Do Active-Learning Strategies Improve Students' Critical Thinking?

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Abstract

Improving students' ability to recognize work-related problems and apply effective strategies and solutions to fundamental challenges in the field is at the crux of a good college preparation. This paper attempts to investigate if active-learning strategies improve students' critical thinking ability in this regard. Participants were pre-service teachers in physical education and athletic training education taking a teaching methods service-learning course. Findings showed significant improvement with critical thinking measures across both quasi experimental conditions. As a result, gains were largely attributed to the service-learning field component common to both conditions. Furthermore, academic tracking showed students pursuing a B.A. in physical education benefitted significantly more from the active-learning assessment than students pursuing a B.S. in athletic training. The paper also discusses how the active-learning sequence was a preferred method of instruction and how these strategies were purposeful with problematizing teaching situations and engaging students with course content. This paper may draw interest from educators who are research-minded and eager to apply critical thinking approaches in a learning environment.

Keywords: critical thinking, active-learning, teacher education, service-learning, physical education

1. Introduction

1.1 Introduction of the Problem

In 2008, The Council for Industry and Higher Education created the International Employer Barometer which surveyed 233 large multinational and small companies across a range of social and technical skill areas (Archer & Davison, 2008). Findings showed that skills such as communication and team-working ability by college graduates were the most important and sought after aptitudes by employers. In addition, three out of four employers ranked analysis and decision-making skills as a most important skill for the future. Even though the practice and development of these skills have received overwhelming support, many university professors do not teach with this goal in mind. Studies have shown that 65% to 80% of university instructors spend their class time lecturing to a passive student audience with little or no focus on group development, active-learning, and/or cultivating problem-solving skills (Panek, 2005; Chickering & Gamson, 1987; Blackburn, Pellino, Boberg, & O'Connell, 1980). In addition to university centers and employers, the National Research Council (2012) has called on college professors to not only adopt more active methods of instruction that engage students directly with course content, but also provide strategies to help students develop critical thinking skills and solve everyday problems.

In effort to help develop critical thinking skills in teacher preparation programs, education professors have been encouraged to provide major field experiences into coursework that engage preservice teachers with authentic teaching and learning collaborations, partnerships, and mentoring programs (Huang, 2006; Darling-Hammond, 2000). In teacher education, "Young teachers do not get enough hands-on practical training about managing the classroom that they need, especially for high-needs students" (Duncan, 2009, p. 1). Furthermore, the Carnegie Report, A Nation Prepared: Teachers for the 21st Century (1986) proposed that the best learning environment for teacher preparation programs was within a clinical school setting that links school and university faculty together (e.g., service-learning). This kind of teacher training is best known for its capacity to expose preservice teachers to new situations that could occur on the job, to uncover obscure assumptions hidden in the profession, and resolve real-world problems with professional and experienced consult. In effect, service-learning creates an

opportunity to question, analyze, and process timely challenges occurring in the field in a collaborative and supportive setting.

Although there is extensive evidence that service-learning is beneficial for preparing preservice teachers for the job, there is little evidence showing what is being done in the "lecture" part of the associated service-learning course is improving teachers' ability to solve problems and apply critical thinking principles in the field (Abrami et al., 2008). While offering a field experience is certainly important, teacher educators may not be taking full advantage of their "lecture" time to further develop students' social and reasoning skills. Thus, the authors of this study believe it would be beneficial to employ and test an active-learning sequence focused on engaging students with problem-based learning that is linked to the required service-learning component in a teaching methods course. The authors believed that if students were repeatedly engaged in the practice of problematizing specific teaching conditions and then receiving strategies and solutions on how to address those kinds of situations, they would develop new critical thinking skills that would improve their ability to interpret, analyze, and address similar teaching situations in the field of practice. Research questions include: 1) Does a strategically developed active-learning sequence improve critical thinking skills; 2) What kinds of active-learning exercises have the most impact on developing critical thinking outcomes; and 3) Do the active-learning exercises affect groups of students differently?

1.2 What Is Critical Thinking and How Was it Operationalized for this Study?

Arum and Josipa (2011) argue that a goal of instruction is students learn to solve problems and think critically. Questions arise, such as: What is critical thinking? What are the differences between thinking, creative thinking, and critical thinking? Can critical thinking simply be explained as operating on the higher levels of Bloom's (1956) cognitive taxonomy? Does one determine if a student is able to think critically by self-report, tests, or behavior? What specific student behaviors and classroom instructional strategies lead to thinking critically and what can professors do in their classrooms to move students towards developing critical thinking skills? Indeed, scholars and practitioners alike have wrestled with questions about the nature of thinking and critical thinking for decades.

Many traditional educators cite Bloom's (1956) cognitive taxonomy (whether it be the original one devised in the 1950's or the more recent adaptation by Anderson and Krathwohl (2001)) as the best way to model and determine critical thinking skills. The three highest levels of operation (analysis, synthesis and evaluation) all involve the ability to think critically. At the analysis level students must determine how to divide something into its component parts and determine how those parts relate with one another. At the synthesis level, students must be able to create something new, given their ability to operate successfully at the four lower levels. Creativity is also cited as evidence of the ability to think critically, but evaluation and the ability to make discerning judgments is most frequently cited as a critical thinking skill.

