

Board of Certification Examination Success and Clinical Education

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# BOC EXAMINATION SUCCESS AND CLINICAL EDUCATION

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## ABSTRACT

Athletic training education has evolved from a model with a strong experiential component and a weak educational curricular component to a standards based framework program.

Throughout the development of Athletic Training Education Programs (ATEPs), starting in 1950's through today when the Commission on Accreditation of Athletic Training Education (CAATE) has tightened restrictions and standards for athletic training curriculum. Athletic training education is broken into two components. The first component includes a didactic education or classroom curriculum and the second component involves clinical experience, where hands on experience supplements classroom understanding and allows students to become competent with the concepts taught during classroom curriculum. In comparing allied health professions, entry-level athletic trainers perceive approximately 53% of their professional development comes from clinical experiences, while physical therapy clinical experience have been reported to be 23% - 30% of the professional development (Weidner & Henning, 2002). The purpose of the study was to examine if relationships exist between characteristics within ATEPs and athletic training students (ATSS) success on the Board of Certification (BOC) examination.

Twenty-four graduates from six selected CAATE accredited NCAA Division I participating Institutions completed a 20 question survey regarding characteristics of clinical experiences within the ATEP as well as other demographic information that may identify relationships between those characteristics and success on the certification examination.

Results of this study identified no significant relationships between characteristics within ATEPs, football experience, or student demographics and success on the BOC examination. The number of subjects was limited and, if a larger population were surveyed, results may differ. Although not statistically significant, GPA as a predictor of and first attempt success on the BOC examination approached a significant value. These findings show consistency with previous research.

In conclusion, this study did not identify relationships that were significant but relationships that approached a level significance. No significant relationships were identified between ATEP characteristics, football experience, or student demographics and BOC examination success. Although fall football experience is not related to success on the BOC examination results show significant relationship between football experience and students' perception of observational role as well as hands on injury evaluation experience. Students who are placed within Division I football tend to hold roles strictly as observers versus those students who are placed within the high school football settings. Future research in the area of clinical experience and success on the BOC examination should continue. A larger sample size, from a variety of athletic conference's should be included in the survey population.

## DEDICATION

I dedicate this dissertation to my mom, Janet. Thank you for all your tireless editing work and helping to keep me on track. I could not have completed this without all your hard work and encouragement. Your drive and passion for work has been instilled in me from a young age and this dissertation is a direct reflection of the work ethic you showed Patty and me during our childhood.

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## **Chapter 1**

### **Introduction**

Athletic training is a complex profession that utilizes knowledge from many areas of study. Certified athletic trainers (ATCs) are responsible for the prevention, care, rehabilitation, and management of athletic related injuries within multiple settings including, hospitals, clinics, secondary schools, colleges, and professional sports. Educating and preparing future athletic trainers is important due to the wide range of knowledge needed to become an athletic trainer. Athletic training education programs (ATEPs) were created to help prepare athletic training students (ATs) for the profession. Clinical education has become an integral portion of the ATEP curriculum, providing ATs the opportunity to observe, learn, and treat patients in real life situations. Graduates have reported that approximately 53% of their professional developments as an AT came during their clinical education and experiences (Weidner & Henning, 2002).

The Commission on Accreditation of Athletic Training Education (CAATE) sets the standards for ATEP curriculums and holds the university accountable for providing ATs with an education that meets those standards of an entry level professional. Improving the quality of clinical education has become increasingly important. CAATE has developed clinical education standards that are now part of the ATEP curriculum requirements. With the increased emphasis on clinical education, it is important to determine if the CAATE standards are in fact the characteristics that will best prepare ATs for the BOC examination.

Universities that offer an ATEP are evaluated by CAATE every five to ten years for reaccreditation. Part of a five-year evaluation includes first time passing rate on the Board of Certification (BOC) examination. Research relating the clinical education to success on the

Board of Certification (BOC) examination is limited. Since the exam change in 2007, there has been no published research on this subject. There is a need for this type of research in order to help CAATE improve ATEP standards and to help ATEP Program Directors design clinical experiences which will better prepare ATSS.

It has long been thought that working fall football would provide a superior clinical experience compared to other sports. Contrary to that assumption, studies have identified that no such relationship exists. The NCAA Injury Surveillance results document the injury rates for various sports. Differences observed within football depending on the time of year and season. Spring football has the highest injury rate, followed by games, followed by pre-season practice. However, the prior research did not account for the different football seasons (Hootman et al., 2007). Based on the NCAA Injury Surveillance data additional research should be done comparing football seasons (preseason, fall, spring, or summer conditioning) and type of football (high school, Division I, Division II, Division III, or professional) experiences to success on the BOC examination.

Research published prior to the 2007 examination found that student demographics including age, grade point average (GPA), and early exposure in an allied health field were predictive of examination success (Turocy, Comfort, Perrin, & Gieck, 2000). Type of clinical experience and total number of clinical hours were not predictive of outcome on the BOC examination. Turocy et al. (2000) concluded that further research would help the Board of Certification (BOC) to determine whether the completion of CAATE requirements on clinical experience has any measurable impact on students' outcomes on the national examination and that their findings could be a baseline for future studies.

## **Statement of Purpose**

The purpose of this study was to examine if relationships exist between characteristics within ATEPs and ATS's success on the BOC examination. In particular, student demographic information and the characteristics of clinical football experience were explored.

## **Research Questions**

1. What are the relationships between selected characteristics of athletic training education programs and success rates on the BOC examination?
2. What is the relationship between selected characteristics of the clinical football experience and success rates on the BOC examination?
3. What are the relationships identified between the student's age or GPA and their success on the BOC exam?

## **Definitions**

*Athletic Training Education Program (ATEP)* is an accredited undergraduate curriculum program within a University.

*Board of Certification (BOC)* is the organization that administers the national, standardized test to certify professional Athletic Trainers in the United States.

*Commission on Accreditation of Athletic Training Education (CAATE)* is the agency which establishes curriculum requirements and approves ATEPs.

*Clinical Education* is the "practice of assisting a student to acquire the required knowledge, skills, and attitudes in practice settings to meet the standards as defined by the professional accrediting board" (Rose & Best, 2005).

*Football Bowl Subdivision (FBS)*, formerly known as Division 1-A, is the highest level of intercollegiate athletics.

*Football Championship Subdivision (FCS)*, formerly known as Division 1-AA.

*National Athletic Trainers' Association (NATA)* is the professional membership association for athletic trainers and others who support the athletic training profession.

### **Significance**

The significance of football experience related research could help ATEP Program Directors understanding of how to better prepare ATs for the BOC examination. Responsibility also needs to be placed on the ATs regarding the benefit of the football clinical experience and the potential learning environment that the clinical rotation offers in their professional preparedness.

