowledge on entering the course and, thereby, a more realistic indicator of the change in efficacy over the semester. This inquiry as a scholarship of teaching and learning provided an opportunity to better understand the nature of the impacts of

the new course on teacher candidate self-efficacy while utilizing a retrospective design, a targeted methodology.

A retrospective study allows the researcher to gather data after the treatment on the pre-treatment conditions. For self-report measures, this can improve validity, as participants may not be able to accurately assess or report on a condition that is being measured until after the fact (Hoogstraten, 1982). The researchers hypothesized that the retrospective survey data could provide a more accurate measure of candidates' self-efficacy entering the course and then the measure of change over the semester would be a better reflection of their change in self-efficacy. This measure then allows for the instructor to effectively inform appropriate programmatic changes. By identifying where efficacy is high, low, or inflated, professors can track teacher candidates' patterns of self-efficacy and provide experiences that allow the candidates to have a realistic view of the teaching profession. Additionally, professors can demonstrate that inservice teachers have the supports and systems in place to help them be successful.

PURPOSE OF THE STUDY
The purpose of this study was to evaluate the self-efficacy scores of teacher candidates as they experienced the new residency course. Researchers aimed to compare teacher candidates' sense of self-efficacy at the onset of the course compared to their sense of self-efficacy upon completion of the course, utilizing a retrospective design. In so doing, researchers hoped to gain a more accurate understanding of the impact of the course so that appropriate course changes could be made to best meet the needs of teacher candidates.

Theoretical Framework
The theoretical framework of self-efficacy is shaped by Albert Bandura (1997) who defined it as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Self-efficacy theory describes and attempts to explain the differential behaviors related to a desired outcome. The outcome of a behavior may be commonly accepted. The teaching act may be quite effectively defined, and the description accepted by a wide audience, including by the individual teacher. Whether or not a teacher can successfully attain that level of effectiveness depends on several factors, including belief in one's own capabilities. Self-efficacy, then, represents an individual's personal belief in his or her own ability level, particularly in regard to their ability to perform the behaviors that will lead to expected and desired outcomes (Bandura, 1977).

The theoretical framework of the self-report measures of self-efficacy is also formed by the retrospective design of gathering pretest data *following* the intervention (treatment). Retrospective pretest surveys have been recommended when participants were asked to complete self-report measures (Pohl, 1982) to address the confounding variable of response-shift bias, a phenomenon in which the participants' understanding of what is being measured changes from pre- to posttest (Drennan & Hyde, 2008). Retrospective surveys are considered useful in measuring change over time (Howard, Schmeck, & Bray, 1979) as participants respond to each item two times, once in the past tense, drawn from memories of the beginning of the treatment, and again in the present tense, drawn from reflections at the end of the treatment (Howard, Ralph, Gulanick, Maxwell, Nance, & Gerber, 1979). Hoogstraten states, "For various treatment interventions, retrospective

pretest - posttest comparisons have been shown to give more valid results than conventional pre-post comparisons" (p. 200). This method may be expressed as a practical way to apply quantitative methods to garner information that would normally be gathered in qualitative ways, as with reflective interviews. In this study, the researchers changed the structure of the traditional TSES at the end of the study period by asking the teacher candidates to answer each question from the perspective of how they felt before the course began and from their current perspective after completing the course.

Additionally, a traditional pretest survey was administered to the teacher candidates at the beginning of the semester, giving researchers an opportunity to identify areas of response shift bias (Howard, et al., 1979). Other studies have indicated that survey participants tend to overestimate their abilities in a pretest survey (Moore & Tananis, 2009; Drennan & Hyde, 2008; Howard, Ralph et al., 1979). When biased pre-tests are compared with posttest surveys, it tends to underestimate the effectiveness of the program under study (Moore & Tananis, 2009; Drennan & Hyde, 2008; Howard et al., 1979). By comparing the traditional pretest survey to the retrospective pretest, the researchers were able to identify areas in which teacher candidates had an inflated sense of efficacy.

