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The Effect of Select Programmatic Characteristics on First-Time Pass Rate of the Board of Certification Examination

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The Effect of Select Programmatic Characteristics on First-Time Pass Rate of the Board
of Certification Examination

By
Matthea S. Hungerford

A Dissertation Submitted to the
Gardner-Webb University School of Education
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

Gardner-Webb University
2012

Approval Page

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Abstract

The Effect of Select Programmatic Characteristics on First-Time Pass Rate of the Board of Certification Examination. Hungerford, Matthea, 2012: Dissertation, Gardner-Webb University, Athletic Training Education Program/Athletic Training Program Design/Athletic Training Education/BOC Examination

This study was designed to examine the progression of Board of Certification (BOC) Domain content within athletic training courses and the introduction of Domain content within the curriculum of the Athletic Training Education Program (ATEP) on first-time pass rate of the BOC exam for 2010 graduates. The researcher also gauged the perceptions of athletic training education program directors and instructional faculty regarding importance of specific ATEP characteristics on preparing students for success on the BOC examination.

Invited study subjects included all Commission on Accreditation of Athletic Training Educated accredited ATEP directors and associated instructional faculty. Participants were e-mailed a study introduction and link to the survey. The researcher-developed survey gathered data outlining program specifics, BOC examination results, perceptions of ATEP characteristics, and institutional demographics. Pearson Product correlation analyses were utilized to determine relationships between school units where Domains were introduced and 1) percentage first-time success on the BOC and 2) average individual Domain score. Simultaneous Multiple Regression Analysis was applied to the data to identify optimal timing of introduction of each Domain. Strength of perceptions among respondents was established utilizing Chi square analysis Goodness of Fit, and Kendall's W. Pearson Product correlation analyses were also utilized to determine relationships between the independent variables of 1) ranking of importance of ATEP components on first-time success on the BOC and 2) successful implementation of ATEP components in the institution's ATEP with the dependent variables of 1) percentage first-time success on the BOC and 2) average individual Domain score. Multiple Step-Wise Forward Regressions were then applied to the significant factors. All qualitative responses provided in the survey data were coded utilizing an interpretive method of data coding. Overall descriptive statistics were computed on all survey items.

With the results of this study, it was established that neither the sequence nor timing of Domain content had a measurable influence on first-time success on the BOC examination with correlations and multiple regressions demonstrating no significant results. The highest ranked ATEP component in regard to importance on first-time BOC success and successful implementation was Learning Over Time with a mode of "strongly agree" for each. The ranking of Qualifications of Instructors demonstrated predictive power for overall first-time pass percent on the BOC. Qualification of Instructors, Ratio of Instructors to Students, Sequencing of Content within Courses, and Sequencing of Courses each correlated positively to at least 1 of the average Domain scores. These findings suggest that perceptions of importance of ATEP components and actual implementation of ATEP components are more influential on BOC success than sequence or timing of Domain content.

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Chapter 1: Introduction

Statement of the Problem

In order to legally practice as an athletic trainer in 46 of the United States, one must be certified by the Board of Certification (BOC) and obtain state licensure for practice (BOC, 2010b). Currently, the only way to become eligible to sit for this exam is to complete an accredited athletic training educational program (ATEP) (NATABOC, 2004c). Many researchers in recent years have attempted to identify specific factors that indicate the ability to pass the certification examination on the first attempt. These factors include overall GPA (Harrelson, Gallaspy, Knight, & Leaver-Dunn, 1997; Middlemas, Manning, Gazzillo, & Young, 2001), athletic training GPA, academic minor GPA, ACT composite score, number of semesters of university enrollment (Harrelson et al., 1997), gender (Draper, 1989; Harrelson et al., 1997; Middlemas et al., 2001), fraternity/sorority affiliation, academic minor, teaching/non-teaching track (Harrelson et al., 1997), number of clinical hours (Draper, 1989; Middlemas et al., 2001; Turocy, Comfort, Perrin, & Gieck, 2000), route to certification eligibility (i.e., internship vs. curriculum) (Draper, 1989; Middlemas et al., 2001; Starkey & Henderson, 1995), learning style (Draper, 1989), previous allied health and athletic training experiences, age, and type of sport experience (Turocy et al., 2000). However, the only factors that have a strong relationship to successfully passing the BOC exam are academic in nature, specifically GPA (Draper, 1989; Harrelson et al., 1997; Middlemas et al., 2001). What is missing from research literature concerns the structured environment in which the students study, established by both the accreditation agencies and institutional guidelines under the supervision of the athletic training program director. This lack has also been

recognized by current researchers in the field. Studies from Middlemas as well as Starkey and Henderson stated that “specific didactic requirements” (Middlemas et al., 2001, p. 140) and “various academic models and departmental structures,” (Starkey & Henderson, 1995, p. 62) respectively, needed to be further researched in an effort to determine outlying factors that effect the candidate’s outcome on the BOC examination.

Although programs must be accredited by the Commission on Accreditation of Athletic Training Education (CAATE), which requires courses to include content as outlined in the CAATE’s Standards, with influence from the National Athletic Trainers’ Association’s (NATA) Educational Competencies and the BOC’s Role Delineation Study (RDS) (BOC, 2005; CAATE, 2008b; NATA), each program has institutional autonomy to design the curriculum differently. In addition to the NATA’s Educational Competencies having influence in course content, each student must demonstrate mastery in each identified skill set (NATA, 2006). These competencies are based on the relevance and criticality of an athletic trainer’s role in delivering healthcare to the patient population. Moreover, the frequency of services provided by athletic trainers is based on the most recent Role Delineation Study. From these bodies of knowledge, entry-level ATEPs structure courses to meet the Educational Competencies with content spanning the six Domains of athletic training (as established by the Fifth Edition Role Delineation Study).

Purpose of the Study

Since the CAATE and the NATA choose not to mandate the entire educational process, accredited programs have institutional and programmatic autonomy to create course progressions and decide when to implement the progression within the college

experience. Course progression refers to the sequencing of the athletic training specific courses with implementation being when the course sequence begins within the degree. In establishing the content in these courses, program directors must ensure that each competency is both being taught and being evaluated throughout the curriculum structure. These competencies are linked to specific Domains of professional practice established through the BOC's Role Delineation Study. The current Fourth Edition Educational Competencies are based on the Fifth Edition Role Delineation Study which outlines six Domains of Athletic Training. Through outlining sequencing of competencies in courses, program directors are simultaneously sequencing Domain content throughout the curriculum. When structuring curriculum content, programs are to demonstrate the concept of Learning Over Time which has been defined by the CAATE as "the process by which professional knowledge and skills are learned, integrated, and evaluated...[involving] initial formal instruction and evaluation of knowledge and skill" over an adequate length of time "to allow for practice and integration of discrete knowledge and skill into demonstration of comprehensive clinical (actual or simulated) proficiency" (CAATE, 2008b, p. 18). In order for students to develop mastery of the professional skills needed to enter clinical practice, the Domain content needs to be introduced early enough so practice within the educational environment can be performed.

Although each program is unique, all ATEPs have one common goal – to prepare competent, entry-level athletic trainers equipped to impact both the profession and patient population in a positive manner. The profession as a whole has deemed the BOC examination to be the benchmark for measuring entry-level competence. Anecdotally, it

is well known that program directors and students alike seek to achieve a high first-time pass rate on the exam for both future success and prestige. Dodge, Walker, and Laursen (2009) stated, “If the program is truly preparing their students for entry-level practice, the program should have a satisfactory passing rate on the BOC exam” (p. 50). The CAATE has taken steps to move this ultra-subjective “satisfactory” rate to a quantifiable number. A major change in the working draft of the 2012 CAATE Standards is the inclusion of BOC pass rates into the outcomes section and mandated publication of institutional BOC pass rates (CAATE, 2011). The current version states that ATEPs “must meet or exceed a 3-year aggregate of 50 percent first time passing rate on the BOC exam” (CAATE, 2011, p. 17) and publish institutional pass rates compared to the national average, number of students who attempted the exam, percentage of first-time pass rates and overall pass rate for the 3-year time period (CAATE, 2011). With this new accreditation standard looming on the horizon, it is even more pivotal to identify program-specific characteristics influencing success on the BOC pass rate.