## Chapter 2

### Review of Literature

#### History of Athletic Training Education Programs

Athletic training education has progressed from a strong experiential component and a weak educational curricular component to a standards based framework program. The first formalized ATEP began soon after the organization of the National Athletic Trainers' Association (NATA) in the 1950's (Delforge & Behnke, 1999; Seegmiller, 2003).

In 1956, the NATA Board of Directors organized a committee to study avenues to enhance the profession of athletic training. The committee agreed on a more formalized athletic training education and national certification for athletic trainers (Delforge & Behnke, 1999). Thus, the Committee on Gaining Recognition established the first model for curriculum in athletic training preparation in 1959 (Delforge & Behnke, 1999; Delwiche & Hall, 2007; Schellhase, 2008). The early clinical aspects of education followed an internship model, relying on hands-on experiences to gain knowledge (Seegmiller, 2003). With the evolution and changes taking place in the athletic training profession, the internship model soon changed.

Following a decade of change, the apprenticeship model, similar to that used in early nursing curriculum, became the next model used for athletic training education. This apprenticeship model consisted of a year of classroom learning followed by a year of clinical experience following a "mentor" to acquire professional knowledge and clinical skills (Seegmiller, 2003). The shortcoming of the apprenticeship model was that the entire clinical experience rested in the hands of the mentor (Seegmiller, 2003). The shortcomings of this approach lead to the development of the hour-based model. The thought behind this hour-based model was that by increasing and requiring a set number of hours the student would encounter a

sufficient number of varied situations to help prepare them for the profession of athletic training (Seegmiller, 2003).

In 1969 and 1970 the NATA approved the first ATEPs; Mankato State University, Indiana State University, Lamar University, University of New Mexico, and College of Beaumont (Delforge & Behnke, 1999; Delwiche & Hall, 2007). In 1969, the Certification Standards of the Professional Advancement Committee developed the first NATABOC standards for clinical experience hours (Turocy et al., 2000). Criteria for the development of clinical education requirements was based on committee members' personal experiences as athletic trainers, their knowledge of the needs of the athletic training profession at the time, and their knowledge and understanding of the criteria used by other health-related professions, such as physical therapy (NATA, 1969).

During the 1980's ATEPs became even more comprehensive using the guidelines set by the Professional Education Committee. With the completion of the first Role Delineation Study in 1983, conducted by the NATABOC, ATEPs began to promote a competency-based learning style. These competencies introduced a specific subject matter rather than course requirements (Schellhase, 2008) and defined a set of skills (proficiencies) that entry-level athletic trainers should possess (Seegmiller, 2003). The adoption of these proficiencies marked the change from a strictly quantitative (hour-based approach) to an education model emphasizing quality (Seegmiller, 2003).

Education reform has emphasized the importance of incorporating the strengths from both the apprenticeship and the hour-based approach (Seegmiller, 2003). The combination of the two approaches has helped focus on the concept of "learning over time".

**Accreditation.** ATEPs have had multiple accrediting bodies that set standards and review the eligibility of academic programs. The Joint Review Committee on Educational Programs in Athletic Training (JRC-AT), a subcommittee of the Committee on Accreditation under the Commission on Accreditation of Allied Health Educational Programs (CAAHEP) accredited all ATEPs from October 1991 until 2006 (“BOC: What is CAATE?”, n.d.). Since June 30, 2006, the JRC-AT became independent from CAAHEP and changed its name to the current accrediting body, CAATE. The American Academy of Family Physicians (AAFP), the American Academy of Pediatrics (AAP), the American Orthopedic Society for Sports Medicine (AOSSM) and the NATA cooperate to sponsor the CAATE and collaborate to develop the *Standards for Entry-Level Athletic Training Educational Programs* (“CAATE Standards”, 2008). The mission of the CAATE is to provide comprehensive accreditation services to institutions that offer athletic training degree programs and verify that all CAATE-accredited programs meet the acceptable educational standards for professional entry-level athletic training education (“BOC: What is CAATE?”, n.d.).

### **Current Topics within Athletic Training Education**

**Mastery learning.** Mastery learning is an instructional strategy that breaks down educational content into smaller units according to the essential components of a particular subject matter, in order to establish learning objectives, which helps guide instructional process (Schellhase, 2008). Other terms used to describe mastery learning are “programmed instruction”, “competency-based education”, “skills-based curricula”, and “outcome-based education” (Schellhase, 2008). The principle that “given the correct instruction and time to learn the material, all students can achieve the desired objectives at a satisfactory level” (Schellhase, 2008) is the basis of mastery learning.



John Carroll, Ralph Tyler and Benjamin Bloom, heavily influenced the mastery learning model as early as 1949. Benjamin Bloom developed three categories of objectives based on Ralph Tyler's earlier findings. Bloom developed cognitive, affective, and psychomotor objectives in an attempt to provide educators, researchers, and curriculum planners a common standard. The cognitive objective pertains to recall and recollection of skills. Affective domain relates to student interest, attitudes, and values. Psychomotor pertains to the manipulative and motor skills (Schellhase, 2008).

Later John Carroll's belief was based around the idea that student aptitude determined only the time it would take to learn the stated learning objectives, not his or her ability to learn them (Schellhase, 2008). Students who do not receive a satisfactory score on their objectives repeat the learning module and through repetition, the student gains more time exposure to the material. The student moves on once he or she achieves a satisfactory score. Through this process, mastery learning ensures every student who completes the program achieves a minimum competence with the material.

Mastery learning is appropriate for easily quantifiable content and researchers have found positive results for subjects like math and military training. Mastery learning has also shown benefits in criterion and norm-referred tests. However, there is no positive evidence that suggests mastery learning will benefit critical thinking (Schellhase, 2008).

**Learning over time.** By definition learning over time is the documented, continuous process of skill acquisition, progression, and student reflection. Learning over time reinforces the demonstration of a systematic progression through the three domains, cognitive, psychomotor, and affective (as referred to in previous section relating to Mastery Learning) (Amato, Konin, & Brader, 2002). However, learning over time is primarily associated with

psychomotor skills and clinical proficiencies. This concept encourages the teaching of skills and proficiencies and practicing multiple times before the final testing (Amato et al., 2002).

Learning over time is a direct reflection of the combination of the hour-based approach to education and the apprenticeship approach, that less emphasis be placed on the number of hours needed and more on acquiring the knowledge, skills, and abilities delineated in the Athletic Training Education Competencies (Amato et al., 2002; Seegmiller, 2003; Turocy et al., 2000).

This shift to learning over time and acquiring quality learning environment hours better prepares students to practice in the field of athletic training (Amato et al., 2002).