Research Questions
1. **What effect does the new course have on teacher candidates' sense of self-efficacy?**

2. **How do teacher candidates' retrospective sense of self-efficacy compare to how they rate their sense of self-efficacy at the end of the new course?**

3. **How do teacher candidates' retrospective sense of self-efficacy compare to how they rate their sense of self-efficacy at the beginning of the new course?**

LITERATURE REVIEW
Problem-Based Learning
Problem-Based Learning (PBL), a form of active learning in which students "learn by doing" (Hmelo-Silver, 2004), first gained popularity in the field of medical education during the sixties and has since spread across multiple disciplines (Albanese & Mitchell, 1993). The PBL approach differs with conventional education in that it first exposes students to a problem, rather than with content knowledge presented by lecture. With PBL, students take more responsibility for their learning, work together in small groups rather than receiving lecture in large groups, and may discover more than one solution to a given problem (Hmelo-Silver, 2004). Simulations of practice may be used, and students are permitted to "flounder" through the problem. After the students have created their own solutions, they are presented with the solutions that the professionals chose. This "back story" provides another learning opportunity as students compare their solutions with those of the professionals (Barrows, 1968; Bridges & Hallinger, 1999; Goodin, Caukin, & Dillard, 2019).

Teacher training and PBL

Teacher candidates respond well to the use of PBL in a residency program that immerses them in the role of "teacher." Like aspiring physicians, they make decisions based on actual practice rather than on abstract ideas and must take charge of their own learning (Bridges & Hallinger, 1999; Goodin et al., 2019). The success of the residency program rests on the premise that adults prefer problem-solving situations that require practical applications of learning; that their prior knowledge is recognized as being worthwhile; and that their learning will apply directly to their own life situations (Bennett, Blanchard, & Hinchey, 2012; Henry, 2011; Knowles, 1984).

Research indicates that teacher candidates develop problem-solving skills as well as content knowledge when problem-based learning is used as an instructional method (Christian, Dillard, & McAtee, 2014). Working collaboratively to solve the problem, teacher candidates' critical thinking skills are further developed (Christian et al., 2014) as well as their ability to persevere through productive struggle (Goodin et al., 2019). As a result, the efficacy of the individual and group increases (Christian et al., 2014; Goodin et al., 2019).

Self-Efficacy

Self-efficacy encompasses an individual's personal belief in his or her own ability level (Bandura, 1977). Stronger levels of self-efficacy may increase an individual's effort and persistence levels (Bandura, 1989) by allowing him or her to rely on previously developed coping methods (Bandura, 1977). However, when an individual has a low level of efficacy, he or she may cope with adversity by avoiding it (Bandura, 1977). Thus, a teacher's level of self-efficacy can directly impact his or her desire to remain in the profession. Research indicates that self-efficacy is viewed as a significant factor in teacher retention, persistence, and resiliency (Yost, 2006). When novice teachers are placed in an environment that promotes positive growth, they have a greater likelihood of increasing self-efficacy. When teacher preparation programs provide successful field experiences, the teacher candidate's level of self-efficacy increases significantly. This increase is especially apparent when the field experiences are directly tied to content that expands their range of strategies for teaching and management (Yost, 2006).

Self-Efficacy and PBL

Research indicates that students who use cognitive strategies required in PBL to influence their own learning develop higher levels of self-efficacy (Jungert & Rosander, 2010). This is due in part to the fact that PBL requires students to use self-regulated learning skills, which also has a positive effect on students' self-efficacy beliefs (Demiroren, Turan, & Oztuna, 2016). The PBL approach allows students to have a greater connection with their professors and the course content, thereby increasing the self-efficacy of the students (Jungert & Rosander, 2010).

Professors need to prepare learners to utilize this style of learning in order to help students maximize the benefits of PBL (Demiroren et al., 2016). By providing support in the form of monitoring work and giving timely feedback, professors can help students develop greater levels of self-efficacy. This could be especially true for those with lower levels of self-efficacy who are learning to overcome their fears (Demiroren et al., 2016).

METHODOLOGY
Context

This study took place during the fourth semester of the new Residency I program. In the previous three semesters, the professors used a traditional pretest-posttest Teachers' Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001) to analyze how teacher candidates' self-efficacy had changed over the course of the semester.