This study was designed to examine the progression of BOC Domain content within athletic training courses and the introduction of Domain content within the curriculum of the ATEP on first-time pass rate of the BOC exam for 2010 graduates. The researcher believed that the ideal Domain progression would be Immediate Care (Domain III), Prevention (Domain I), Clinical Evaluation and Diagnosis (Domain II), followed by Treatment, Rehabilitation and Reconditioning (Domain IV), Organization and Administration (Domain V) and Professional Responsibility (Domain VI) without regard to order for the last three Domains. It was also hypothesized that earlier implementation of Domain content within course progression would result in higher first-time success

rate of the overall BOC examination. In addition to objective data gathered, the researcher gauged the perceptions of athletic training education program directors and instructional faculty regarding importance of specific ATEP characteristics on preparing students for success on the BOC examination.

Overview of Methodology

Invited study subjects included all CAATE-accredited ATEP directors and associated instructional faculty. Participants were e-mailed a study introduction and link to the survey instrument which split into the appropriate program director or instructional faculty veins upon selection of role within the ATEP. The researcher-developed surveys aimed to gather data outlining program specifics, BOC examination results, perceptions of ATEP characteristics, and institutional demographics. Pearson Product correlation analyses were utilized to determine strength and direction of relationships between a school unit where a Domain is introduced and 1) percentage first-time success on the BOC and 2) average individual Domain score. Establishing correlational significance laid the groundwork for utilizing a multiple regression analysis to identify optimal timing of introduction of each Domain within the ATEP structure. Strength of perceptions among both program directors and instructional faculty were established utilizing Chi square analysis. All qualitative responses provided in the survey data were coded utilizing an interpretive method of data coding (Miles & Huberman, 1994). Finally, overall descriptive statistics were computed on all survey items.

Delimitations

The scope of this study was delimited to:

1. Program directors and instructional faculty from all CAATE-accredited entry-

level athletic training education programs (both baccalaureate and entry-level master programs).

Data collected pertaining to the BOC examination was delimited to:

1. ATEPs that have been accredited and in good standing with the CAATE during 2009-2010 academic year.
2. ATEPs who received an Individual School Report from the BOC for the 2010-2011 testing year.
3. Information from the 2010 Individual School Report pertaining to the 2010-2011 testing year.

Definition of Terms

For the purpose of this study, the following operational definitions were used:

1. Course Progression: the sequencing and timing of a course within a degree program.
2. Didactic Knowledge: information pertinent to athletic training gained by the student in a classroom setting, normally ATEP required courses.
3. Domains: knowledge required to practice as an athletic trainer as identified by the BOC's Fifth Edition Role Delineation Study, divided into six practice Domains (Domain I – Prevention; Domain II – Clinical Evaluation and Diagnosis; Domain III – Immediate Care; Domain IV- Treatment, Rehabilitation and Reconditioning; Domain V – Organization and Administration; Domain VI – Professional Responsibility).
4. Good Standing: an ATEP not on any type of probationary status with the CAATE.

5. Learning Over Time – “the process by which professional knowledge and skills are learned, integrated, and evaluated” involving “initial formal instruction and evaluation of knowledge and skill...followed by a time of sufficient length to allow for practice and integration of discrete knowledge and skill into a demonstration of comprehensive clinical (actual or simulated) proficiency” (CAATE, 2008b, p. 18).
6. Individual School Report: document sent to institutions from the BOC at the conclusion of a testing year summarizing examination outcomes for the institution. This report is only sent to institutions having five or more students sit for the certification examination during one testing year (L. Horst, personal communication, October 4, 2005).
7. School Unit: unit of measure that the institution uses to divide a school year (e.g. semester, trimester, quarter).
8. School Year: two semesters, three trimesters, or three quarters.
9. Sequencing: the order of courses and/or Domains.
10. Testing Year: begins with the BOC exam offered in April and concludes with the BOC exam offered in February of the following year.
11. Timing: the school unit in which a course is taught.

Summary

Athletic training education lies in the crossroads of two ever-changing fields: medicine and education. This provides a unique dynamic that three interested bodies (the BOC, the CAATE, and the NATA) strive to guide into best practice. Juggling the CAATE’s Standards, the NATA’s Competencies, and the BOC’s Role Delineation Study

along with any institutional guidelines in an effort to ultimately produce quality entry-level athletic trainers is a daunting task. Multiple factors come into play in this fluid dynamic. It was the researcher's aim to capture a snapshot current programmatic structure in order to identify possible strengths, trends, and direction for overall improvement of athletic training education.

Chapter 2: Literature Review

This review discusses current minimum standards set forth by the Commission on Accreditation of Athletic Training Education (CAATE) for professional athletic training educational programs (ATEPs), the Board of Certification (BOC) examination, factors directly influencing success on the BOC examination, factors directly influencing success on other allied health profession certification/licensure examinations, and curriculum design and theory.

Current Minimum Standards of CAATE Accredited ATEPs

The current “Standards for the Accreditation of Entry-Level Athletic Training Education Programs” were developed by the CAATE with input from the American Academy of Family Physicians, American Academy of Pediatrics, American Orthopaedic Society for Sports Medicine, and NATA (CAATE, 2008a; CAATE, 2008b). The Standards outline all minimum requirements for accredited ATEPs, including sponsorship, personnel, resources, operational policies, health and safety, student records, outcomes, curriculum and instruction, clinical education, and administering and maintaining accreditation (CAATE, 2008b). This section focuses on summarizing the educational/class and timeline requirements as established in the Standards.

The curriculum must include emphasis on instructional subject areas as outlined by NATA’s Athletic Training Educational Competencies and the current BOC Role Delineation Study which is further discussed in later sections (CAATE, 2008a; CAATE, 2008b). The competencies are divided into 12 content areas listed below in Table 1 (NATA, 2009). Each area is further subdivided into cognitive competencies, psychomotor competencies, and clinical proficiencies (NATA, 2006). The competencies are “designed to delineate a standardized educational content required by an entry-level

Athletic Trainer” (CAATE, 2008a, p. 1) and should be reflected in the classroom, clinical education, and clinical experiences (CAATE, 2008b).

Table 1

NATA Content Areas

Risk management and injury prevention	Therapeutic exercise
Pathology of injuries and illnesses	General medical conditions and disabilities
Assessment and evaluation	Nutritional aspects of injury and illness
Acute care of injury and illness	Psychosocial intervention and referral
Pharmacology	Health care administration
Therapeutic modalities	Professional development and responsibilities

In addition to the competency content areas, the Standards outline “core” subject areas around which the curriculum should be centered (CAATE, 2008b). The areas may be taught as combined courses or individual classes. The Standards include twenty subject areas as listed in Table 2.