Learning over time needs presentation in a logical progression. The process of learning over time starts with introducing the topic, learning the topic, the ability to perform the skill, and finally retaining. Learning the didactic material in a classroom setting followed by student exposure to the same material or set of skills in a clinical education experience begins the process. Once skills and knowledge are acquired the students progresses through the development of critical thinking and decision-making skills (Amato et al., 2002). Learning over time encourages the students to look at the big picture. As students acquire skills, they must next develop the ability to combine individual skills in order to perform and master proficiencies.

### **Clinical Education Theories and History**

Clinical education is the “practice of assisting a student to acquire the required knowledge, skills, and attitudes in practice settings to meet the standards as defined by the professional accrediting board” (Rose & Best, 2005). Rose and Best (2005) determined that such clinical education was present in the fields of physiotherapy, speech pathology, occupational therapy, podiatry, prosthetics and orthotics, nursing and radiology. Clinical education within these fields involves the student leaving the confines of the university (or education setting) and undertaking

practice patients or client activities in a health, welfare or educational setting with the educational support of a qualified practitioner who is employed by the service or agency (Rose & Best, 2005).

There are five goals of clinical education, which educators should strive to create, authenticating student knowledge, interpreting theoretical and applied knowledge, developing and refining skills, familiarizing students with the workplace, and developing problem solving and time management skills (Radtke, 2008).

### **Clinical Education in the Allied Health and Medical Fields**

Clinical education in allied health fields, in recent years, has become structured and organized, progressing from a haphazard learning experience to a deliberate and focused learning experience. Responsibility naturally lies within three domains, the student, clinical instructor, and clinical education setting.

Clinical experiences designed to involve students in actual practice of a profession, allowing the opportunity to apply theoretic knowledge to real-life situations. Students gain knowledge through trial and error or guided by clinical instructors. Clinical education encourages an active learning environment, which provides learning opportunities (Laurent & Weidner, 2002).

### **Athletic Training Clinical Education**

Athletic training clinical education constitutes a substantial portion of professional preparation in the allied health care fields. Weidner and Henning (2002) reported that entry-level athletic trainers perceive approximately 53% of their professional development comes from clinical experiences, whereas physical therapy clinical experience was perceived to be 23% - 30% of the professional development.

Seegmiller (2003) suggests that a structured clinical experience leading to supervised field experiences will help students transition into professional roles. Based on the results, approved clinical instructors (ACI) should take on the responsibility and role as an educator (Seegmiller, 2003). Athletic training education does not stop in the classroom and ACIs need to be aware of their importance in the outcome of ATS's professional preparedness.

**Active learning time.** The term "Active Learning Time" (ALT) means the amount of time a student is engaged in activities contributing to their academic success (Berry, Miller, & Berry, 2004). Research related to ALT suggests that ALT is a strong determinant of student academic achievement and a positive relationship exists between engaged time and student learning (Berry et al., 2004). Data indicate that an increase in quantity of clinical hours does not guarantee an increase in quality of clinical education (Berry et al., 2004; Laurent & Weidner, 2002). Based on this information, it is imperative for educators to have a model for providing the most effective ways of enhancing ALT. In 2000, Weidner and Laurent's respondents reported that an active learning environment was helpful in professional development and reported that hands on experiences were valuable and important as part of an active learning environment. Miller and Berry (2002) identified that students spent 7% of overall clinical-placement time in instructional activities, 23% in clinical activities, 10% in managerial activities, and 59% in unengaged activities. The data indicates that active learning time and engaged time needs to be front and center because results show a significant relationship between engaged time and student learning (Laurent & Weidner, 2002). Miller and Berry (2002) also found academic standing might influence how they spend their time in clinical settings. Advanced students report that they spend 41% of their time engaged in active learning, 32% for intermediate level students, and

22% for novice students. Miller and Berry (2002) concluded that students must have the educational foundation behind the topic in order to participate in engaged time.

Miller and Berry (2002) also identified differences in engaged time depending on sport. Students assigned to upper extremity sports reported 70% of their time unengaged and 23% in active learning. Significantly different, students assigned to lower extremity sports reported spending 48% of time in unengaged activity and 40% engaged in active learning. Miller and Berry (2002) conclude that this difference could be due to comfort level of material relating to the lower extremity versus the upper extremity and increased exposure to lower extremity injuries. NCAA injury surveillance data indicate more than 50% of all injuries were to the lower extremity (Hootman, Dick, & Agel, 2007).

In another study Berry, Miller, and Berry (2004) looked closely at active learning time and clinical assignments. Subjects reported a significantly larger percentage of time spent in active learning when working with mixed extremity sports. The mixed extremity sports in this study were cheerleading, football, athletic training room, clinical/industrial, and gymnastics (Berry et al., 2004). Results also showed that percentage of time spent in active learning was dependent on clinical setting (clinical/industrial, college/university, and high school). Subjects in the clinical/industrial setting engaged in significantly more ALT (76%) than subjects in the college/university (50%) and high school (44%) settings.

**Critical thinking in athletic training clinical education.** Critical thinking (CT) in athletic training clinical education needs to become the focus of teaching environments and teaching needs to focus on active learning styles and strategies that will help promote CT. According to Walker (2003), ATs need to experience diverse teaching methods that promote CT. Walker (2003) also explains that exposure to a variety of ATCs and clinical experiences helps increase

the students' ability of think critically (Walker, 2003). Students need to be encouraged to be inquisitive, ask questions, and not believe and accept everything they are told.

**Clinical experiences and clinical rotations.** Current CAATE standards require ATs to complete no less than two years of clinical experience rotations. The students' clinical education should include a variety of sites and settings: four-year colleges and universities, two-year colleges, high schools, clinics, hospitals, industrial health care and rehabilitation clinics, professional sports, or Olympic sports. Throughout these clinical sites the students experience must include practice and game coverage, pre-event preparation and athletic training room coverage.

The purpose of clinical experience sites is to involve students in the actual practice of the profession, allowing them an opportunity to apply theoretic knowledge to real-life situations. Acquiring athletic training skills and knowledge either occurs through trial and error or guided by clinical instructors; learning by doing fosters skill acquisition during clinical experiences (Laurent & Weidner, 2002).