The first three studies showed, on average, about the same self-efficacy score at the beginning and end of Residency I. Anecdotal evidence, however, contradicted these findings. For example, university instructors observed changes in the interactions of the teacher candidates with one another, with the PBL scenarios, with the Residency I instructors, and within the schools. Student discussions and feedback at the end of the course suggested that teacher candidates tended to highly value the learning that occurred in the residency experience, reporting that the program contributed substantially to their preparation for Residency II (student teaching) and for the edTPA (Educative Teacher Performance Assessment) requirements. To determine the reasons for these different self-efficacy responses and detect possible response-shift bias, (Howard, et al., 1979b) researchers employed a retrospective pretest-posttest survey to Residency I Cohort 4 teacher candidates.

When participants are asked to evaluate an educational program for which they have a level of knowledge at the onset, initial self-report measures taken at the beginning of the program may be inflated (Howard, Schmeck, & Bray, 1979; Howard, Ralph, Gulanick, Nance, & Gerber, 1979). When these results are then compared to the posttest results, conclusions of no or lower significance could be indicated (Howard et al., 1979a; Howard et al., 1979b).

An overestimation of content understanding has been consistently found in research studies (Moore & Tananis, 2009; Drennan & Hyde, 2008; Howard, 1980; Howard et al., 1979a; Howard et al., 1979b). "Substantial empirical evidence" indicates that "response-shift bias occurs when self-report instruments are used to measure differences in a participant's perception and that this bias can mask program effectiveness" (Moore & Tananis, 2009, p. 192). This is especially true when the evaluated training was designed to increase the participants' awareness of the training under evaluation (Moore & Tananis, 2009). Even if participants overestimated their initial understanding of the concept evaluated, they provide a more accurate reflection of the change that occurred over the course of the training when they then complete the survey as a retrospective pretest. This suggests that retrospective pretest scores of skill development or content knowledge have the ability to capture more accurate measurements than a traditional pretest (Moore & Tananis, 2009).

As a result, Drennan & Hyde (2008) recommend using a retrospective pretest to analyze the effectiveness of a course of study in which students have been previously exposed to the content. When students answer the same question from two perspectives (their current and past) at the same time, their responses utilize the same point of reference (Drennan & Hyde, 2008). This provides a more accurate picture of the respondent's growth over time because students re-conceptualize the construct under investigation at the summation of a course (Drennan & Hyde, 2008; Howard, 1980).

Participants

Thirty-eight of the forty-one Cohort 4 teacher candidates participated in this study, thus constituting a convenience sample (Gall, Gall, & Borg, 2007). Candidates were in one of two sections of the new course. Each course consisted of a weekly three-hour seminar paired with one or two days of field work in a local K-12 school. The teacher candidates for this study included the following majors: Art education, biology, chemistry, English, general science, geography, German, health education, history, instrumental music, mathematics, music education, physical education, physics, political science, and vocal/general music. Table 1 identifies how many teacher candidates were majoring in each subject.

Table 1. Number of Teacher Candidates in Each Major	
Major	**# of Teacher Candidates**
Art Education	5
Biology	3
Chemistry	1
English	4
French	1
General Science	1
Geography	2
German	1
Health Education	2
History	3
Instrumental Music	4
Mathematics	3
Music Education	2
Physical Education	1
Physics	2
Political Science	2
Vocal/General Music	1

Instrumentation

As indicated earlier, the research instrument utilized in this quantitative study was Tschannen-Moran and Hoy's (2001) Teachers' Sense of Efficacy Scale (TSES). This twenty-four-item scale asks participants to choose responses along a nine-point Likert scale ranging from "Nothing" to "A Great Deal." Within the scale are three subscales to measure the individual's self-efficacy in classroom management, instructional strategies, and student engagement. This instrument was selected since it was built upon the theoretical framework of Bandura and because it maintains a high reliability rating (alpha = .90: Tschannen-Moran & Hoy, 2001). Additionally, research indicates that the instrument has consistently shown a correlation between the total TSES score and teachers' job satisfaction (Klassen, Bong, Usher, Chong, Huan, Wong, & Georgiou, 2009).