Table 2

CAATE Subject Areas

Assessment of injury/illness	Pathology of injury/illness
Exercise physiology	Pharmacology
First aid and emergency care	Professional development and responsibilities
General medical conditions and disabilities	Psychosocial intervention and referral
Health care administration	Risk management and injury/illness prevention
Human anatomy	Strength training and reconditioning
Human physiology	Statistics and research design
Kinesiology/biomechanics	Therapeutic exercise and rehabilitative techniques
Medical ethics and legal issues	Therapeutic modalities
Nutrition	Weight management and body composition

In addition to classroom instruction, a minimum of two academic years of clinical experience with course credit is required (CAATE, 2008b). The clinical experience must

count for course credit, be assessed frequently throughout the experience, and “follow a logical progression that allows for increasing amounts of clinically-supervised responsibility” (CAATE, 2008b, p. 10) that is mirrored in the didactic courses and acquirement of psychomotor skills. Clinical experiences provide direct patient care in which the student is given opportunity to integrate psychomotor, cognitive and foundational behaviors of professional practice, effectively combining classroom instruction with practical, hands-on experience (CAATE, 2008b). Each of these aspects focus on a different component of understanding/competence of skills needed to practice as a professional in athletic training. Psychomotor aspects include the ability to physically perform the required skill and/or proper manipulation of a device. Demonstration of comprehension of science, theory, and techniques incorporated in the Proficiency is included under the cognitive umbrella. Lastly, the foundational behaviors include professional and ethical components inherent in athletic training professional practice (NATA, 2006).

The aim of clinical education is not solely focused on the integration of didactic knowledge to applied skill and clinical decision-making. It is designed for an athletic training student (ATS) to observe and begin to understand the role of an athletic training as a “healer” contributing to individual lives and society as a whole, seeing how athletic trainers establish and maintain necessary relationships both professionally and personally. It also allows the students to begin to attain “the essential knowledge and skills needed to provide athletic training services to patients of differing ages and genders and work, and lifestyle circumstances and needs” (NATA, 2006, p. i). The CAATE recommends for these experiences to begin early in the ATEP. Within the minimum recommendation of 2

years, ATs should have varying exposure including but not limited to gender, level of risk, protective equipment, and addressing the continuum of care, all of which should meet the Domains of athletic training (CAATE, 2008b). The clinical experience must be under the direct supervision of a qualified clinical instructor or approved clinical instructor with a minimum of 1-year work experience in his/her respective field. It is recommended that no more than eight students be assigned for direct supervision by a clinical instructor or approved clinical instructor (CAATE, 2008b). At least 75% of the clinical experience must take place under direct supervision of a certified athletic trainer in a clinical setting of an athletic training room with exposure to athletic practice and competition. The other year may be completed in a clinic, hospital, other health care facility, or continued in an athletic training room (CAATE, 2008b).

Board of Certification Examination

State legislature regulates the practice of athletic training in 48 states (with the exception of California and Alaska), with 46 states requiring an individual to successfully pass the National Athletic Trainers' Association Board of Certification examination in order to practice as an athletic trainer (BOC, 2010b). The BOC is responsible for development, administration, and evaluation of the certification examination for athletic trainers (NATABOC, 2004c).

Overall the first step in the development of the BOC examination was to conduct a Role Delineation Study (NATABOC, 2004c) which defines "the primary responsibilities of the entry-level ATC credential holder, the essential tasks the ATC credential holder performs, and the knowledge and skill the ATC credential holder must possess in order to provide athletic training services in a competent manner"

(NATABOC, 2004a, p. 1). This was achieved through a BOC-appointed committee, consisting of subject-matter experts, who began the process by defining six Domains of athletic training including Prevention; Clinical Evaluation and Diagnosis; Immediate Care; Treatment, Rehabilitation, and Reconditioning; Organization and Administration; and Professional Responsibility. The study then further subdivides these areas into distinct tasks, knowledge, and skills essential to practicing as an athletic trainer (NATABOC, 2004c). Following the completion of the Role Delineation, a validation survey was developed with a rating system for importance, criticality, and relevance of the Domains (and individual subdivisions) for entry-level athletic trainers. The survey for the Fifth Edition Role Delineation Study was sent out to approximately 5,000 actively-practicing, certified athletic trainers (NATABOC, 2004c) with approximately one third of these choosing to respond (NATABOC, 2004a). The results were comparable to ratings of the committee, therefore the study was determined to be a relevant assessment of the profession (NATABOC, 2004c). The first Role Delineation Study was conducted in 1982 with a new study being conducted approximately every five years (NATABOC, 2004c).

The specific development of a BOC examination begins with a test blueprint developed from the Role Delineation survey results. This blueprint outlines the content included in each test. The survey results, relating to importance, criticality, and relevance of the Domains and tasks, are used as a baseline in determining the percentage of questions from each content area to be included in the examination (NATABOC, 2004c). Questions are then developed following the outline of the test blueprint. Practicing athletic trainers, athletic training educators, and allied health professionals trained in

writing, reviewing, editing, and validating questions are responsible for question development (NATABOC, 2004c). Each question developed is validated by at least two verifiable references and at least three other content-area specialists. During this process each question is assigned to a content area, rated for cognitive level, and validated regarding appropriateness for an entry-level athletic trainer (NATABOC, 2004c). Once the questions make it through this process, each one is sent for psychometric and editorial review. Following this review, the resulting question is qualified to be entered into the BOC computerized test bank and is considered eligible for inclusion on BOC examinations (NATABOC, 2004c). A draft examination is created by random selection of questions from the test bank while ensuring that the correct number of questions from each content area is included. The BOC examination committee reviews the draft to verify technical accuracy, to guard against duplication of questions, and to identify any possible problematic areas within the test (NATABOC, 2004c).

Historically, the exam consisted of three parts, the Written examination consisting of a multiple choice exam, the Practical examination, consisting of various essential clinical skills, and the Written Simulation examination consisting of clinical scenarios to demonstrate the ability to engage in successful clinical decision-making. These individual tests were designed to assess different aspects of a candidate's knowledge. Each component of the certification examination had a unique design and an individual scoring system (NATABOC, 2004c).

Currently the examination is a computer-based test with a singular pass point, including multiple choice, alternative items (drag and drop, multi-select, etc), and focused testlets. Focused testlets include a scenario with five follow-up critical questions

based on the given scenario (BOC, 2009). The computer-based exam was first administered in May/June 2007 (CASTLE Worldwide, 2008). The BOC examination is a timed, 4-hour test administered at contracted testing sites during five 2-week testing periods throughout the year (February, March/April, May/June, July/August, and November) (BOC, 2010a; CASTLE Worldwide, 2008). The examination questions for the 2010-2011 testing year cover six Domains of athletic training as derived by the Fifth Edition Role Delineation Study (BOC, 2010a; NATABOC, 2004b). The following table provides the breakdown for the associated percent of test questions devoted to the individual content areas (BOC, 2010a).

Table 3

Distribution of BOC Examination Questions in Athletic Training Domains

Domain Area	Percent of Total Questions
Prevention	16%
Clinical Evaluation and Diagnosis	23%
Immediate Care	18%
Treatment, Rehabilitation and Reconditioning	23%
Organization and Administration	11%
Professional Responsibility	9%

The BOC uses the Modified Angoff Technique, one of the most defensible criterion-referenced methods, to set the passing point (BOC, 2009). This technique utilizes pooled judgments from content experts who utilize the following question to weigh each test item individually: “What is the probability that a ‘minimally acceptable’ candidate *will* answer this item correctly?” (BOC, 2009, p. 3). Following this, the probability of the question being answered correctly is multiplied by the number of questions in the test to establish the minimum acceptable score. This pooled judgment is then coupled with a statistical adjustment for testing error resulting in the passing point

for the individual examination (BOC, 2009). The passing point has been established as a score of 500 on a scale of 200-800 possible points (BOC 2009; BOC 2010a).