Because thinking and critical thinking encompasses a wide range of complex understandings, some educators have made some differentiations. For example, Lipman (1988) suggests ordinary thinking is simple and lacks standards; whereas critical thinking is more complex and based on standards of neutrality and consistency. Moore (2009) defines thinking as "the act of withholding judgment to use knowledge and experience in finding new information, concepts, and/or conclusions," and reinforces Lipman's definition of critical thinking as "the ability to analyze complex situations critically, using standards of objectivity and consistency" (p. 230). Moore (2009) also lists non-thinking behaviors that negatively affect the development of thinking skills in the classroom which include (on the part of the student) impulsiveness, overdependence on the teacher, dogmatism, and inflexibility. On the other end of the scale he lists activities which contribute to critical thinking which include brainstorming, inductive thinking, inference making, problem-solving, analysis, and interpretation (pp. 233-238).

Paul and Elder (2009) define critical thinking in the following way, "A well-cultivated critical thinker—raises vital questions and problems, formulating them clearly and precisely—gathers and assesses relevant information, using abstract ideas to interpret it effectively—comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards—thinks open-mindedly within alternative systems of thought, recognizing and assessing as need be, their assumptions, implications, and practical consequences, and—communicates effectively with others in figuring out solutions to complex problems" (p. 2). In addition, Peter Facione (1990) listed the dispositions of critical thinking which include inquisitiveness, open-mindedness, systematicity, analyticy, truth-seeking, self-confidence, and maturity (p. 264). With regard to these dispositions, Walker (2003) is concerned that while educators' value students who think critically about concepts, "the spirit of disposition to think critically is, unfortunately, not always present in all situations" (p. 264). The original work of Facione (1990) was called the Delphi Project and pulled together the results of many research studies on the subject and

created the following definition of critical thinking, "We understand critical thinking to be a purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference as well as explanation of the evidential conceptual methodological, criteriological, or contextual considerations upon which that judgment was based" (p. 2).

The ability to see things from multiple points of view and evaluate those views with some refereed standard is a common theme occurring within the critical thinking literature. Thus, the professor must realize that human argument requires well thought out evaluation (Browne & Freeman, 2000), and be prepared to provide balance and structure surrounding the problem. This suggests the professor should focus on a set of skills that enable a listener or reader to apply rational criteria and guidelines to the reasoning of any embodied piece. Because Dewey (1910) said that students must wrestle with the conditions of a problem, withhold judgment, and use healthy skepticism in order to think critically, the authors believe a starting point would be to pose questions to students that unearth the conclusions and reasons within an argument (Shaw, 1996). Therefore, critical thinking begins when a state of doubt about what to believe exists (Baron, 1985).

Bean (2011) suggests the professor adopt the role of coach, "the teacher presents students with critical thinking problems, gives students supervised practice at addressing them, and coaches their performance by critiquing their solutions, providing helpful intervention and advice, and modeling critical thinking themselves" (p. 149). Bok (2006) tells us that instructors who do best at teaching critical thinking tend to follow a set of four principles. First, instructors concentrate on what they want their students to learn and not just focus on what material should be covered in the course. This includes delineating what reasoning skills should be mastered in order to handle the problems posed. Second, they think about how to awaken students' curiosity and generate intrinsic interest in the subject. Third, instructors search out, expose, and debunk any misconceptions students bring to the course that may interfere with their thinking, thus opening up new possibilities for transformation and growth. Fourth, they "encourage learners to think for themselves by challenging them with interesting questions and using class discussions, collaborative projects, and other forms of active-learning to develop habits of critical thinking and respect for the power of careful reasoning and analysis" (p. 119).

1.3 Why Active-Learning as a Means for Developing Critical Thinking Skills

Active-learning does not necessarily imply mental activity. Students can be physically active and/or verbally active in a learning experience, but neither of these actions ensures the student is mentally involved or developing any kind of thinking skill. Active-learning strategies that teach students to think critically must therefore be the type of activities that are designed to mentally stimulate and engage thinking in a relevant context. Therefore, the question becomes which active-learning strategies lead to the acquisition of critical thinking skills defined above?

Bean (2011) describes many active-learning exercises as strategies that make students more powerful thinkers and better arguers. He recommends the use of case studies, role-playing, small group work, and creative activity which stretches thinking skills that can be applied to applicable situations. Bean warns that the goal of the small group work is not to come up with the right answer, rather develop reasonably supported answers that students are asked to defend later in front of the class. According to Browne and Freeman (2000), the strength of the active-learning classroom is that it facilitates personal involvement with the material, thereby provoking students into relevant discussion and evaluation. According to Meyers (1986), an active-learning technique moves students from passive-learning to active-learning and therefore maximizes the impact of the material upon learners. Burbach, Matkin, and Fritz (2004) found that the active-learning strategies they used (small groups, scenarios, case study, etc.) did improve critical thinking skills as measured by the Watson-Glaser Critical Thinking Appraisal, which assesses decision making ability as well as predicts judgment, problem solving, and creativity. Furthermore, Tsui (1999) investigated a broader question—whether specific college courses affected students' self-reported growth in critical thinking. She found that having a paper critiqued by an instructor, conducting an independent research project, working on a group project, and giving a class presentation all helped with critical thinking skills.