### **Board of Certification**

Since 1969, the Board of Certification (BOC) is responsible for the certification of Athletic Trainers. Upon its inception, the BOC was an entity of the professional membership organization the NATA, known as the NATABOC. However, in 1989 the BOC became an independent non-profit corporation. The BOC reviews and revises the BOC Role Delineation Study every five years and revises the certification exam accordingly ("BOC Certification", n.d.). A primary purpose of a role delineation study serves as a blueprint for examination development (NATABOC Delineation, 2004). A critical reason for reviewing the Role Delineation Study is to ensure content validity of the BOC examination (NATABOC

Delineation, 2004). “All aspects of athletic training covered on the examination reflect the tasks performed in the range of practice settings throughout the United States” (NATABOC Delineation, 2004, p. 1). A panel of 20 experts identified essential aspects of athletic training, categorized them into “domains” (NATABOC Delineation, 2004). The domains, split into six categories; include skills, tasks, and knowledge sets for each domain. Within each domain, proficiencies and competencies identify what entry-level athletic trainers need to be able to perform during their time in the profession (NATABOC Delineation, 2004).

**The BOC Examination.** Throughout the 1960’s the NATA Certification Committee was in the process of developing a certification examination (Delforge & Behnke, 1999). In 1970 the BOC examination was created and the first examination was administered in July of 1970 (Delwiche & Hall, 2007), in Waco, Texas (Delforge & Behnke, 1999). The BOC examination was a three-part examination; written, written simulation and practice. Persons taking the exam could pass the individual examination section but not the entire exam, leaving them short of certification. Persons who did not pass could take one or more sections later until they passed all three sections. After approximately 40 years of certifying individuals, the BOC developed a new test. The new computer based examination (CBE) format, first offered in June 2007, is a 4-hour integrated examination (“Computer Based Exam”, 2007). Examination is comprised of 100-125 multiple-choice questions and four hybrid style questions (similar to the written simulation portion of the original examination). The examination is scored from 200-800 with a 500 or better receiving a passing grade (“Exam Scoring”, n.d.).

**Eligibility routes for qualifying to sit for the BOC examination.** From 1969, during the development of athletic training clinical education, through 2004 there have been multiple routes for ATS to complete clinical education experiences and become eligible for the BOC

examination. Starting in 1969 there were four recognized routes for student to become eligible for the BOC examination. The first route was for athletic trainers who were actively engaged in the profession but had not gained certification. Those individuals had to provide proof of 5 years of experience beyond that of an athletic training student at the secondary school level. The second route was for those ATS enrolled in a current NATA approved graduate or undergraduate athletic training program. These students had to acquire a minimum of 800 clinical experiences hours, under the supervision of a NATA approved supervisor. A third route was for students who had graduated with a physical therapy degree. These candidates needed to acquire two years of athletic training experience beyond that of an athletic training student at secondary school level, under direct NATA approved supervision. The fourth, and final, route was apprenticeship. Apprenticeship candidates were required to provide proof of 1800 hours of on-the-job training under direct supervision of a certified NATA member (Turocy et al., 2000; Weidner & Henning, 2002).

In 2000, the BOC accepted only two routes for eligibility for the exam. Route 1 was for ATS who graduated from an accredited ATEP while collecting a minimum of 800 hours in a variety of athletic training experiences, in no fewer than two years. Route 2 was an internship route (similar to that of the apprenticeship route). These individuals had to document 1500 hours of athletic training experiences. At least 1000 of those hours had to be in traditional settings (interscholastic, intercollegiate, or professional sports). The remaining 500 hours could be in other allied health clinical settings or sport camps while under supervision of an ACI (Turocy et al., 2000).



Since 2004, there has been only one qualification route for the BOC examination. All candidates for the BOC examination must have graduated from an accredited ATEP (Delwiche & Hall, 2007; Schellhase, 2008).

**Predictors of success.** Turocy et al. (2000) found that students with an excess of 400 hours over the minimum required placement hours demonstrated a higher passing rate on the examination than those students who only met the minimum requirement. Researchers indicated a relationship between candidates' ages and the scores on the oral/practical section. However due to the small amount of variance in the scores, age could not be considered a predictor of outcome on this portion of the examination. There was no relationship between age and success on other sections of the exam (Turocy et al., 2000).

Turocy et al. (2000) concluded that further research be done to evaluate the "quality" versus the "quantity" of clinical experience hours. Researchers concluded clinical experiences should have greater emphasis on assuming increased responsibility (Turocy et al, 2000). Data identified a relationship between previous experience in an allied health field and outcome on the BOC examination. However, these findings were not statistically significant (Turocy et al., 2000). In another study to determine if clinical experience in athletic training was a predictor of success on the BOC examination, data showed that grade point average and early start to clinical education influenced the passing of at least one portion (the written simulation or the practical exam) of the 3 part examination (Searcy, 2006).

***Clinical experiences as a predictor of BOC examination success.*** In 2000, Turocy et al. reported findings that clinical experiences are not predictive of outcomes on the BOC examination. In this study Turocy et al., looked closely at whether high-risk sport experience was predictive of success on the BOC examination. High-risk sports included in the study were

football, soccer, hockey, wrestling, baseball, gymnastics, lacrosse, volleyball, and rugby. Results could not establish a significant predictive value for high-risk sports and passing success on the BOC examination. Significant findings were discovered for wrestling alone ( $P=.0464$ ) on the written section and field hockey ( $P=.0260$ ) on the oral/practical section. Turocy et al. (2000) did not conclude those particular findings were predictive of examination scores because subject numbers accounted for only a small percentage of the variance in scores. The NCAA injury surveillance data show that wrestling was second in injury rate per 1000 Athlete-Exposure to football competitions (Hootman et al., 2007).

Turocy et al. (2000) were also interested in whether clinical experience with football was a predictor of BOC examination outcomes. Because of “...the longstanding belief that fall football experience helped to prepare students better clinically than any other sport experience” (Turocy et al., 2000, p. 72). According to the NCAA injury surveillance data, football accounted for the highest injury rates in both practices and games when comparing 15 collegiate sports. The injury rate, expressed as number of injuries per 1000 Athlete-Exposures, for football games is 35.9; wrestling follows at 26.4 injuries per 1000 Athlete-Exposures (Hootman et al., 2007). Spring football practice has twice the injury incidence rate as fall football, 9.6 injuries per 1000 Athlete-Exposures versus 3.8 (Dick, Ferrara, Agel, Courson, Marshall, Hanley, & Reifsteck, 2007). Data indicate that fall preseason practice injury rates are three times higher than fall practices (Dick et al., 2007). Turocy et al. (2000) found clinical experience with fall football was not predictive of outcomes on the BOC examination (see Table 1). Turocy et al. (2000) concluded a possible reason for non-significant relationship between fall football experience and passing rate is that students do not make critical decisions or use the skills necessary. Students

reported an exposure to many new skills but often times not asked to perform these skills but rather strictly observe the ATC or ACI (Turocy et al., 2000).