There are eight questions from each subsection classroom management, instructional strategies, and student engagement. The three types of questions mingle together rather than separated by category. Some examples of classroom management questions include: "How much can you do to control disruptive behavior in the classroom?" and "How much can you do to get children to follow classroom rules?" Examples of instructional strategy questions include: "To what extent can you craft good questions for your students?" and "How much can you use a variety of assessment strategies?" Examples of student engagement questions include: "How much can you do to motivate students who show low interest in school or work?" and "How much can you assist families in helping their children do well in school?"

A retrospective pretest design was used because they are considered useful in measuring change over time (Howard, Schmeck, & Bray, 1979) and can help eliminate response-shift bias that can occur due to a construct change after treatment (Drennan & Hyde, 2008). The original TSES was used for the pretest and a modified version of the TSES during the posttest included a retrospective design. For the posttest, each of the original 24 questions was duplicated so that one question asked candidates how they felt before the course and the other asked how they felt after completing the course (Howard, Ralph, Gulanick, Maxwell, Nance, & Gerber, 1979).

RESULTS

This study contains three research questions. Results for research question one were obtained using a traditional pre-post survey; results for research questions two and three utilized the retrospective survey design. The first research question that guided this study was: What effect does the course have on teacher candidates' sense of self-efficacy? A paired-samples *t*-test was used to determine any significant difference between the teacher candidates' TSES scores at the beginning of the course compared to their TSES scores at the end of the course. The average overall TSES scores as well as the averages of each of the subsets: classroom management, instructional strategies, and student engagement were compared. A Cohen's *d* was also calculated to determine the effect size. In order to reduce an overestimation of the effect size since this study required a correlated design (paired-samples *t*-test), the original standard deviation, rather than the pooled standard deviation, was used (Dunlop, Cotina, Vaslow, & Burke, 1996).

While there was a statistically significant difference between the overall average pre and post TSES scores, the effect size was quite small. There was a statistically significant decrease in a sense of self-efficacy related to classroom management from the pre to post TSES survey. The effect size for this measure is considered moderate at a 0.43 (Cohen, 1988). There were no statistically significant differences in sense of self-efficacy from pre to post survey regarding instructional strategies or student engagement. Table 2 shows the results of the comparison of the thirty-eight teacher candidates' TSES scores at the beginning and end of the course.

Table 2. Comparison of Average TSES Scores at the Beginning and end of Residency I				
Measure	**Mean**	**SD**	**p**	**d**
Pre TSES	7.11	0.79	.023*	0.17
Post TSES	7.25	0.91		
Pre-Classroom Management	7.25	0.91	.017*	0.43
Post Classroom Management	6.87	0.89		
Pre-Instructional Strategies	7.03	0.87	0.917	0.02
Post Instructional Strategies	7.04	0.81		
Pre-Student Engagement	7.04	0.81	0.515	0.1
Post Student Engagement	6.96	0.72		
Note. *p < .05				

Research question 2 was: How do teacher candidates' retrospective sense of self-efficacy compare to how they rate their sense of self-efficacy at the end of the course? Again, a paired-samples t-test was performed to compare the average retrospective pre TSES scores (teacher candidates' sense of self-efficacy at the beginning of the course but measured at the end of the course) to the average post TSES scores for each TSES measure. A Cohen's d was calculated for the overall scores as well as the sub scores for classroom management, instructional strategies, and student engagement to determine effect size. There were statistically significant increases from the retrospective pre to the post TSES with high effect sizes for all measures. Table 3 shows the comparison of the average retrospective pre scores and the average post scores for each TSES measure.

Table 3. Comparison of Average Retrospective Pre TSES Scores and Post TSES Scores

Measure	Mean	SD	p	d
Retrospective Pre TSES	5.39	1.18	.000***	1.76
Post TSES	7.25	0.91		
Retrospective Pre Classroom Management	5.52	1.24	.000***	1.25
Post Classroom Management	6.87	0.89		
Retrospective Pre Instructional Strategies	5.32	1.34	.000***	1.56
Post Instructional Strategies	7.04	0.81		
Retrospective Pre Student Engagement	5.34	1.19	.000***	1.66
Post Student Engagement	6.96	0.72		

*Note. ***p < .001*

Research question 3 was: How do teacher candidates' retrospective sense of self-efficacy compare to how they rate their sense of self-efficacy at the beginning of the course? A comparison of the average pre TSES scores and average retrospective pre TSES scores was again calculated using a paired-samples t-test as well as a Cohen's d for each TSES measure. All TSES measures indicated a statistically significant decrease from pre to retrospective pre TSES with high effect sizes. Table 4 shows the comparison of teacher candidates' average pre TSES scores to the average retrospective pre TSES scores.