2. Method

2.1 Participant (Subject) Characteristics

Participants of this study (N = 190) were college seniors from a large diverse urban research university who were taking a capstone secondary physical education teaching methods course. These students were either pursuing a Bachelor of Arts degree in Physical Education Teacher Education (N = 150) or a Bachelor of Science degree in Athletic Training with All-Level Teacher Certification (N = 40). These two degree plans share a few Kinesiology core courses although the non-core coursework from each program look very different. For example, because the

pedagogy students have had multiple opportunities to gain experience with teaching and practice public speaking upon entering the course, they were generally more confident to engage in the active-learning exercises. Furthermore, the pedagogy students will have already spent numerous hours observing and teaching in the public schools bringing a better understanding of education theory and school pragmatism to the discussions. In contrast, the athletic training education students were generally better with organizing steps and designing actions for success. Protocols for the study were approved by an internal review board for research.

2.2 Course Attributes

The course used in this study was specifically designed to prepare preservice teachers to become physical education teachers and coaches in the secondary level public schools. As part of the course requirement, each student participated in an extensive service-learning project that required them to work directly with middle school students in a local school district. The majority of students (67%) either coached or co-coached in an after-school soccer program that required approximately 60-70 hours of instructing and managing middle school students at practices (after-school) and games on Saturdays (including bus rides to and from). The remaining students designed, implemented, and instructed a volunteer service-learning project with secondary level students in the public schools (e.g., athletic training events, fitness hiking competitions, fitness testing events, etc.). All students in the course participated in the study. Those enrolled in the course during the fall of 2010 and spring of 2011 were in a lecture-style control group (N=90 [73 physical education, 17 athletic training]), and the other students who took the course in the fall of 2011 and spring of 2012 participated in the active-learning sequence intervention (N=100 [77 physical education, 23 athletic training]). The two investigators were professors in the College of Education and Health Professions (one from a department of Curriculum and Instruction, and the other from a department of Kinesiology). One professor, a sport pedagogist, had many years of experience developing community service-learning models in teacher education coursework, and the other professor, an educational psychologist, had extensive experience using active-learning strategies in both teacher education coursework and faculty development training workshops.

2.2.1 Descriptions of the Active-Learning Strategies Used

Although control group students participated in the same course content and same service-learning experiences as the experimental students, the methods by which the students learned the course content was very different. The strategic active-learning intervention included nine (50-minute) instructional strategies (i.e., Role-Play, Case Study, and Small Groups) designed to promote problem-solving and critical thinking skills that related/applied to their service-learning and course experiences. The strategies were selected to intellectually, verbally, and physically engage the students. The course content utilized in these active-learning strategies were designed to challenge students to take risks, to occasionally be wrong in their approach, and therefore come up with creative alternative solutions. Afterwards, the experience was discussed with their peers. It was the researchers' premise that education students have to be prepared to be wrong sometimes, and therefore develop strategies (as well as the capacity) to quickly make adjustments in order to be successful. All of these factors were taken into consideration in the selection of the three active-learning strategies used in this research.

2.2.2 Case Studies, Small Groups, and Role-Play

Our process involved placing students into small groups, providing them with case studies with problematic situations, directing them to analyze and discuss the cases, and then role-play possible solutions. The use of all three of these active-learning strategies as leading to the development of critical thinking skills is heavily documented in the literature (Bean, 2011; Paul & Elder, 2009; Moore, 2009; Barclay, Cross, & Major, 2005; Mitchell, 2004; Bain, 2004; Honan, 2002; Youngblood & Beitz, 2001; Barnes, Christensen, & Hansen, 1994; Brookfield, 1987; and Dewey, 1916). Small group process is sometimes used in a variety of university classrooms and therefore may have been more familiar to the subjects in this study. Small groups, however, are not always used in an effective manner. When combined with the problem-based case study, the small group process can be very useful. There are a number of advantages of using case studies in a small group format, but it is considered to be a primary method to encourage critical thinking and improve decision-making skills (Mitchell, 2004). We followed Bean's (2011) description of best practice: "The teacher presents students with critical thinking problems, gives students supervised practice at addressing them, and coaches their performance by critiquing their solutions, providing helpful intervention and advice, and modeling critical thinking themselves" (p. 149). After reading and discussing the original cases, students were asked to write (individually and as a group) what they wanted to accomplish in the role-plays and to specify the exact words and techniques to be used. In other words, they were required to make a plan rather than just role-play spontaneously. Role-plays were repeated so that multiple students could try out their own solutions and other students could see different

approaches. The post-role-play discussions were pre-planned, detailed, in-depth, and explored how their classmates and professors reacted to the differing solutions to the problems (See Appendix A for an example role-play used in the study).