The process to ensure a content-valid examination includes annual reviews of the BOC examinations as well as performing statistical analysis of previous test versions (NATABOC, 2004c). Annual reviews are performed in an effort to ensure the examinations remain a consistent measure of the candidates' abilities. Statistical analysis of previous test versions is performed to determine any inappropriate or problematic questions. These questions are either revised or removed from the test bank. Newly developed test questions are used to replace any items deemed inappropriate or problematic (NATABOC, 2004c).

Factors Directly Influencing Success on the Board of Certification Examination

In attempts to identify specific factors that directly affect success on the BOC examination, several factors have been identified by various researchers, the most prevalent of which being academic achievement. Harrelson et al. (1997) found GPA to have significant relationship to all three sections of the BOC examination. The study design was longitudinal in nature, covering 52 graduates from a sole institution spanning from 1978 to 1992, enrolled in the ATEP for a minimum of 4 semesters with a minimum GPA of 2.5 on a 4.0 scale. The researchers reviewed student files, and supplemental telephone surveys when needed, to gain the following information: overall GPA, athletic training GPA, academic minor, academic minor GPA, fraternity/sorority affiliation, ACT composite score, sex, teaching/nonteaching track, and number of semesters of university enrollment (Harrelson et al., 1997).

The study compiled a composite set that correctly classified 42% of first-time

candidate's success. The set, in rank order, is as follows: overall academic GPA, athletic training GPA, academic minor GPA, ACT composite score, and number of semesters of university enrollment. The power of this composite set greatly decreased with increased attempts (Harrelson et al., 1997). A study performed by Middlemas et al. (2001) found similar results in a national study. From the April/June 1998 offering of the BOC examination, 270 first-time candidates were included in the subject group providing release of exam results as well as a data form including sex, overall GPA, number of clinical education hours and internship or curriculum route to certification. GPA was found to be a significant positive correlation with scores on all three sections and was connected to whether the candidate passed the entire examination. Results demonstrated that none of the other factors provided significant correlation to success on the BOC examination as a whole or individual section scores (Middlemas et al., 2001).

Contrary to the GPA results above, an older study by Draper (1989) found that GPA only correlated with success on the written section of the examination when comparing students with ≥ 3.5 (on a 4.0 scale) to students with < 3.5 GPA. This research utilized candidates for the January 1988 offering of the then BOC examination; 14 of the 16 exam sites agreed to pass out the research information to candidates upon completion of the examination. The research format included completion of the Babich and Randol "Learning Styles Inventory" and a copy of the exam scores. Out of the 372 candidates who took the research packet, 102 completed all portions and were retained for the study. This information provided the researchers with other factors including personal learning style, social learning style, preference for oral examination, route to eligibility, and number of clinical hours worked ($> 2,000/ < 2,000$ hours). No relationship was found

between success on the overall BOC examination or individual sections and any of these factors (Draper, 1989).

In similar research, Turocy et al. (2000) looked at like factors including demographic profile, years of athletic training experience, length of time to meet clinical experience requirements, years of experience of endorsing athletic trainer, number of clinical hours, type of sport experience, sex of athletics in each clinical assignment, type/level of clinical assignments, and level of autonomy experience in each clinical assignment (Turocy et al., 2000). Specific to comparison to the Draper (1989) study, her study found that neither the number of clinical hours nor the type of sport experience influenced BOC outcomes (Turocy et al., 2000). However, Turocy et al. (2000) differed from Draper (1989) showing that there was a higher passing rate for candidates with approximately 400 hours above the hour requirement, with respect to route to eligibility, than those who logged greater than 400 hours above requirement or those that met the hour requirement. This data was gathered from 269 first-time candidates from the June and November offerings of the 1993 BOC examination (Turocy et al., 2000).

The final study simply explored the relationship between routes of eligibility and success on the BOC examination. The researchers obtained their data through the testing agency that maintained the BOC records for the 1992-1993 BOC examination test dates. A total of 3675 first-time candidates were assessed with 1443 coming from a curriculum route and 2232 from internship programs. The findings of Starkey and Henderson (1995) showed that curriculum candidates were more successful than internship candidates. This finding is contrary to the previously discussed studies but is backed up by the BOC Annual Report from the 2003 testing year (NATABOC, 2004a).

As has been discussed in the above paragraphs, multiple attempts at determining a consistent predictor for BOC examination success have been made. Factors have been identified, but as Harrelson (1997) confessed, no one variable could independently predict the outcome of the overall exam or the individual sections. Studies from Middlemas et al. and Starkey and Henderson stated that “specific didactic requirements”(Middlemas et al., 2001, p. 140) and “various academic models and departmental structures,”(Starkey & Henderson, 1995, p. 62) respectively, needed to be further researched in an effort to determine outlying factors that effect the candidate’s outcome on the BOC examination. Additionally all of the research presented was conducted under the paper-based, 3-section examination format with no current research performed on the computer-based examination.

Factors Directly Influencing Success on Other Allied Health Profession Certification/Licensure Examinations

First-time passing rates of other allied health care certification/licensing examinations are significantly higher than the BOC first-time passing rate (43.3%) (Johnson, 2010). Both nursing and physical therapy students have significantly higher passing rates, boasting an approximate first-time passing rate of 85% (Turocy et al., 2000). When considering these numbers, the question arises as to what these professions have found to be predictive of success on their respective examinations. Multiple studies have been performed in the field of nursing. Some of these studies are discussed as well as studies in physical therapy and with medical students.

Nursing. Similarly to athletic training, the overall main predictive power found in multiple nursing studies lies in academic factors. Academic factors have been found to be predictive of success on the National Council Licensure Examination for Registered

Nurses (NCLEX-RN) (Feldt & Donahue, 1989; Foti & DeYoung, 1991; Horns, O'Sullivan, & Goodman, 1991; Jenks, Selekman, Bross, & Paquet, 1989; Lengacher & Keller, 1990) and State Board Examinations (SBE) (Dell & Halpin, 1984; Feldt & Donahue, 1989; Yocom & Scherubel, 1985). Foti and DeYoung (1991) found several factors to be predictive of success on the NCLEX-RN in their study of 298 graduated nursing students from a singular program spanning from 1985 to 1988.

One of the highest was the Mosby AssessTest which is a standardized examination administered for its NCLEX-RN predictive power. Other significant predictors include overall GPA, major GPA, National League for Nursing (NLN) Baccalaureate Achievement Test, and verbal SAT score. Science GPA and quantitative SAT score were both found to be insignificant (Foti & DeYoung, 1991). Another study incorporating the Mosby AssessTest led by Jenks also found it to be predictive (Jenks et al., 1989). This was also a university-based research design covering 1984-1987 with 407 of 499 graduating seniors participating in the study. Data obtained through student records included the following independent variables: transfer GPA, transfer credit, previous university science GPA, level of previous university attended, theory grades for clinical nursing courses, age at graduation, sex, and raw score on Mosby AssessTest.

These independent variables were analyzed by Pearson Product Moment Correlation Coefficients (to determine magnitude and direction of relationship), stepwise regression analysis (to determine amount of variance could be explained), and discriminate analysis (to determine what percentage of students could be correctly identified as 'pass' or 'fail' based on the combination of independent variables) against the dependent variable of the NCLEX-RN score. This research team found the first five

clinical nursing course GPA to be significant but discounted the influence of transfer GPA, science GPA, number of transfer credits, age, sex, and type of institution (Jenks et al., 1989). The study assessed the students multiple times and found the best correlation to be found when the student was assessed in the graduating semester. However, almost 81% of students were accurately identified as either pass or fail for the NCLEX-RN at the completion of the junior year (Jenks et al., 1989).