Table 4. Comparison of Average Pre TSES Scores to the Average Retrospective Pre TSES scores

Measure	Mean	SD	p	d
Pre TSES	7.11	0.79	.000***	1.71
Retrospective Pre TSES	5.39	1.18		
Pre-Classroom Management	7.25	0.91	.000***	1.59
Retrospective Pre Classroom Management	5.52	1.24		
Pre-Instructional Strategies	7.03	0.87	.000***	1.52
Retrospective Pre Instructional Strategies	5.32	1.34		
Pre-Student Engagement	7.04	0.81	.000***	1.69
Retrospective Pre Student Engagement	5.34	1.19		

*Note. ***p < .001*

CONCLUSIONS

The purpose of the teacher preparation program featured in this study was to promote hard work and perseverance in the face of obstacles (Dweck, 2006), increase resiliency, and thereby improve self-efficacy (Yost, 2006). The program sought to promote these characteristics and abilities in the teacher candidates who experienced the course. It was deemed important that these future teachers would acquire these attributes and thus become confident in their abilities over time. After receiving conflicting data from previous cohorts of students, the researchers used a retrospective pre TSES in addition to the pre/post TSES to better determine the perceived level of student efficacy in these three areas. A comparison of the traditional pre/post TSES taken before the course ($M = 7.11$, $SD = .79$) and after the course ($M = 7.25$, $SD = .91$) indicated that the pre-service teacher candidates' overall sense of self-efficacy had increased slightly with a small effect size ($p = .023$, $d = 0.17$). Statistical analysis of the retrospective pre and post TSES revealed much different results. Overall retrospective pre TSES ($M = 5.39$, $SD = 1.18$) and post TSES ($M = 7.25$, $SD = .91$) indicate that pre-service teacher candidates' overall sense of self-efficacy had increased significantly with a high effect size ($p < .001$, $d = 1.76$). Howard, Schmeck, & Bray (1979) and Howard, et al (1979) indicate that when using self-report measures there is an assumption that participants have a basis for understanding what is being measured, when in fact, they may not. Thus, a retrospective design may provide a more accurate estimation of the pre-posttest measures. In this case, the retrospective design provided sufficient evidence that teacher candidates overestimated their sense of self-efficacy at the beginning of the course, which is not uncommon for individuals with their academic capabilities and can actually improve their motivation and persistence to learn (Artino, 2012; Bandura, 1986; Chen, 2002). This overestimation of self-efficacy could be from a lack of understanding of the complexities of field experiences (Parker, 2006; Yildiz & Arici, 2021) and the nature of the learner and learning.

Classroom Management

A statistically significant difference in the teacher candidates' sense of self-efficacy related to classroom management on the pre TSES taken before the course ($M = 7.25$, $SD = .91$), and the post TSES taken after the course ($M = 6.87$, $SD = .89$) showed that students had a lower sense of self-efficacy regarding classroom management skills at the end of the course ($p = .017$, $d = 0.43$). This finding was indicative of the candidates' overinflated sense of self-efficacy before the course. This decreased as they observed the realities of teaching and the skills needed for successful classroom management. Also, important to note is that during the course, teacher candidates spend much more time in classrooms than in previous courses and are thus exposed to a wide variety of classroom management issues, which could make them realize that they were not as prepared for these challenges at the beginning of the course as they thought they were.