According to Moore (2009), these strategies included the following behaviors which lead to thinking critically; open-ended activities, problem-solving, and decision-making. Our vignettes were based on scenarios the students might realistically experience in the future, and as such conform to Bean's (2011) definition of a good case: "Good cases generally tell a real or believable story, raise thought-provoking issues based on conflict, lack of obvious or clear-cut answer, and demand a decision reached through critical thinking and analysis" (p. 159). He further supports the practice of using role-play in addition to small group exercises, "Role-playing unfamiliar or disorienting perspectives or imaging 'what if' situations makes an excellent critical thinking exercise" (p. 156). An additional suggestion is not to have students try to come up with the right answer, but instead have them work toward a reasonable, supported answer which can later be supported in front of their peers. Paul and Elder (2009) agree that critical thinking also involves the ability to communicate effectively with others in figuring out solutions to complex problems.

2.3 Sources of Data

For this study, we hypothesized that critical thinking is a learnable skill and prescribed to Moore's (2009) definition of critical thinking, "the ability to analyze complex situations critically, using standards of objectivity and consistency" (p. 230). Thus, in order to problematize the concept of critical thinking and operationalize measurement for the study, three context specific case studies called the "Evaluation Vignettes" were developed for repeated measures (Appendix B). These vignettes were specifically designed to measure each preservice teacher's ability to identify a specific problem (one that typically occurs in the service-learning experience) and provide solutions and strategies to address them. For example, the first vignette "Legal" was designed to measure the student's ability to prioritize multi-problematic teaching circumstances that have legal ramifications. They were asked to identify the clear and present danger (i.e., child abuse), and provide a step-by-step protocol of how to appropriately handle each of the significant issues presented. The second vignette "Management" presented a variety of challenging "physical education" scenarios that appeal to a variety of techniques and strategies for controlling each environmental situation. The last vignette "Motivation" was designed to evaluate the teachers' ability to analyze an apathetic learning situation typically seen in the profession and provide appropriate cues that drive intrinsic motivation to participate in physical activity. A multivariate analysis of variance was used to look for differences between pre and post measures, experimental and control conditions, and academic track of students across individual and total vignette scores.

Six independent raters were hired to evaluate the Evaluation Vignettes. Raters were solicited through a call for participants circulated by the chairs of the departments of English, Communication, and Kinesiology. Raters were all undergraduate students in good academic standing who were willing to participate in both the training and implementation phases of the project. The raters convened for a 90-minute interactive training session facilitated by the Vice Provost for Academic Affairs, who was assisted by an Assessment Director from the Office of Institutional Research. During the 90 minute training, raters were familiarized with the rating rubrics and participated in real-time ratings of five sample vignettes. Following the training, raters read through and scored each Evaluation Vignette response using the provided rubrics (Appendix B). From this data, inter-rater correlations were computed. One of the six raters had considerably low associations with the other raters (ranging from .458 to .513). As a result, this rater's data was dropped from further analysis. The remaining five raters had good Pearson Correlations ranging from .738 to .825 and were all significant at the .01 level (2-tailed).

The second source of data utilized a naturalistic approach (Lincoln & Guba, 1985) in the form of student-centered focus groups, journal reflections, and self-evaluations completed by the students in the course. Focus groups were conducted with a representative sample of students in the course by an independent representative from the provost's office at three separate times spaced evenly throughout the semester. The representative asked questions specific to how actively engaged students were in the learning process and the perceived benefits of participating in that kind of instructional format. Individual journal entries captured students' personal feelings about what was taking place in course meetings as well as their related service-learning experiences. The self-evaluation was an open-ended culminating reflection about what students liked and/or disliked about the course, how they have changed as a result of the course, and a personal assessment of how they took risks engaging in course activities. All of the above content was recorded, transcribed and analyzed in order to gather all salient and recurring units of meaning that were then framed into common themes. These themes helped explain and clarify some of the important issues arising from the investigation and provided a more complete and in-depth description of events happening in the study. These

processes also helped better understand some of the limitations associated with the quantitative measures and identify some of the complexities and difficulties associated with measuring critical thinking.

3. Results

Findings from the study indicated that in no case did the active-learning sequence show any significant improvement on Evaluation Vignette scores between conditions (Table 1). However, we did find an effect of time (pre- vs. post-treatment), with post-test scores being higher than the pre-test score means in almost every analysis except within the Management Vignette. Moreover, when we ran a two-way analysis (taking out the variable for condition [i.e., control vs. experimental]), we found PE teachers made significantly higher gains on the Evaluation Vignettes than the Athletic Trainers (Table 2). Thus, both academic groups made significant gains with scoring on Legal, Motivation, and Total Vignette score averages, although PE teachers benefited significantly more from the experience overall. This suggests that the active-learning sequence may have affected the PE teachers' more diametrically than the Athletic Training education students.