In looking at predicting pass/fail on the NCLEX-RN as well as additionally looking at predicting the specific score, a study led by Horns found differences in factors from previous studies (Horns et al., 1991). GPA, race, final clinical class grade and NLN scores were all significant in predicting pass/fail whereas 67% variance in predicting the NCLEX-RN score was explained by admission GPA, race, second clinical class grade, adult health nursing grade, final clinical class grade and percentile rank for NLN examination (Horns et al., 1991). In a more focused 2-year study of 146 graduates from a community college in Florida, Lengacher and Keller (1990) delved into specific course predictors. Stepwise multiple regression tests and correlation coefficient analyses demonstrated that psychiatric nursing/gerontology clinical class grade, medical/surgical theory grade, medical surgical clinical class grade, final semester theory course grade and the Basics Two NLN test were predictive. Within these factors, the grades from the theory classes held more predictive power than the clinical course grades (Lengacher & Keller, 1990). This is interesting considering that nursing is a hands-on profession and the curriculum is established so that skills are taught and applied in clinical class.

Another study looking at NCLEX-RN success obtained data through 155 student transcripts including: high school rank, ACT subtest and composite score, grade code

(psychology, sociology, general chemistry I/II, biology, zoology, microbiology, anatomy), science and cumulative GPA after third semester, and nursing GPA. Criterion variables studied included: nursing GPA, NCLEX-RN score, dichotomous criterion (0 = fail, 1 = pass) for analysis of NCLEX-RN success, and dichotomous criterion (0 = withdrawn, 1 = completion) for program completion. The researchers found the following significant factors as predictors specific to NCLEX-RN success: ACT composite score, high school percentile rank, first-semester chemistry grade, and nursing GPA. In this same study the SBE factors were analyzed and first year GPA, GPA entering the nursing program, cumulative college GPA, GPA in social science courses, ACT subset scores, SAT verbal and quantitative scores, and grades in physics and physiology all had positive correlations (Feldt & Donahue, 1989). Dell and Halpin (1984) researched predictors of success in a nursing program as well as predicting success on the SBE for 456 students in a singular program during 1970-1974. Predictive factors for the SBE include SAT score, high school GPA, NLN Pre-nursing Examination, and college GPA (Dell & Halpin, 1984). Yocom and Scherubel (1985) obtained an extensive list of academic factors from graduates of a baccalaureate nursing program including grades for all prerequisite courses and GPA of pre-admission courses, sophomore, junior, and senior course work, upper-division liberal arts/science courses and total course work. Other information obtained through student records included race, prior school attended, number of credit hours prior to admission, and previous academic degree. Out of these factors, several proved predictive for the SBE including pre-admission college liberal arts GPA, cumulative GPA, and cumulative clinical theory GPA. Cumulative clinical theory GPA was found to be more predictive than cumulative

clinical practicum GPA (Yocom & Scherubel, 1985) similar to the findings by Lengacher and Keller (1990). Science GPA held no correlation (Yocom & Scherubel, 1985) which was a similar finding to studies previously discussed (Foti & DeYoung, 1991; Jenks et al., 1989) but differed from Feldt and Donahue (1989).

Overall, each study identified academic factors as being predictive of success on the NCLEX-RN, the State Board Exams, and on success within the nursing program. In most cases differing factors were found such as science GPA, SAT score, or a NLN examination score. But the unifying factor of each being based on academic performance holds true for all the studies discussed.

Physical Therapy. Research in physical therapy has also shown an academic trend for predictive performance in clinical skills (Balogun, 1988), in predicting academic success in a physical therapy program (Balogun, 1988; Balogun, Karacoloff, & Farina, 1986), and in predicting success on the physical therapy licensing examination (Roehrig, 1988). Whereas academic coursework has not been shown to be predictive of clinical performance in nursing, occupational therapy, or medical school, a study by Balogun showed it to be true for physical therapy (Balogun, 1988). In his study of 42 graduates of a singular physical therapy program he obtained data through student records including the following: pre-professional GPA, essay score, interview ratings, pre-professional faculty ratings, mean allied health professions admission test, scores on comprehensive written, and oral-practical exam. He found the admission interview and pre-professional GPA to be factors in predicting clinical performance.

Academic success in physical therapy was also explored and pre-professional GPA and mean Allied Health Professions Admission Test score were found to be

predictive, but the interview held no predictive power. Both the admission essay and faculty ratings held no predictive significance in the study (Balogun, 1988). In an earlier study Balogun et al. (1986) found that GPA was the most powerful predictor of academic performance in a physical therapy program for the study's 83 female graduates.

Cumulative pre-professional GPA, scores on Allied Health Professional Admission Test score, essay score, pre-professional faculty recommendation scores, ratings by physical therapist after a 70-hour clinical rotation, and personal interview ratings were correlated with GPA at the end of the 2-year professional program. Fifty-one percent of the variance in academic achievement was accounted for with GPA and admission essay alone (Balogun et al., 1986). Roehrig (1988) looked specifically at predictors of licensing examination success including ACT composite and subset scores, prerequisite GPA, non-prerequisite GPA, scores from preadmission letters of recommendation, and admission interview scores. Hierarchical multiple regression analyses to determine the optimal combination and weightings of the independent variables to best predict scores on the licensing examination demonstrated that ACT, GPA, admission interview, and recommendation scores all held significant predictive value (Roehrig, 1988).

Medicine. The National Board of Medical Examiners provides the board examinations during medical school. One longitudinal study looking at predictive factors for this examination found that for the National Board of Medical Examiners Part I, the review course final created by the university faculty, and overall academic performance were significant in predicting success. The Medical College Admissions Test was the only other factor considered, but it was found to hold no significant value for predicting

National Board of Medical Examiners Part I, medical school performance, or performance on the review course final (Hyde, Krug, & Dearnier, 1987). In a study led by Nowacek, the results only partially supported these findings (Nowacek, Pullen, Short, & Blumner, 1987). He found the Medical College Admissions Test to hold no predictive power for medical school academic achievement, but that it did hold predictive power for the National Board of Medical Examiners Part I. One reason for this might be the large sample size of 974 students spanning several years (1978-1984) (Nowacek et al., 1987).

In a study looking at medical residents from 14 regionally diverse emergency medicine residency programs, achievement on a multiple choice examination to measure ultrasound proficiency was investigated through the collection of a wide variety of factors. Variables assessed included the following: number of ultrasound scans performed, presence of a formal ultrasound rotation, presence of a structured ultrasound rotation, number of hours of didactic training, and percentage of ultrasound training taught by emergency physicians. An increase in test score with an increase in number of residency years, number of scans performed, and presence of clinical ultrasound rotation was discovered through utilizing Chi square tests, Kruskal-Wallis tests, and post-hoc Mann-Whitney U tests with bonferroni adjustment to determine within-group differences. Interestingly there was no difference in test score in relationship with number of hours spent in ultrasound didactic learning (Costantino, Satz, Stahmer, & Dean, 2003) which might suggest that practical application of skill instills a deep-seeded learning that outweighs time spent undergoing didactic instruction.

Seemingly contradictory results were found in a study of a singular medical school looking at number of times a task was performed, perceived confidence level, and

simulator test score. Candidates participated in a 1-day educational session, filled out a 25-point questionnaire tabulating prior experience and confidence, and completed a scored simulation experience. A significant correlation was found between number of times a task was performed and the perceived level of confidence. When simulator test scores were added into the correlation, no significant relationship was found. The researcher therefore concluded that “little correlation [exists] between students’ clinical experience and their results in final examinations” (Morgan & Cleave-Hogg, 2002, p. 537).