Table 1

**Fall Football Experience Hours as Predictor of Examination Outcomes**

Category	<i>P</i>	<i>F</i>	<i>r</i> <sup>2</sup>	SD
Written	.4584	.55	.0021	15.449
Oral/practical	.6157	.25	.0010	5.987
Written simulation	.2262	1.47	.0056	296.906

Data from Searcy (2006) showed a significant relationship between the number of clinical rotations or settings a student encountered during the ATEP and performance on the BOC examination. This finding supports the NATA education council beliefs that students should participate in three or more clinical settings during their education (Searcy, 2006). Although these findings are significant, it is important to note that, the data collection occurred prior to the 2007 CBE format.

Since NATA first organized in the 1950s, one of the primary goals of the organization has been to improve the professional preparedness of athletic trainers by continuously improving and standardizing education programs, certification requirements, and certification testing for becoming an ATC. During that time, there has been little research to understand elements of the education program that are predictors of success on the BOC examination. At the same time, many people, both students and administrators, have thought that fall football is the best clinical experience for becoming an ATC, despite the fact that limited, existing research has shown no such correlation. More recently, emphasis has increased on developing clinical proficiencies, competencies, and clinical education standards within ATEP and the way those proficiencies are tested on the BOC examination changed in 2007. Since then, no research has been published regarding predictive factors of success on the new examination. Research in this area will assist ATEP coordinators and program directors in providing an educational experience that prepares their students for success in not only passing the exam but also becoming successful ATC professionals. Such research would also assist the CAATE as the committee evaluates and updates standards for all ATEPs.

## **Chapter 3**

### **Methods**

#### **Statement of Purpose**

The purpose of this study was to examine if relationships exist between characteristics within ATEPs and ATS's success on the BOC examination. In particular, student demographic information and the characteristics of clinical football experience were explored.

#### **Research Questions**

1. What are the relationships between selected characteristics of ATEPs and success rates on the BOC examination?
2. What is the relationship between selected characteristics of the clinical football experience and success rates on the BOC examination?
3. What are the relationships identified between the student's age or GPA and their success on the BOC exam?

#### **Subjects**

The subjects will be drawn from ATCs who graduated from CAATE accredited ATEPs during academic years 2007, 2008, 2009 and 2010, whose universities participate in a selected Division I athletic conference. The subject pool consists of approximately eighty individuals who remain in contact with program directors following graduation from the ATEP. Assuming a fifty percent response rate the goal subject number was 40 participants. ATEP graduates have a better follow-up relationship with program directors or ACIs compared to other university major graduates so the subject number has the potential to be higher.

**Instrumentation**

A twenty-question survey was created to obtain information regarding the subjects' clinical experiences while in the ATEP (see Appendix 1). To establish construct validity, four experts within athletic training education were asked to review the questionnaire. Experts included ATEP educators and a head football athletic trainer. A pilot study was performed to assess functionality and ease, as well as understanding of the survey. Graduate Assistant Athletic Trainers from a Division I athletic institutions, that will not be included in the study, were the subjects for the pilot study. Minor changes were made following the completion of the pilot study.

**Procedure**

An introductory letter was sent to six ATEP program directors to explain the purpose of the study as well as the possible benefits for educating future athletic training students. All six ATEP program directors had expressed interest in assisting in the study and reported that they could provide alumni contact information. ATEP program directors would provide email addresses for graduated ATs who graduated from the program in academic years 2007, 2008, 2009, 2010 and had already taken the BOC examination. Recent graduates who have not passed the BOC examination were excluded from the study. The International Review Board (IRB) granted prior approval, with exempt status. Based on exempt status, once a subject completes the questionnaire, informed consent is implied.

An introduction email was sent to those subjects along with the link to access the survey on [survey.vt.edu](http://survey.vt.edu). Subjects were asked respond to all questions with the understanding that all responses will be anonymous and the university name is not included in the data. Two weeks following the original email, a follow-up email with the link to [survey.vt.edu](http://survey.vt.edu) was sent to all

subjects serving as a thank you to those who have completed the questionnaire and a friendly reminder to those who have not completed the survey to do so.

All results were individually recorded in Microsoft Excel upon completion of the study. Once the final subject was entered all information was exported into JMP 8.0 statistical software.

### **Analysis**

Statistical analyses performed using JMP 8.0 software. Contingency tables were set up for the above-mentioned criteria. Chi-squared tests for each variable were calculated to identify if a relationship exists. Variables independent of one another will have no significant relationship. Variables that were related will have a significant statistical finding; therefore, a relationship between the two variables is noted. Statistical significance, at a 95% confidence level, was determined by an alpha value less than 0.05.



## Chapter 4

### Results

#### Introduction

The purpose of this study was to examine if relationships exist between characteristics within ATEPs and ATS's success on the BOC examination. In particular, student demographic information and the characteristics of clinical football experience were explored. A survey was created to identify characteristics of athletic training clinical experience and approved by experts in athletic training education and clinical experience. The survey was distributed to recent graduates, from six ATEP schools. The participant sample (n= 24) consisted of graduates from 2007-2010 academic years. Success on the BOC examination was calculated using two formats, total number of attempts (*# attempts*) taken to pass the examination and first time success rate (*first attempt*). Of the 24 twenty-four subjects ten passed the BOC examination on the first attempt and fourteen did not (Figure 1). Figure 2 shows the distribution of total number of attempts it took subjects to pass the BOC examination.

Figure 1  
Distribution: First Attempt

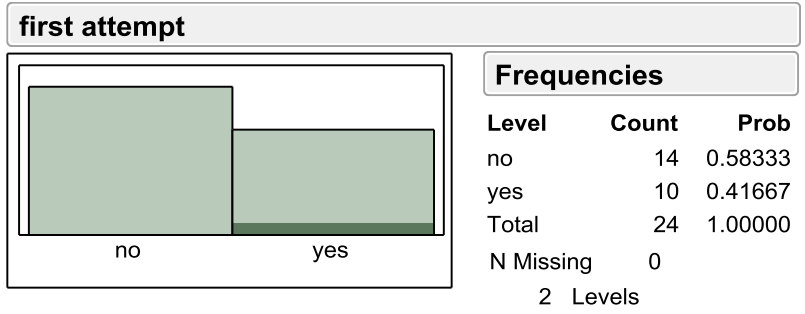
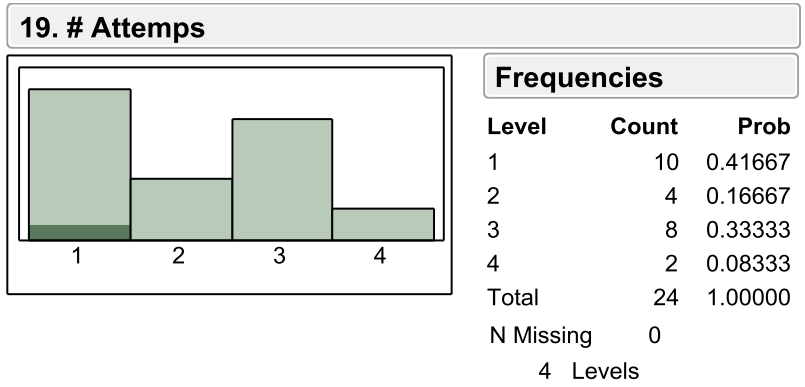