Table 1. Mean scores of the evaluation vignettes by time and condition

Vignette	Condition	Pre-Test Mean	SD	Post-Test Mean	SD	Time (F)	Time*Condition (F)
#1 Legal	Control	5.48	2.75	7.52	1.32	15.91*	
	Experiment	6.23	2.11	7.36	1.47	11.07*	2.74
#2 Management	Control	2.76	1.03	2.93	1.14	0.89	
	Experiment	2.82	1.37	3.32	1.31	1.04	0.59
#3 Motivation	Control	2.32	1.27	3.63	1.26	32.09*	
	Experiment	2.64	1.17	3.50	1.22	21.26*	1.18
Total	Control	10.56	3.57	14.08	2.54	49.58*	
	Experiment	11.69	2.98	14.18	2.58	25.82*	1.49

Note. * Significant at the $p < .05$ level

Table 2. Mean scores of physical education students vs. athletic training students on the evaluation vignettes

Vignette	Academic Track	Pre-Test Mean	SD	Post-Test Mean	SD	Time (Pre-Post) (F)	Academic Track (F)
#1 Legal	Athletic Trainers	6.27	2.28	7.24	1.75	10.20*	
	PE Teachers	5.77	2.49	7.49	1.30	15.91*	0.14
#2 Management	Athletic Trainers	3.36	1.54	3.53	1.39	0.98	
	PE Teachers	2.64	1.08	3.03	1.19	1.14	2.51
#3 Motivation	Athletic Trainers	2.86	1.21	3.91	1.07	20.08*	
	PE Teachers	2.39	1.22	3.46	1.27	21.26*	2.45
Total	Athletic Trainers	12.49	3.53	14.68	2.45	19.64*	
	PE Teachers	10.80	3.17	13.98	2.57	26.84*	5.30*

Note. * Significant at the $p < .05$ level

One of the most recurrent themes emerging from the qualitative dataset in support of the active-learning sequence had to do with students being more excited about what was going on inside the classroom and therefore finding more value with course content. Much of these reported gains came in the form of students being able to draw connections between course content and what they were experiencing in the course-related field experiences. As an example, preservice teachers put it this way:

"I enjoyed coming to class every day and I felt like if I missed I was going to miss out on something important and useful. Hearing the different strategies for solving the problems were important to learn and I did not want to overlook anything I could use with my kids while coaching. I was always excited to see what might be coming next."

"Role-play gets you closer to the real deal rather than listening to someone tell you how to do it. It was never boring; I was always eager to see how people would respond to the vignettes. I looked forward to seeing all the different techniques and practicing the new ideas. I feel like it forced you to think on the spot and respond quickly as opposed to just passively listening to a lecture. I wanted to take notes and try out some of these new strategies."

The data also presented a theme centered upon the idea of trying out others' ideas in a safe and non-threatening environment, and then receiving useful feedback:

"Watching others handle the role-play situations was the most useful part of the class. I remember several of us saying to ourselves, 'Oh, I wouldn't have ever thought to say or handle things that way,' or 'that was handled well.' I remember complimenting Kevin after class and telling him I enjoyed the way he handled that situation, how professional he was about it, and how it got me thinking about how I might do things differently when it was my turn. There was no pressure to get it right, just a process of doing things better and better."

"The role-play activities were similar to some of the situations I encountered during my project. Learning new steps and ideas for dealing with student issues beforehand really improved my ability to handle similar situations when they occurred. I have much more confidence in myself that I can handle these kinds of situations when they arise next time."

Planning an intended outcome or goal in advance were also some of the most valued experiences by students as a result of the active-learning sequence:

"The class discussions really opened my eyes to different ways of handling tough situations and I realize there are many ways of addressing teaching issues. I have a huge weakness with dealing with these kinds of confrontational situations. I now realize that I should buy some time and delay my response until I can think through the circumstance fully and get help and advice when I need to in order to handle things appropriately."

"The group activities showed me that I need to look for a solution early on but also take a moment to strategize how I go about reaching my goal. I realize now that I need to focus more on the outcome and not allow my emotions to overtake the goal along the way."

"It really made me think about how I would react and if those first instincts would be the right thing to do. I understand now that I need to look at things from multiple perspectives."

Finding one's style or strategy for dealing with the challenges and realities of the profession was explicit, as it was noted time and again that this learning strategy was effective at bringing out individual strengths and weaknesses when it came to dealing with common situations educators are faced with daily. As a result, the active-learning sequence provided an initial realization about how preservice teachers are likely to respond on the job allowing for deep-seated reflection and self-analysis of how to handle challenging situations and make useful adaptations upon entering the profession.

4. Discussion

4.1 Implications of Findings

Critical thinking skills consistently improved amongst preservice teachers across both control and experimental conditions but not necessarily as a result of the active-learning sequence employed. One explanation for this may be the well-established service-learning field component already incorporated into the course. Thus, data from this study may support the use of well-established service-learning experiences to help preservice teachers develop the critical thinking skills necessary to experience higher levels of success in the public schools.