While the comparison between the pre and post TSES indicated a decrease in the students' sense of self-efficacy related to classroom management, the comparison between the retrospective pre TSES ($M = 5.52$, $SD = 1.24$) and the post TSES ($M = 6.87$, $SD = .89$) indicated an increase in the students' sense of self-efficacy related to classroom management ($p < .001$, $d = 1.25$). The results of the retrospective pre TSES and post TSES indicated that teacher candidates felt that their sense of self-efficacy

related to classroom management increased after the course. With this conclusion, program facilitators recognize a need to focus more carefully on aspects of classroom management, looking to impact teacher preparation with high quality experiences in order to improve teacher outcomes (Ronfeldt & Reininger, 2012). As the population of students changes across schools and academic school years, teachers must adapt their classroom management strategies to students' immediate needs (Lezotte & Snyder, 2002). Teacher educators must try to immerse teacher candidates in a variety of school settings with diverse populations of students to effectively observe and practice classroom management techniques. By attending to the developing skills of classroom management of teacher candidates, teacher educators can use classroom management self-efficacy as a protective factor and thereby potentially reduce teacher burnout (Aloe, Amo, & Shanahan, 2013). Problem-based learning is being utilized as a tool to connect classroom management theory to practice during critical clinical experiences and thus providing teacher candidates with tools and resources to address classroom management needs.

Instructional Strategies and Student Engagement

There were no statistically significant differences in the students' sense of self-efficacy regarding instructional strategies or student engagement on the traditional pre/post TSES. However, there were statistically significant increases in the means between the retrospective pre TSES and the post TSES related to instructional strategies (Retro: $M = 5.32$, $SD = 1.34$; Post: $M = 7.04$, $SD = .81$; $p < .001$, $d = 1.56$) and student engagement (Retro: $M = 5.34$, $SD = 1.19$; Post: $M = 6.96$, $SD = .72$; $p < .001$, $d = 1.66$). The coursework and field experiences in Residency I contrasts with the teacher candidates' prerequisite courses in that they were exposed to many more field experiences with extended teaching episodes in local classrooms, Problem-Based Learning opportunities, and guest speakers; furthermore, it also required them to work within Professional Learning Communities. These unique features of Residency I provide teacher candidates with the skills, knowledge, and experience to approach their student teaching semester with confidence.

Implications

The phenomenon of self-efficacy, as a measurable construct in teacher candidates, is worthy of exploration and understanding, as this information can be used to reflect on individual and program improvement. High levels of self-efficacy lead to loftier goal setting, higher levels of engagement, and firmer commitments (Bandura, 1993), all of which are needed to persist in the field of education.

Even with an increase in self-efficacy from the beginning to the end of the course overall and in all three areas – classroom management, instructional strategies, and student engagement – teacher educators still need to consider ways to better prepare teacher candidates for the classroom management, instructional strategies, and student engagement issues they are likely to face. More exposure to meaningful teaching experiences may promote a higher sense of self-efficacy in teacher candidates (Cole, 1995). As mentioned before, more diverse settings across the teacher preparation program could provide greater exposure to different contexts. Another consideration could be to use mixed-reality simulations to provide highly focused and supported classroom experiences. The nature of the Problem-Based Learning experi-

ence provides teacher candidates with the inductive tools needed to identify common classroom problems, seek and implement solutions, and thus increase their sense of self-efficacy and likely promote a growth mindset. Throughout the course, facilitators guided teacher candidates by fostering an environment in which they were encouraged to seek answers to authentic problems. This PBL method could help teacher candidates become more apt to face challenges in their future classrooms. Additionally, preservice teachers recognize that they do not have to know how to solve all the problems themselves since they have a network of support within the school that can help them, particularly if the school they are working in has effective Professional Learning Communities. Increasing their self-efficacy gives them the confidence to utilize this support system when problems arise and, as a result, develop the perseverance needed to remain in the profession.

FUTURE STUDIES

This retrospective study allowed researchers to gain a better understanding of teacher candidates' sense of self-efficacy before and after the course, particularly with the issue of response-shift bias. The question arises as to what is the nature of teacher candidate experiences that promotes a higher sense of self-efficacy. While Problem-Based Learning is at the core of the Residency I program, there were also central experiences (i.e., specific classroom contexts, working with mentor teachers and faculty supervisors, and engaging in Professional Learning Communities) and peripheral experiences (guest speakers, writing a learning segment, and practicing for edTPA). Research into which aspects of the program proved most meaningful to the teacher candidates and inquiring into what they wished they had experienced during their teacher preparation program could give insight into improvement needs. A longitudinal study of candidates over the course of their teacher preparation and into the first years of teaching could allow researchers to gain a better understanding of how efficacy changes over time. Further studies comparing high self-efficacy and growth mindset are also of interest. By having a high sense of self-efficacy, even if it is inflated, teacher candidates may be more willing to persevere in the face of challenges. Future research could be conducted to determine the relationship between growth mindset, self-efficacy, and teacher attrition rates.