Figure 2  
Distribution: Number of Attempts



## **Analyses**

Contingency tables were formed for the following areas in the interest of analysis. The first analysis compared the characteristics within ATEPs and success of the BOC examination. The second analysis compared variables within football clinical experience and success on the BOC examination to identify if a relationship exists. The final analysis identified whether a relationship between demographic variables and success of the BOC examination exists. Pearson's Chi-squared tests were calculated from the contingency tables to determine if a relationship exists between the variables. Statistical significance was noted if  $\text{Prob} > \text{ChiSq}$  was less than 0.05.

### ATEP characteristics and success on the BOC examination

The first analysis looked for a relationship between ATEP characteristics and success on the BOC examination. ATEP characteristics tested were: the total number of clinical experience hours, the year in which the student was assigned their first rotation, and the number of clinical rotations assigned that consisted of more than 50 total hours. Chi-squared tests indicated there is no relationship between these program characteristics and passing the BOC exam.

### Football experience and success on the BOC examination

The second analysis examined the potential relationships between football experience and success on the BOC examination. The football experience characteristics tested were subject responses related to: total football hours, type of football (high school, Division I, Division II, etc.), football season (preseason, fall, spring etc.), as well as responses to Likert Scale questions relating to observational status during football, perception of athlete preparation, and perception of involvement in injury evaluation. Results show no significant statistical findings of alpha 0.05. However, the relationship tested between football season worked and first attempt success

on the BOC exam did have a Pearson's Chi-squared result of  $\text{Prob} > \text{ChiSq} = 0.0858$  (Table 2).

Results indicate that 4 of 5 students who worked both preseason and fall football passed on the first attempts, while 3 of 9 students who worked preseason football alone passed on the first attempt.

#### Student demographics and success on the BOC examination

The final analysis examined the potential relationships between student demographics (GPA and age) and success on the BOC examination. Although not statistically significant, because of the small sample size, Chi-squared test results indicate a likelihood ratio  $\text{Prob} > \text{ChiSq} = 0.0425$  and a Pearson's  $\text{Prob} > \text{ChiSq} = 0.0811$  (Table 3), approached a significance level of 0.05 when relating GPA and first attempt passing success. Results indicate that all students (N=4) with GPA over a 3.6 passed the BOC examination on the first attempt. No other relationships were identified.

Table 2  
Fit y by x: Football Season by first attempt

		Football Season								
Count	fall	fall, spring	preseason	preseason, fall	preseason, fall, spring	preseason, fall, summer	preseason, spring	spring		
Total %										
Col %										
Row %										
Expected										
first attempt	no	3	0	6	1	0	2	2	0	14
		12.50	0.00	25.00	4.17	0.00	8.33	8.33	0.00	58.33
		100.00	0.00	66.67	20.00	0.00	100.00	100.00	0.00	
		21.43	0.00	42.86	7.14	0.00	14.29	14.29	0.00	
		1.75	0.58333	5.25	2.91667	0.58333	1.16667	1.16667	0.58333	
	yes	0	1	3	4	1	0	0	1	10
		0.00	4.17	12.50	16.67	4.17	0.00	0.00	4.17	41.67
		0.00	100.00	33.33	80.00	100.00	0.00	0.00	100.00	
		0.00	10.00	30.00	40.00	10.00	0.00	0.00	10.00	
		1.25	0.41667	3.75	2.08333	0.41667	0.83333	0.83333	0.41667	
	3	1	9	5	1	2	2	1	24	
	12.50	4.17	37.50	20.83	4.17	8.33	8.33	4.17		

**Tests**

N	DF	-LogLike	RSquare (U)
24	7	8.0699988	0.1904

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	16.140	0.0239*
Pearson	12.480	0.0858

Warning: 20% of cells have expected count less than 5, ChiSquare suspect.

Warning: Average cell count less than 5, LR ChiSquare suspect.

Table 3  
Fit y by x: GPA by first attempt

<b>Contingency Table</b>						
Adj. GPA						
	2.8-3.1	3.2-3.5	3.6-3.9	3.9-4.2		
Count						
Total %						
Col %						
Row %						
first attempt	no	5	9	0	0	14
		20.83	37.50	0.00	0.00	58.33
		71.43	69.23	0.00	0.00	
		35.71	64.29	0.00	0.00	
	yes	2	4	3	1	10
		8.33	16.67	12.50	4.17	41.67
		28.57	30.77	100.00	100.00	
		20.00	40.00	30.00	10.00	
	7	13	3	1	24	
	29.17	54.17	12.50	4.17		

<b>Tests</b>				
	N	DF	-LogLike	RSquare (U)
	24	3	4.0886083	0.1572
Test	ChiSquare	Prob>ChiSq		
Likelihood Ratio	8.177	0.0425*		
Pearson	6.729	0.0811		

Warning: 20% of cells have expected count less than 5, ChiSquare suspect.

Warning: Average cell count less than 5, LR ChiSquare suspect.

**Other Results**

Although not a specific research questions in this study, some results reveal a potential relationship between type of football experience (high school, Division I FBS, Division I FCS, Division II, Division III, and professional) and students' perceptions of their role and opportunity for hands on injury evaluation skill development. Students were asked if they agreed or disagreed with the following statement: I feel like I performed injury evaluations prior to the supervising ATC. Subjects responses yielded a  $\text{Prob} > \text{ChiSq} = 0.0425$  (Table 4), expressing a relationship between the two variables. Results indicate that 8 of 10 students with high school experience felt they performed injury evaluations prior to the ACI. Student responses to the question: I feel I was there more in an observation role, identifies that a relationship exists between observational role and football season (Table 5). 7 of 9 subjects who worked preseason felt they were there in an observational role, while 4 of 5 subjects who worked preseason and fall football disagreed that they were acting in an observational role.