Results from the focus groups showed significant improvement with student engagement in the course as a result of the active-learning sequence. Students believed they responded to the instructor and fellow students in a more formidable way and thus participated in class discussions more attentively and with more empathy as a result. There was no question that the instructional situations students were asked to respond to in the active-learning exercises were oftentimes intense and students were emotionally invested at times, which may also help explain why students themselves believed they were more engaged. In essence, the experience awakened students'

curiosity and generated intrinsic interest in the subject area but we don't think this would have happened to the same degree without the connection to the field experiences. For many of the students, the novelty of the experience was unlike anything they had practiced before, and in the process transformed their beliefs about analyzing difficult situations and solving real-world problems.

How individual viewpoints were transformed during specific active-learning exercises was similar to what preservice teachers might expect as novice teachers. This type of learning was new to many of the students in the course, and initially many felt reluctant to participate. These were tough issues to try to get up in front of your peers and deal with. However, we did find evidence that participation in the active-learning exercises and practicing new strategies led to an improved sense of self and confidence with thinking through and solving real-world problems. For example, when dealing with public school students who will not take no for an answer, the "Broken-Record" technique was introduced during one role-play. It involves the verbal repitition of messages without engaging the conversation/confrontation further and therefore should usually put the issue and/or contestation to rest very quickly. This kind of scaffolding allowed students to try out different techniques and strategies across a variety of situations.

4.2 Why Consistent Gains with Legal and Motivational Issues but not Management?

A possible explanation for gains with the legal and motivation measures but not the management measures could be related to the preservice teachers' preparation in the program. Faculty teaching in the program specific to this study had very few years of teaching experience inside the public schools. The preservice teachers participating in this study had already received multiple opportunities in their program to grapple with content regarding legal issues and motivational theory in education settings, thus having a significant knowledge base to draw upon and solve these kinds of related issues/problems. Where the program has lacked rigor over the years is retaining the experiential knowledge and skill with managing large groups of students inside the public schools. If faculty have not built a strong foundation for creating the managerial skills necessary to solve real-world problems, then it would make sense that the preservice students are not going to develop these kinds of skills as quickly and thus move up "Bloom's Taxonomy" in this regard.

4.3 Were Preservice Teachers More Engaged in the Learning Process?

According to students' written reflections and participation in the focus group, the opportunity to be a part of the active-learning exercises was appealing because it forced personality types to surface and interact when confronted with professional challenges. This kind of learning is reflected in Mezirow's (2000) theory of transformative learning where students encounter a transformation in their approach to solving problems through various forms of a "disorienting dilemma", thereby realizing they have a weakness working through difficult issues and seeking out solutions. The researchers believed it was better for the preservice teachers to experience these "dilemmas" during a formal (yet safe) training experience. This would include being mentored with practical solutions and steps of application that may preclude poor decision-making when similar situations arise in the field. Because of the dilemmas presented, the active-learning experiences were more stimulating for the preservice teachers (i.e., the intensity of participation was heightened), and the researchers believe that this created a more organic learning experience with direct social-emotional connections to the learning goals of the course.

The other part of the focus group discussions reflected some of the benefits of going through an authentic and mentored kind of learning exercise without being tied to a "real" situation with direct and potentially harmful consequences. Rarely do beginning teachers get a trial "run-through" experience that encourages mistakes to be made without any real consequences to students. This includes the affordability that role-play allows to take a time-out, consider multiple angles and solutions, and re-think how to approach a particular situation. These exercises allowed for extra time and space for questions, new ideas, elaborations, and redirection of an experience in order to gain depth and understanding of the appropriate (and inappropriate) ways to approach and/or handle teaching interactions and different learning situations. This is important since we know that a teacher's word choice, body language, and personal dispositions have important consequences with students. It was also discussed that this platform makes it possible to learn from multiple people with diverse experiences (not just the professor) and gain a multi-dimensional perspective about how to deal with the problems effectively and in different contexts.

Another possible explanation for many of the gains made could be attributed to the course-related field experiences where preservice teachers were directly engaged in many hours of teaching public school kids. Preservice teachers were likely to be more "vested" in the course activities because of the realities they were facing in the schools (and the course being directly tied to some of those realities). Of course, this is not new to

teacher education as many studies have shown service-learning to be a powerful teacher training tool, especially when the right conditions exist and presented within the course infrastructure (Tice & Nelson, 2012). The self-evaluations at the end of the course clearly showed that even the most inept students appreciated the challenges and the difficulty of the course activities.

4.4 Curricular Considerations for Teacher Education Programs

Findings in this study showed physical education preservice teachers benefited significantly more from the active-learning experiment than athletic training students, which has curricular and degree program implications. The intensity of the assigned field experiences (in relation to course content) was typically very different for both sets of students. The physical education students (who were performing high interaction service-learning projects and spending many hours with students in the schools) were finding significantly more value and relevance in what was being done in the course, most likely because the content was tied directly to what they were experiencing in the field and future profession. The athletic training students, on the other hand, may not have seen as much value in the active-learning sequence due to less relevance to their professional aspirations. Based on these findings, the authors suggest two possible solutions. Take a metacognitive approach and design a parallel active-learning sequence for the athletic training students that better reflects their professional vocation, or use these findings to advocate for a new course in the B.S. degree plan that would better address the needs and interests of the athletic training education students.