Finally, the results were not collected until the end of the course. In the future, researchers could collect these data earlier, share the TSES results with the teacher candidates, and discuss the possible interpretations and understandings based on their self-efficacy scores. If teacher candidates can learn how to identify their own sense of self-efficacy and how their mindset impacts their learning, then they can be proactive in terms of personal reflection and even potentially transfer this knowledge of self-efficacy to their future students.

REFERENCES

Albanese, M., & Mitchell, S. (1993). Problem-based learning: A review of literature on its outcomes and implementation issues. *Academic Medicine, 68*(1), 53-81.

Artino, A. (2012). Academic self-efficacy: from educational theory to instructional practice. *Perspectives on Medical Education*, *1*, 76-85.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Bandura A. (1986). *Social foundations of thought and action: a social cognitive theory*. Englewood Cliffs: Prentice Hall; 1986.

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44*(9), 1175-1184.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117-148.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: Freeman.

Barrows, H. (1968). Simulated Patients in Medical Teaching. *Canadian Medical Association Journal, 98,* 802-805.

Bennett, E., Blanchard, R., & Hinchey, K. (2012). Applying Knowles' andragogy to resident teaching. *Academic Medicine, 87*(1), 129.

Bridges, E. M., & Hallinger, P. (1999). The use of cases in problem-based learning. *The Journal of Cases in Educational Leadership*, *2*(2), 1-6.

Caukin, N.G. & Brinthaupt, T.M. (2017). Using a teaching philosophy statement as a professional development tool for teacher candidates. *International Journal for the Scholarship of Teaching and Learning, 11*(2), 1-9.

Chen, P. (2003). Exploring the accuracy and predictability of the self-efficacy beliefs of seventh-grade mathematics students. *Learning and Individual Differences, 14,* 79-82.

Christian, B., Dillard, H., & McAtee, R. (2014). Problem-based learning among pre-service teachers: implications for teacher preparation and professional collaboration. *Florida Association of Teacher Educators Journal 1*(14), 1-13. http://www.fate1.org/journals/2014/christian.dillard.mcatee.pdf

Cohen. J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Cole, K. (1995). Novice teacher efficacy and field placements. Paper presented at the Mid-South Educational Research Association. https://eric.ed.gov/?id=ED393849

Demiroren, M., Turan, S., & Oztuna, D. (2016). Medical students' self-efficacy in problem-based learning and its relationship with self-regulated learning. *Medical Education Online, 21,* 1-9.

Drennan, J., & Hyde, A. (2008). Controlling response shift bias: The use of retrospective pre-test design in an evaluation of a master's programme. *Assessment & Evaluation in Higher Education, 33*(6), 699-709.

Dunlop, W. P., Cortina, J. M., Vaslow, J. B., & Burke, M. J. (1996). Meta-analysis of experiments with matched groups or repeated measures designs. *Psychological Methods, 1,* 170-177.

Dweck, C. S. (2006). *Mindset: the new psychology of success.* New York, NY: Ballantine.

Gall, M., Gall, J., & Borg, W. (2007). *Educational research: An introduction,* 8th Edition. Boston: Pearson.

Goodin, T. L. , Caukin, N. G. , & Dillard, H. K. (2019). Developing Clinical Reasoning Skills in Teacher Candidates Using a Problem-Based Learning Approach. *Interdisciplinary Journal of Problem-Based Learning, 13*(1). https://docs.lib.purdue.edu/ijpbl/vol13/iss1/1/

Henry, G. (2011). Education in a Competitive and Globalizing World: Malcolm Shepherd Knowles: A History of his Thought. Hauppauge, NY, USA: Nova Science Publishers,

Hmelo-Silver, C. (2004) Problem-based learning: What and how do students learn? *Educational Psychology Review, 16*(3), 235-266.