Table 4  
Fit y by x: Football setting by performed injury evaluations

Contingency Table						
> hrs in FB setting						
	Count	Division I	Division IAA	Division II	High School	
	Total %					
	Col %					
	Row %					
Injury Evaluation	agree	0	1	1	8	10
		0.00	4.17	4.17	33.33	41.67
		0.00	25.00	100.00	72.73	
		0.00	10.00	10.00	80.00	
	disagree	7	3	0	2	12
		29.17	12.50	0.00	8.33	50.00
		87.50	75.00	0.00	18.18	
		58.33	25.00	0.00	16.67	
	n/a	1	0	0	1	2
		4.17	0.00	0.00	4.17	8.33
		12.50	0.00	0.00	9.09	
		50.00	0.00	0.00	50.00	
	8	4	1	11	24	
	33.33	16.67	4.17	45.83		

Tests				
	N	DF	-LogLike	RSquare (U)
	24	6	8.4237437	0.3039
Test	ChiSquare	Prob>ChiSq		
Likelihood Ratio	16.847	0.0099*		
Pearson	13.032	0.0425*		

Warning: 20% of cells have expected count less than 5, ChiSquare suspect.

Warning: Average cell count less than 5, LR ChiSquare suspect.



Table 5  
Fit y by x: Football season by observational role

		Football Season								
Count	fall	fall, spring	preseason	preseason, fall	preseason, fall, spring	preseason, fall, summer	preseason, spring	spring		
Total %										
Col %										
Row %										
Observational Role	agree	1	0	7	1	0	0	1	1	11
		4.17	0.00	29.17	4.17	0.00	0.00	4.17	4.17	45.83
		33.33	0.00	77.78	20.00	0.00	0.00	50.00	100.00	
		9.09	0.00	63.64	9.09	0.00	0.00	9.09	9.09	
	disagree	2	0	2	4	0	2	0	0	10
		8.33	0.00	8.33	16.67	0.00	8.33	0.00	0.00	41.67
		66.67	0.00	22.22	80.00	0.00	100.00	0.00	0.00	
		20.00	0.00	20.00	40.00	0.00	20.00	0.00	0.00	
	n/a	0	1	0	0	1	0	1	0	3
		0.00	4.17	0.00	0.00	4.17	0.00	4.17	0.00	12.50
		0.00	100.00	0.00	0.00	100.00	0.00	50.00	0.00	
		0.00	33.33	0.00	0.00	33.33	0.00	33.33	0.00	
	3	1	9	5	1	2	2	1	24	
	12.50	4.17	37.50	20.83	4.17	8.33	8.33	4.17		

**Tests**

N	DF	-LogLike	RSquare (U)
24	14	13.009551	0.5518

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	26.019	0.0257*
Pearson	29.062	0.0103*

Warning: 20% of cells have expected count less than 5, ChiSquare suspect.

Warning: Average cell count less than 5, LR ChiSquare suspect.

## **Chapter 5**

### **Discussion**

#### **Summary of Study**

The purpose of this study was to examine if relationships exist between characteristics within ATEPs and ATS's success on the BOC examination. In particular, student demographic information and the characteristics of clinical football experience were explored. The following research questions were examined: what are the relationships between ATEP characteristics, football experience characteristics, or student demographics and success on the BOC examination.

#### **Discussion**

Results show no significant relationships between characteristics of ATEP, football experience, and/or student demographic information and success on the BOC examination. However, results were not statistically significant, they were consistent with research by Searcy (2006) in the area of athletic training education and success of the BOC examination, this study identified a Pearson's  $\text{Prob} > \text{ChiSq} = 0.081$  and a Likelihood Ratio  $\text{Prob} > \text{ChiSq} = 0.0425$  that GPA is a factor for success on the BOC examination. For this particular model, GPA and passing on the first attempt were used for analysis.

Turocy et al. (2000) concluded that age was predictive of success on the oral/practical section of the BOC examination but no relationship existed between age and the written or written simulation sections. Results from this study identify no relationship between age and success on the BOC examination, consistent to the Turocy et al. (2000) study findings. Since the BOC examination has eliminated the oral/practical section, the Turocy et al. (2000) findings are no longer important.

Results from this study support previous research identifying predictors or relationships between examination success and fall football experience. Turocy et al. (2000) concluded that fall football experience was not a predictor for success on the BOC examination because the students are often in an observational role and not given the opportunities for hands on skills practice or development.

Limitations to this study occurred during data collection that was unexpected. In the development stage of this study, the ATEP program director at each of the six schools identified for this study was contacted regarding their interest and willingness to assist in the data collection. At that time, all program directors responded positively, that they would be willing to provide an email list for students who graduated from 2007-2010. However, a few months later when data collection was approaching, most program directors were either extremely slow to respond to the follow-up emails requesting former student's emails or were ultimately unwilling to provide those email addresses. Graduates from three of the six universities included in this study did not receive emails from the researcher directly. Program directors felt that it would be in their better interest if graduates received the email from the program directors. Program directors were sent the recruitment document to forward on to their respective students. The delayed response combined with the inability to contact program graduates directly, led to a smaller sample population than expected. Simply by increasing the population size, either by including more schools or by obtaining a contact list generated directly by the BOC might yield a larger number of subjects. Another limitation during the data collection was the nature of the email address. Program directors tend to have only school email accounts. The low number of responses suggests that graduated students do not tend to check their old school email account.

Because the focal point of this study was the nature of the clinical experience, responses provided by the subject about specific components of their clinical experience were also analyzed. As previously mentioned, the relationship between types of football experience (Table 4) exposes that 8 of 11 students who were placed in High School football would agree that they performed injury evaluations prior to the ATC overseeing their experience compared to 7 of 8 students that were placed in the Division I BCS football setting who disagreed with the statement. According to athletic websites from the participating schools, athletic training staff size within the Division I football institutions is larger than smaller divisions (I FCS, II, and III) and extensively larger than at the high school level where there is typically one ATC. Division I institutions may have graduate student athletic trainers who are also in the process of professional development who are given more of an opportunity for the hands on skill acquisition. Physicians are also frequently present within Division I athletics, taking away experience for the undergraduate athletic training students. Athletic training clinical education is designed to provide students with the learning environment that will prepare them for the profession of athletic training. While Division 1 Football certainly provides valuable experience for the ATS, it should not be considered a key clinical rotation for hands-on skill development. Providing each student with opportunities in both Division I setting as well as high school setting may provide the student a better overall educational experience.

### **Suggested Future Research**

Future research in the area of clinical experience as it relates to success on the BOC examination will increase the effectiveness for ATEPs and it could place greater emphasis on the areas of clinical education. Such information will also help ATEP program directors to educate

their ACIs assigned to sports that have shown to be a better indicator of success on the BOC examination and emphasize teachable moments for the students.

Future studies should include a larger sample size as well as a population of ATEPs from multiple NCAA division levels, as the characteristics of exposure could change depending on the NCAA division level.