4.5 Limitations of the Study

There were a few issues in this study that may have limited the development and implementation of the Evaluation Vignettes. For example, two different types of students were enrolled in the course that may have had a number of different past experiences, interests, future aspirations, and a significant portion of their preparation coursework. The data showed a significant difference in the two types of subjects participating in the study. Would the findings have indicated a more significant impact on just the physical education students independently? Another factor that may have limited results has to do with the inclusion of a service-learning component that is not exactly the same for both the control and experimental group populations. Some service-learning experiences were completed with different people, locations, supervisors, and challenges unique to each school environment. Furthermore, would the active-learning data differ had there not been a service-learning component tied to course content? Lastly, there were two professors present during the active-learning experiment, but only one of them was present during the control phase. Both professors agreed that the "team-teaching" dynamic improved learning conditions to varying degrees throughout the experiment when both were present at the same time.

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Appendix A

<u>Directions</u>: Students read vignette and take a few minutes to write down key points about how to handle the situation and accomplish a reasonable outcome. Students are then paired up so that each takes a role and works through each key point (Note. instructor can stop in the middle of this phase to check in with how student or teacher now feels in that role). Facilitator then calls up two people from the class to play the role of the student and the teacher (Note. the teacher-role can have 1 or 2 helpers behind them to consult with if they need help or get stuck—i.e., whisper ideas into their ear…). Once this process has been worked through adequately, the facilitator leads a discussion of what worked well and what didn't work so well, and calls up new students to play each role again. Students take notes on what worked well and examine how different approaches and styles might work best for their particular temperament, and if they need to develop any traits to become more successful in the future handling these types of situations. Finally, the instructor summarizes and reemphasizes the talking points brought up throughout the process.

Example Role-Play "Bullying"

You are a substitute teacher and have been called in this morning to cover Mr. Daniels PE classes for the rest of the semester (about 3 weeks) at Eagle Lake High School. There were no lesson plans left for you. Fifth period rolls around where juniors and seniors enter the gym for a class called "Team-Sports". They tell you they have been playing a flag-football unit and a few students immediately enter the equipment closet and pull out the necessary equipment. A senior named Dominick divides up teams and runs the class very efficiently leaving you very little time and opportunity to manage and/or control anything. The game begins and Dominick exhibits extremely aggressive behavior towards the opposing team - hitting students hard and tripping and tackling them to the ground violently. He is also abusive to his own teammates yelling at them when they make a mistake and blame them for anything that goes wrong on their team. It is obvious the students are afraid of him and will do anything to try and just appease him and/or stay out of his way. You ask Dominick to speak with you in the office. What is your next move…?

Talking Points:

-Be sure to have a plan before you have this discussion (buy some time if necessary [e.g., 24 hrs] in order to consult with people/colleagues of support and form a strategy - know exactly what you want out of this meeting.

-Teacher drives this discussion, stay calm, don't bad mouth Dominick or Mr. Daniels (for his lack of authority), have confidence & use good eye contact… and even ask for eye-contact back if necessary to emphasize the seriousness of the situation. Keep the relationship real and touch base often.

- Be assertive and use "I" statements like "Here's what I think… Here's what I want… Here's what I want you to do…" There is no I in team…

-Show respect and empathy by asking questions and trying to understand his perspective and situation. Students need to see that you care and have passion for them and their education. Try to get "buy in" by asking what he would like to do and negotiate responsibilities/roles he can assist with… Have him do another role (i.e. referee).

- Get him to see the bigger picture of what is happening in the learning environment and the opportunities that are possible… Think of "win-win" outcomes. What would he do if he was in your situation…? Ask him! -Set

expectations and get agreement ("Golden Rule").

-Explain that injury/consequences to others (psychological or physical) could lead to civil/legal action by other parents… help them understand the consequences of this (e.g., $, alternative school, suspension, etc.)

-Try to make health connections of being psychologically abusive on others (+ consequences)

-Make it about fun for everyone… Team-work!

-Establish consequences for actions (time-out, principles office), and give choices for behavior… Also, go over these expectations and rules of the game routinely with the rest of the class. Agree on what steps must happen next time and what behavior do you expect… Know what consequences (student choices) will be at end if you don't get this cooperation. Make sure he understands and remind him early and often if necessary.

Appendix B

Evaluation Vignette #1

Steven threw his clipboard and lanyard on the desk and dropped down in his chair. Even the air-conditioned gym was miserably hot in Texas. He switched on his desk fan and thought about his day. This was at least the third time David had refused to suit up. He had sheepishly admitted today that his father's belt buckle had been leaving marks and asked me not to tell. Then there was Tyrone who never wanted to do anything but complain. And finally Jeff, who happened to be the Principal's son, sprained his ankle during the last drill. What a day! I think I'll just stop thinking about it and get ready for the 6th period. Just shake it off, he decided. Nothing happened today that I really need to be concerned about.