Curriculum Design and Theory

According to the Commission on Accreditation of Athletic Training Education (CAATE), programs are to demonstrate Learning Over Time (LOT) when structuring curriculum content. The concept of LOT has been defined by the CAATE as “the process by which professional knowledge and skills are learned, integrated, and evaluated...[involving] initial formal instruction and evaluation of knowledge and skill” over an adequate length of time “to allow for practice and integration of discrete knowledge and skill into demonstration of comprehensive clinical (actual or simulated) proficiency” (CAATE, 2008b, p. 18). Carr, Ploeger, and Drummond (2007) performed a literature review specific to LOT. According to the study, “the challenge to LOT is making a smooth transition from the classroom to actual clinical practice [which includes a] sequential and progressive nature” (Carr et al., p. 21). Additionally his review of literature identified the concepts related to LOT as “progression, synthesis, integration, reflection, and critical thinking” (Carr et al., 2007, p. 21). This review helped the authors develop their own definition of LOT which is “the logical progression of skill and

knowledge acquisition, synthesis, integration, and evaluation, which requires reflection and critical thinking” (Carr et al., 2007, p. 25). Therefore, the literature review specific to curriculum development and theory is centered around these core concepts.

Psychological theorist, Jerome Bruner (1966), stated in his book *Toward a Theory of Instruction* that “learning is so deeply ingrained in man that it is almost involuntary” (p. 113). Therefore, students are wired to learn; educators just need to create an environment conducive to learning. In order to do that, an understanding of learning and the components of learning is required. Other psychological theorists such as Jean Piaget and Lev Vygotsky have expanded the view of learning to recognize “that people construct new knowledge and understandings based on what they already know and believe” (Bransford, Brown, & Cocking, 1999, p. 10). As educators, it is important to recognize “incomplete understandings, the false beliefs, and naïve renditions” already present in a learner in order to “build on these ideas in ways that help each student achieve a more mature understanding” (Bransford et al., 1999, p. 10). Research has shown that using this information as a starting point to guide new instruction results in enhanced learning (Bransford et al., 1999). Teachers being able to recognize what knowledge a student brings with them can also help that student start to recognize personalized knowledge in order to “build upon it, improve it, and make decisions in the face of uncertainty” (Bransford et al., 1999, p. 120).

One educational lens that may help when considering students’ prior learning as a vital piece in the attainment of novel information is the constructivist viewpoint. The four principles of constructivism follow. (1) Current knowledge exists from past constructions. (2) We gain constructions through two means, assimilation or

accommodation. Piaget, a leader in constructivist theory, defines assimilation as a “logical framework or scheme we use to interpret or organize information” (Fosnot, 1989, p. 19). Piaget further depicts accommodation as occurring when a current framework/scheme is deemed inadequate to explain new experiences and must be altered to include the new and old information in a higher-order framework/scheme (Fosnot, 1989). (3) Learning is more organic than mechanic. (4) New learning becomes meaningful through reflection and “resolution of cognitive conflict” (Fosnot, 1989, p. 20). Already in this brief introduction of constructivism, we see several core concepts of Learning Over Time: acquisition of knowledge, synthesis, integration, reflection, and critical thinking.

A closely related concept to constructivism is the idea of scaffolding, referenced by several theorists such as Jerome Bruner. The educational idea of scaffolding shares much of the same characteristics of physical scaffolding utilized in construction. Some adjectives utilized to describe/define scaffolding include temporary, adjustable, indispensable for higher-level work, connects multiple points, and systematic support, to name a few (Dempsey, Halton, & Murphy, 2001; Keefe & Walberg, 1992). Additional characteristics of educational scaffolding include supporting reflective learning (Dempsey et al., 2001), problem solving, higher order thinking, and bridging from current ability to increasing levels of competence (Keefe & Walberg, 1992). Scaffolding can have a minimalistic approach provided by a teacher or peer (Keefe & Walberg, 1992), or a more immersive approach of an apprenticeship model (Bransford et al., 1999). Whatever approach is taken, the ultimate goal, as stated by Jerome Bruner, is to transform a spectator into a participant (Bransford et al., 1999). This approach is

pertinent to athletic training, especially with the emphasis on application of knowledge through clinical education.

An important limitation inherently exists within the concept of scaffolding. This limitation as described by Lev Vygotsky is the “zone of proximal development” (Bransford et al., 1999; Keefe & Walberg, 1992). The zone of proximal development is described as “a bandwidth of competence”(Bransford et al., 1999, p. 68) in which “the student cannot proceed by [him/herself], but can do so when guided by a teacher” (Keefe & Walberg, 1992, pp. 37-38). If the student is left to learn within this area without proper support/guidance, learning will fail. It is important to “first assess whether the student has the background knowledge to profit from the instruction” (Keefe & Walberg, 1992, p. 38). In an unrelated text, cognitive psychologist Robert Gagne (1977) supports the importance of guidance in learning; he states “as a minimum, guidance of thinking informs the learner of the goal of the activity, the general form of the solution; this amount of guidance appears to be required if learning is to occur at all” (p. 163). This requires focus on both the learner and the environment, which does not happen by chance. In order for a teacher to accomplish this, he/she must merge content area expertise with pedagogical knowledge to create “cognitive roadmaps to guide the assignments they give students, the assessments they use to gauge student progress, and the questions they ask in the give-and-take of classroom life” (Bransford et al., 1999, p. 230).

One important component of this ‘give-and-take’ life is the teacher’s ability to “understand in a pedagogically reflective way; they must not only know their own way around a discipline, but must know the ‘conceptual barriers’ likely to hinder others”

(McDonald & Naso as quoted in Bransford et al., 1999, p. 144). Therefore, experts in a field do not automatically equate to experts in a classroom. However, the general goal of athletic training education programs is to prepare competent, entry-level athletic trainers. The curriculum outline provided by the NATA's Athletic Training Educational Competencies are based on the current BOC Role Delineation Study (CAATE, 2008a; CAATE, 2008b) which is created by "experts" in athletic training content and validated by the common body of athletic trainers (including all levels of expertise from novice to accomplished) (NATABOC, 2004c). The curriculum content within athletic training relies on input from experts in order to help provide the foundation for expertise; therefore, it is relevant to delve into the characteristics of an expert.

Experts have not only attained a "rich body of knowledge about subject matter" (Bransford et al., 1999, p. 9) but have connected and structured the knowledge around core principles which helps condition the information into an applicable format aiding not only comprehension but promoting transfer of knowledge to novel situations/problems/contexts (Bransford et al., 1999). According to Miller, experts ability to recall vast amounts of information seemingly instantaneously relies on the ability to "chunk" information into meaningful patterns (as cited in Bransford et al., 1999, pp. 20-21). Once these internal patterns are established, it is only a matter of time before meaningful patterns are recognized in a variety of situations (increasing transfer) (Bransford et al., 1999) which contributes to an expert's "ability to use their knowledge...[that] has been implicitly organized as a result of considerable experience for rapid, efficient and effective use" (Eraut, 2004, p. 254). This automatic and fluent retrieval of pertinent information is one of the hallmarks of experts, allowing conscious

thought to be directed to the novel portions of the task (Bransford et al., 1999).

Automatic patterns are not restricted to thought processes. Routinization of both thought processes and psychomotor activities “frees practitioners’ attention for monitoring what are often rapidly changing situations and for taking a more meta-like perspective on their action ” to where “even when there is no emergency, experienced people typically prefer to do many things quickly and smoothly if they are confident of their own proficiency” (Eraut, 2004, p. 261). Whereas thought processes may be difficult to observe, psychomotor skills demonstrate that “performance exhibited by a novice and an expert differ most apparently in the observable degrees of precision, smoothness, and timing” (Gagne, 1977, p. 211). Relevant points for curriculum design include centering curriculum around the “core concepts” of a domain, providing bridges for meaningful organization of material within and across domains, and creating internal structure of information, which is more important than a surface treatment of a vast amount of material (Bransford et al., 1999).