### **Conclusion**

In conclusion, this study identified no statistically significant relationships between success on the BOC examination and ATEP characteristics, football clinical experience, or student demographics studied. Type of football season (preseason, fall, spring, and summer conditioning) and first attempt passing on the BOC examination shows that a relationship approaching a level of significance exists, however due to a limited sample size significance is not reached. The results of this study were consistent with previous studies which were conducted prior to the 2007 examination format change. Identifying characteristics within an athletic trainer's professional development which enhance their learning and better prepare them for success on the BOC examination, needs to continue to be on the forefront of curriculum development.

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## Appendix A

## ATEP Clinical Education and BOC Examination Questionnaire

**What year did you graduate from the ATEP?**

- 2007    2008    2009    2010

**What was your overall GPA?**

- 2.0-2.49    2.5-2.99    3.0-3.49    3.5-4.0    other:

**During which academic year were you first assigned a clinical rotation?**

- Freshman    Sophomore    Junior    Senior

**How many semesters were you assigned clinical rotations while in the ATEP?**

- 3 Semesters  
 4 Semesters  
 5 Semesters  
 6 Semesters  
 7 Semesters  
 other:

**The number of clinical rotations you spent more than 50 hours with?**

- 4    5    6    7    8    9    10    other:

**In total, approximately how many clinical hours did you complete while in the ATEP?**

- 600-700hours  
 700-800hours  
 800-900hours  
 900-1000hours  
 1000+hours

**During your ATEP career did you work Football?**

- Yes    No

**Where did you complete your football clinical experience/s?**

- High School  
 College Division 1-FBS (Football Bowl Subdivision)  
 College Division 1-FCS (Football Championship Subdivision)  
 College Division II

- College Division III
- Professional
- other: \_\_\_\_\_

**How many hours did you accumulate during your football clinical experience?**

- 0-100hours
- 100-300hours
- 300-500hours
- 500+hours

**What time of year did you complete your football experience/s?**

- Fall pre-season (August) included 2-a-days
- Fall football including all practices and games
- Spring football
- Summer workouts and conditioning

other: \_\_\_\_\_

**What athletic training skills did you master during your football experience more than during any other sport experience?**

- taping
- acute injury management
- injury evaluation
- rehabilitation
- injury prevention
- emergency response
- bracing & splinting
- equipment fitting

During your football experiences please rate the following on a scale from 1-5. 1 being strongly disagree and 5 being strongly agree

**I prepared athletes for practice/competition on a regular basis.**

- 1-Strongly disagree
- 2-Disagree
- 3-Neither agree nor disagree
- 4-Agree

5-Strongly agree

**I feel I was there more in an observation role.**

- 1-Strongly disagree
- 2-Disagree
- 3-Neither agree nor disagree
- 4-Agree
- 5-Strongly Agree

**I was involved in the rehabilitation process of injured athletes.**

- 1-Strongly disagree
- 2-Disagree
- 3-Neither agree nor disagree
- 4-Agree
- 5-Strongly Agree

**I preformed injury evaluations prior to an ATC more often than not.**

- 1-Strongly disagree
- 2-Disagree
- 3-Neither agree nor disagree
- 4-Agree
- 5-Strongly Agree

Please answer the following questions relating to the BOC exam

**What was your age when you first took the BOC exam?**

**When did you first take the BOC exam?**

example: YYYYMM

**How many attempts did it take you to pass the BOC exam?**

- 1
- 2
- 3
- 4
- 5
- 6
- other:

**Please identify which sport experience you believe best prepared you for the BOC exam?**

Appendix B  
Recruitment Document

All Participants will receive an email with the text of the body being:

Greetings,

You all have one thing in common, graduating from a CAATE accredited Athletic Training Education Program. As we all know, our clinical experiences throughout our ATEP provided beneficial knowledge that helped prepare us for the passing of the BOC examination. Comparing clinical experiences is hard to quantify and even harder to identify and outcomes/benefits from those experiences.

I have created a simple questionnaire that will potentially lend athletic training education providers with important information regarding football clinical experience and students' outcomes on the BOC exam.

If you would graciously take and submit the attached questionnaire, taking no more than 10 minutes to take, I believe that as a group we could help identify characteristics of football clinical experiences that can predict a better outcome on the BOC examination.

Going to this link and filling out the questionnaire can help the profession that we all love.  
<https://survey.vt.edu/survey/entry.jsp?id=1273622825301>

Thank you for your contribution to this study,

Kathy Hickman  
Assistant Athletic Trainer  
Radford University

## Appendix C

Follow-up Email: sent 2 weeks following initial recruitment documentation was sent

Greetings,

Again, as a reminder and for increased interest, I am following up regarding the questionnaire sent to you two weeks ago. This questionnaire will only take 10 minutes, by taking the time and submitting your responses, you could make a huge contribution to the future of athletic training education programs.

Enter <https://survey.vt.edu/survey/entry.jsp?id=1273622825301> into your internet browser and continue through the short survey.

If you have already completed this questionnaire please do not submit a second survey, this could drastically alter the data. Thank you for your prompt response!

Thank you again,

Kathy Hickman  
Assistant Athletic Trainer  
Radford University

Appendix D  
IRB Exempt Approval

Office of Research Compliance  
Institutional Review Board  
2000 Kraft Drive, Suite 2000 (0497)  
Blacksburg, Virginia 24060  
540/231-4606 Fax 540/231-0959  
e-mail [irb@vt.edu](mailto:irb@vt.edu)  
Website: [www.irb.vt.edu](http://www.irb.vt.edu)

**MEMORANDUM****DATE:** July 2, 2010**TO:** Richard K. Stratton, Katherine Hickman**FROM:** Virginia Tech Institutional Review Board (FWA00000572, expires June 13, 2011)**PROTOCOL TITLE:** Football Experience and BOC Examination**IRB NUMBER:** 10-465

Effective July 2, 2010, the Virginia Tech IRB PAM, Andrea Nash, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at <http://www.irb.vt.edu/pages/responsibilities.htm> (please review before the commencement of your research).

**PROTOCOL INFORMATION:**Approved as: **Exempt, under 45 CFR 46.101(b) category(ies) 2**Protocol Approval Date: **7/2/2010**Protocol Expiration Date: **NA**Continuing Review Due Date\*: **NA**

\*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

**FEDERALLY FUNDED RESEARCH REQUIREMENTS:**

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

*Invent the Future*

IRB Number 10-465

page 2 of 2

Virginia Tech Institutional Review Board

Date*	OSP Number	Sponsor	Grant Comparison Conducted?

\*Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office ([irbadmin@vt.edu](mailto:irbadmin@vt.edu)) immediately.

cc: File