Does teacher/coach Steven have anything to be concerned about? If yes, what is it, and what should he do?

Rubric: Find the description below that best fits the student's response/answer (9 points maximum).

Correct Answer	**0 points**	**3 points**	**6 points**	**9 points**
Legal/Ethical requirement to report Child Abuse to appropriate school athorities depending on specific District and school Policy.	Not Identifying David's abuse as a Legal/Ethical Reponsibility to report. Identifying the issues of Tyrone or Jeff as legal/ ethical responsibilities.	Identifying David's abuse as a Legal/Ethical issue.	Stating that some specific actions should be taken about David's abuse but either taking the wrong action or not knowing what action to take.	Knowing to follow school policy to immediately report suspected child abuse to appropriate authorities.

Evaluation Vignette #2

Observers of the teaching process agree that if a class is unmanageable, it is not teachable. That said, Steven was just notified by his principal that the budget needed to be cut and his teaching assistant was just let go. The principal also explained to Steven a need to put some of Ms. Harper's kids into his 1st period PE class. Even though Steven was use to teaching large classes, he was very concerned about managing these changes, especially since 1st period already had many kids with Attention Deficit Hyperactivity Disorder (ADHD).

In order to minimize difficult management issues that are likely to arise during 1st period, list three things Steven could do in terms of Planning Activities, Giving Instruction, & Managing Equipment?

Rubric: Check each description that was described in the student's response. Give one point per description item referred to below (9 points maximum).

Planning	High **involvement** activities/no standing in lines (1pt)
	Games w/ **simple rules** (1pt)
	Management behaviors should be planned & practiced (1pt)
Instruction	Use **attention-getter** or audio signal (e.g., whistle) or visual signal (e.g., hands raised) (1pt)
	Bring group in close for **simple, clear, & quick instructions** (1pt)
	Tell students "**when before what**" [e.g., "When I say go I want you to toss the ball…"] (1pt)
Equipment	Utilize **minimum equipment** (1pt)
	Choose a **student helper/assistant** for faster distribution (1pt)
	Have **equipment prearranged** around perimeter for quick & safe access (1pt)

Evaluation Vignette #3

Steven is determined to have a positive effect on his students and motivate them to get the most out of his physical education class. He realizes that those students who are unable to perform the exercises are not likely to develop a positive attitude toward physical activity. He also knows that he himself plays a direct and indirect role in their development. When motivating his students, list three things Steven should be thinking about in terms of (A) student-centered learning, (B) curriculum & instruction, and (C) his own role-modeling that is likely to get his kids motivated to participate in fitness activities and be successful at exercise?

Rubric: Check each description that was described in the student's response. Give one point per description item referred to below (9 points maximum).

Student-Centered Learning	Fitness experiences and assessments should be designed to allow/measure children to **determine their own goals & personal workloads, interests, and solutions** before, during, and after instruction (1pt)
	Always present/allow students to start at a **skill level they can accomplish. Constant reinforcement of skill/behavior/cues etc.** (1pt)
	Voluntary long-term exercise is more probable when individuals are **internally driven** to do their best. Learners dislike/fear experiences perceived **forced upon** them. **No exercise as punishment**. Extrinsic motivation only works short-term, intrinsic motivation will work long term and must be developed (1pt)
	Focus on student **names, person-ability,** and empower/encourage **reciprocation** of learning and sharing of experiences (1pt)
	Choice and options allows students to take ownership in the learning experience (1pt)
Curriculum & Instruction	Presenting a **variety of fitness opportunities** increases the likelihood that students will experience something they find personally enjoyable… Choice! (1pt)
	Tie activities to values of physical activity. Follow **TEKS & lesson plans** (scope and sequence) (1pt)
	Students are more likely to operate in one another's best interest using **cooperative games** vs. competitive or exclusion games (1pt)
	Learning student names early promotes a sense of belonging to the class and a climate of trust (1pt)
	Immediate, accurate, and specific **feedback/training** regarding exercise performance encourages continued participation. **Reinforce cues**. Use **demonstrations** and **aesthetic movement practices** (1pt)
	Fitness activities that contain a high level of **"Play"** are more likely to motivate participation and encourage a positive experience (1pt)

Role-Modeling	Teachers who **display physical vitality**, are in shape & take pride in being active will positively influence youngsters to maintain an active lifestyle. **Positive presence** and create **positive atmosphere** (1pt)
	Teachers must exercise/**participate with their class** periodically to assure students that they are willing to do what they ask others to do. Lots of **verbal contact** and **connect with students** (1pt)
	Smiling, humor, and **personal warmth** are invariably more effective than a strict belabored approach (1pt)
	Enjoying what you are doing as a PE teacher and **having fun** (1pt)
	Give respect to get respect (1pt)
	Practicing **healthy lifestyle habits**/behaviors (e.g., eating healthy foods & drinking lots of water) in the presence of students (1pt)

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