Hoogstrate, J. (1982). The retrospective pretest in an educational training context. *The Journal of Experimental Education, 50*(4), 200-2004.

Howard, G. (1980). Response shift bias: A problem in evaluating interventions with pre/post self-reports, *Evaluation Review, 4,* 93-106.

Howard, G., Ralph, K., Gulanick, N., Maxwell, S., Nance, D., & Gerber, S. (1979). Internal invalidity in pre-test/post-test self-report evaluations and a re-evaluation of retrospective pre-tests. *Applied Psychological Measurement, 3*(1), 1-23.

Howard, G., Schmeck, R., & Bray, J. (1979). Internal invalidity in studies employing self-report instruments: A suggested remedy. *Journal of Educational Measurement, 16*(2), 129-135.

Ingersoll, R., Merrill, E., Stuckey, D., & Collins, G. (2018). *Seven trends: The transformation of the teaching force - updated October 2018.* CPRE Report. Philadelphia: Consortium for Policy Research in Education, University of Pennsylvania.

Jungert, T. & Rosander, M. (2010). Self-efficacy and strategies to influence the study environment. *Teaching in Higher Education, 15*(6), 647-659.

Klassen, R., Bong, M., Usher, E., Chong, W., Huan, V., Wong, I., & Georgiou, T. (2009). Exploring the validity of a teachers' self-efficacy scale in five countries. *Contemporary Educational Psychology, 34,* 67-76.

Knowles, M. (1984). *Andragogy in action.* San Francisco: Jossey-Bass.

Lezotte, L. W., & Snyder, K.M. (2002). *Assembly required: A continuous school improvement system*. Okemos, MI: Effective Schools Products.

Miller, G., & Wilson, E. B. (2010). Designing field-based and experiential education for preservice teachers in agriculture. In R. M. Torres, T. Kitchel & A. L. Ball (Eds.), *Preparing and advancing teachers in agricultural education* (pp. 130-141). Columbus, OH: Curriculum Materials Service. The Ohio State University.

Moore, D. & Tananis, C. (2009). Measuring change in a short-term educational program using a retrospective pretest design.

National Commission on Teaching and America's Future. (2003). *No dream denied, a pledge to America's children.* Washington, DC: National Commission on Teaching and America's Future.

Parker, J. (2006). Developing perceptions of competence during practice learning. *The British Journal of Social Work, 36*(6), 1017-1036.

Pohl, N. (1982). Using retrospective pre-ratings to counter response-shift confounding. *Journal of Experimental Education, 50*(4), 211-214.

Rashidi, N., & Moghadam, M. (2014). The effect of teachers' beliefs and sense of self-efficacy on Iranian EFT learners' satisfaction and student achievement. *The Electronic Journal for English as a Second Language, 18*(2), 1-23.

Romano, M. (2008). Successes and struggles of the beginning teacher: Widening the sample. *The Educational Forum, 72,* 63-78.

Ronfeldt, M., & Reininger, M. (2012). More or better student teaching? *Teaching and Teacher Education, 28(8)*, 1091 – 1106.

Santoro, D. (2021). Demoralized. *Why teachers leave the profession they love and how they can stay*. Harvard Education Press.

Thieman, E., Marx, A., & Kitchel, T. (2014). "You've always got challenges:" Resilience and the preservice teacher. *Journal of Agricultural Education, 55*(4), 12-23.

Tschannen-Moran, M., & Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17,* 783-805.

Wardlow, G. W., & Osborne, E. W. (2010). Philosophical underpinnings in agricultural education. In R. M. Torres, T. Kitchel & A. L. Ball (Eds.), *Preparing and advancing teachers in agricultural education* (pp. 16-29). Columbus, OH: Curriculum Materials Service. The Ohio State University.

Yildiz, E. & Arici, N. (2021). An investigation of pre-service science teachers' self-efficacy beliefs towards teaching and their teaching skills. *International Online Journal of Education and Teaching, 8*(2), 588-603 589. https://files.eric.ed.gov/fulltext/EJ1294374.pdf

Yost, D. (2006). Reflection and self-efficacy: Enhancing the retention of qualified teachers from a teacher education perspective. *Teacher Education Quarterly, 33*(4), 59-76.