This research also suggests that providing students with experiences to observe, participate, learn, and practice both cognitive and psychomotor skills in a way that promotes recognition of meaningful patterns is vital to a successful program (Bransford et al., 1999). An approach to curriculum, designed to meet these suggestions, must show integration of theory and practice, cognitive knowledge and psychomotor skills, with a “both/and” mindset essential for positive change (Clapton et al., 2006). This approach of merging learning and practice can be seen throughout nursing and education curricula and research studies (Allsopp, DeMarie, Alvarez-McHatton, & Doone, 2006; Clapton et al., 2006; Grealish & Smale, 2011) and has been included in athletic training

requirements through the clinical education component.

Within education it is important to start with simpler steps and work toward more complex entities (Billett, 2002; Gagne, 1977; Keefe & Walberg, 1992). One method to accomplishing this goal includes “front-loading” curriculum with theory prior to application/integration of skills. However this has been shown to be ineffective in regard to overall student success (Clapton et al., 2006; Grealish & Smale, 2011). Students do need sequence of content/material, but it needs to include application/integration of psychomotor skills. Introduction of psychomotor skills must also incorporate the concept of sequencing. Students engaging in application of psychomotor skills need to have “sequenced access to activities...which moves from those where imperfect performance has negligible consequences through to activities that have high levels of criticality and where mistakes carry significant consequences” (Billett, 2002, p. 32). This opportunity to apply the skills through an active process helps to cement what the student has learned cognitively (Bransford et al., 1999).

Physical practice not only provides internal physiological cues that help increase smoothness and precision (Gagne, 1977) but also demonstrates structural change in the brain, specifically with practice in a complex environment (Bransford et al., 1999). Individual motor skills are often parts of a larger procedure, of which a procedure is “an intellectual skill, often a rule determining sequence (a sequential rule), with which certain subordinate rules are also associated” (Gagne, 1977, p. 214). This again demonstrates the “both/and” approach to facilitating learning. Practice needs to focus on individual skills, promoting precision and timing, and also the overall procedure which is considered a cognitive activity. When the individual components demonstrate proficiency, the student

can focus on the cognitive aspect of the procedure without getting bogged down by perfecting both cognitive and psychomotor aspects. Practicing the procedure without competence of the individual skills does not promote overall proficiency (Gagne, 1977). In regard to the acquisition of motor skills, how much practice a student participates in is more important than the distribution of practice (Gagne, 1977). Robert Gagne (1977) makes a very important point in defining practice when he states,

By ‘practice’ is meant the repetition of the procedure (1) with intent on the part of the learner to achieve an improved performance, and (2) with ‘feedback’ which provides information to the learner. Repetition of the motor act without these two conditions is not normally meant by the word ‘practice’; learning under such negative conditions is essentially nil. (p. 217)

Feedback needs to visibly show the otherwise invisible cognition and focus on understanding rather than recall (Bransford et al., 1999). According to Gagne (1977), learning is not complete until a student is provided feedback, which provides what he terms a “reinforcing event.” Ideally, “such an event provides the learners with information concerning the correctness and often with the degree of correctness, of their performances” (Gagne, 1977, p. 297).

A revealing form of assessment evaluates the ability of a student to transfer learned cognitive and psychomotor skills to a novel situation/problem (Bransford et al., 1999). Multiple strategies exist for supporting positive transfer of knowledge/skills. A foundational step involves identifying the pertinent knowledge and strengths that a student brings with them to any learning situation which is inherent in a constructivist viewpoint (Bransford et al., 1999). If the requisite knowledge a student has attained is

not adequate, successful transfer will not occur (Bransford et al., 1999). Therefore in some instances remedial instruction may be necessary before proceeding. During instruction of content, providing examples, practice, and instruction within multiple contexts and demonstrating wide application promotes flexible transfer (Bransford et al., 1999; Gagne, 1977). Balancing specificity of applied principles, as well as broad generalizations also aids in successful transfer (Bransford et al., 1999). The instruction and learning should demonstrate a cumulative nature which “ultimately results in the establishment of capabilities that make it possible for the individual to solve a great variety of novel problems” (Gagne, 1977, p. 152). If adaptability of knowledge and skills to new problems is an overall goal, it makes sense that Gagne viewed problem solving as “the final step in a sequence of learning that extends back through the many prerequisite learnings that must have preceded it” (Gagne, 1977, p. 164).

A student may not always recognize which information is relevant to a problem/situation/context. External feedback as well as personal reflection are important tools to help overcome this deficit (Bransford et al., 1999). Reflection has been identified in the athletic training LOT definition as well as a strategic component of the constructivist approach. Educational reformer, John Dewey, is widely cited in reference to reflection in an educational context. He believed that the two components intrinsic to reflective learning were “(1) a state of doubt, hesitation, perplexity, mental difficulty, in which thinking originates, and (2) an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity” (as quoted in Dempsey et al., 2001, p. 632). A closely related strategy is Kolb’s loop concept which “suggests that experience is acted upon through reflective observation, which in turn acts as the basis on

which active experimentation followed by feedback produces change in practice behaviors” (Dempsey et al., 2001, p. 632). The goal of utilizing reflection in personal practice and learning is to create entry-level practitioners who are “conscious, proactive and responsive” (Dempsey et al., 2001, p. 635) rather than rote, rehearsed, and robotic.

All of the information provided thus far feeds into what is considered the “hallmarks” of the educated: “breadth of knowledge, integration of disciplines with a deep understanding of the structure of thinking within them, and insight into the connections and dialects among subjects” (Fosnot, 1989, p. 6). With all of this information, educators are faced with a daunting task of facilitating and structuring information and curriculum in an effective, efficient, and enjoyable manner. It would be nice if an ideal sequence existed for all students, but this is not the case (Bruner, 1966; Cooper, Braye, & Geyer, 2004; Gagne, 1977). In effect the “ideal” sequence includes “many tracks leading to the same general goal” (Bruner, 1966, p. 71) with “continual adaptation and exploration” of learning strategies (Cooper et al., 2004, p. 187) while recognizing “that a degree of uncertainty and unpredictability is a necessary and healthy part of any functioning complex system” (Cooper et al., 2004, p. 186).

Research Questions

The BOC exam’s purpose is to determine which candidates have the essential knowledge and skill to practice as competent, entry-level athletic trainers. The validity of the exam has been established and meets criteria for high reliability for a certification examination (NATABOC, 2004c). However, the passing rate of this exam is hovering near or below 50% of all first-time test takers for the national passing rate for other allied health care certification/licensing examinations (Johnson, 2010; Turocy et al., 2000).

The one consistency found in all studies reviewed showed the only relevant predictive power for certification/licensing exams was academic in nature. Both the academic measures and the certification/licensure examinations were set up to determine knowledge and/or skill of a health care provider. Therefore, it is logical that correlations have consistently been found between these measures and certification/licensing scores across healthcare professions. However, the results of these studies show that there are other predictive factors not yet identified. Rather than blindly looking for another possible source, branching off of a known predictive power for further investigation of alternate facets is appropriate. Especially considering that the coursework guidelines for ATEPs are so broad and much room for interpretation exists.

Basic guidelines for programs are set up by the CAATE's Standards with recommended coursework coming from differing content areas established by three different sources – the CAATE's Standards, the BOC's Role Delineation Study, and the NATA's Educational Competencies. Room should be left within the Standards for individual programs to develop a program structure that allows for inclusion of institutional guidelines and unique program characteristics. However, if the candidate is expected to integrate didactic knowledge with practical application in order to be prepared for a certification examination that determines competency as an entry-level athletic trainer, implementation guidelines for programmatic course sequencing should be established. Therefore, the following research question guided this investigation:

1. Does the sequence of Domain content within an ATEP's curriculum influence first-time success on the BOC examination?
2. Does timing of introduction of Domain content within an ATEP's

curriculum influence first-time success on the BOC examination?

3. What are the perceptions of important programmatic components in relation to first-time success on the BOC examination of ATEP directors and/or instructional faculty?
4. Are program directors' and/or instructional faculty's perceptions of importance of programmatic components in relation to first-time success on the BOC examination predictive of institutional first-time success on the BOC examination?

Summary

With the results of this investigation, ATEPs can be sequenced between didactic learning and time in clinical experiences to better prepare athletic trainers for first-time success on the BOC examination and ultimately produce better quality healthcare practitioners. This is especially important since there are no established guidelines found in the literature. Results from perceptions may also identify alternate predictive themes for future research to strengthen not only athletic training education programs but also influence effectiveness of program directors, instructional faculty, and future clinicians. Any information gained through this study will help establish a framework for structuring programs, and/or areas to further investigate, as each program faces changes in accreditation standards directly linking accreditation status to acceptable BOC pass rates.

Chapter 3: Methods

Introduction

In an effort to help athletic training education programs create a beneficial curriculum structure and sequence of athletic training specific knowledge, the researcher sought to answer the following research questions:

1. Does the sequence of Domain content within an Athletic Training Education Program's (ATEP) curriculum influence first-time success on the Board of Certification (BOC) examination?
2. Does timing of introduction of Domain content within an ATEP's curriculum influence first-time success on the BOC examination?
3. What are perceptions of important programmatic components in relation to first-time success on the BOC examination of ATEP directors and/or instructional faculty?
4. Are program directors' and/or instructional faculty's perceptions of importance of programmatic components in relation to first-time success on the BOC examination predictive of institutional first-time success on the BOC examination?

The researcher hypothesized that the ideal Domain progression would be Immediate Care (Domain III), Prevention (Domain I), Recognition, Evaluation and Assessment (Domain II), followed by Treatment, Rehabilitation and Reconditioning (Domain IV), Organization and Administration (Domain V) and Professional Responsibility (Domain VI) without regard to order for the last 3 Domains. It was also hypothesized that earlier implementation of Domain content within course progression

would result in higher first-time success rate of the overall BOC examination.

Design Statement

To address the primary research question, a correlation analysis was conducted to assess the relationship between established variables. Independent variables were the ATEP's sequencing for Domain introduction. The dependent variables were the institutional first-time pass rate on the BOC examination and the average individual Domain scores from the BOC examination. Chi square analyses were conducted to determine strength of perceptions across subject responses. The qualitative responses were coded utilizing an interpretive method of data coding (Miles & Huberman, 1994). The primary researcher reviewed responses and created categories and sub-categories based on trends in responses. Alternate committee members reviewed the categories and sub-categories identified and reached a consensus prior to finalizing data analysis. Due to the qualitative data that was collected, a mixed method design with participation validation was not utilized.

Subjects

All program directors for the Commission on Accreditation of Athletic Training Education (CAATE) accredited entry-level athletic training educational programs and associated ATEP instructional faculty were invited to participate in this study. Data regarding the BOC examination results was not collected from ATEPs who were not in good standing with the CAATE during 2009-2010 and/or did not receive an Individual School Report from the BOC for the 2010-2011 testing year.

Instruments

This study employed two web-based surveys developed specifically for this study, one for ATEP directors and the second for ATEP instructional faculty. The ATEP director survey (Appendix A) included the construct areas of program specifics, BOC exam results, perceptions of ATEP characteristics, and institutional demographics. The ATEP instructional faculty survey (Appendix B) included all construct areas except the BOC exam results section. Items included in both surveys were compiled as a result of a comprehensive literature review and feedback solicited from a variety of content area experts.

Program Specifics. This construct area included specifications of institutional school units, when a traditional student applies to the ATEP, the course(s) that have 50% or more content directly related to each Domain and associated timing of identified course(s).

Board of Certification Examination Results. This area opened with the following qualifying questions:

1. Was your ATEP accredited and in good standing with the CAATE during 2009-2010?
2. Did your ATEP receive an Individual School Report on the 2010 Board of Certification Athletic Trainer's Certification Examination?

A subject was required to answer "yes" to both questions in order to qualify to complete this section. If a subject answered "no" to either question, the survey transitioned to the next section of the survey. The construct area continued with institutional specific BOC examination results related to first-time passing percentage and average Domain scores.

Perceptions. Subjects were asked to provide a sequence of Domains that would be best in preparing athletic training students for the BOC examination. Table 4 outlines the items that subjects were asked to rank on a five-point agreement Likert scale (“strongly agree” to “strongly disagree”) in relation to 1) being important to first-time success on the BOC examination and 2) successful implementation in institution’s athletic training education program.

Table 4

Survey Items in Perceptions Construct Area

Learning Over Time
Length of Clinical Program
Length of Didactic Program
Number of Hours in Major
Percent of Instructor Workload Dedicated to Teaching
Qualifications of Instructors (e.g. degrees earned, specialty certifications, years of experience)
Ratio of Instructors to Students
Sequencing of Content within Courses
Sequencing of Courses

The subjects were given the opportunity to provide any relevant reasoning behind stated Domain sequencing and Likert ratings.

Institutional Demographics. Data was collected regarding the National Athletic Trainer’s Association District in which the institution resides, Carnegie Research status, funding classification (public or private), type of entry-level athletic training degree awarded, and length of CAATE accreditation.

Procedures

A list of program directors and associated contact data was attained from the CAATE website. An email communication outlining the study was sent to program

directors. A link was provided in the invitation letter to the website housing the survey with a request to forward the link to all institutional ATEP instructional faculty. The initial e-mail was sent out Monday, November 28, 2011, with reminder e-mails being sent out on day 3 (Thursday, December 1, 2011), day 9 (Wednesday, December 7, 2011), day 15 (Tuesday, December 13, 2011), and the survey was closed after seven weeks on January 16, 2012.

The first page of the survey included an introduction to the study with a request to indicate the respondent's position within the ATEP (Program Director or Instructional Faculty). Upon selection of position, the survey split into separate threads with the subsequent page being informed consent (Appendices C & D). The subject was required to click "yes," agreeing to grant consent before continuing on to the survey. Once consent was granted, the survey was displayed to be completed by the subject. The survey concluded with a page thanking the subjects for their participation in the study. Survey responses were stored in a secure database to be accessed by the researcher. Data from completed surveys was converted into a secure Microsoft Excel© spreadsheet and then transferred into SPSS statistical software for analysis. Data was analyzed for repeated submissions by identifying identical survey information. Any repeated submissions were deleted and excluded from statistical analysis. When multiple courses were identified as having 50% of content from a specific Domain, the course with the earliest timing with the ATEP was utilized for statistical analyses.

Statistical Analyses

Pearson Product correlation analyses were conducted to determine if a relationship existed between the school unit (e.g., semester, quarter) that a Domain was

introduced and average individual Domain score. Additional Pearson Product correlation analyses were conducted between the school unit that a Domain was introduced and first-time success on the BOC examination. The a priori level of significance was set to $p \leq .05$, and the a priori positive and/or negative correlational significance was set to $r \geq .50$. Correlation analysis established both the magnitude and direction of the relationship of the independent variables (Domains) to the dependent variables of individual Domain scores and first-time success on the BOC examination.

Once correlational significance was established, a multiple regression analysis was utilized. This step allowed the researcher to identify the best set of predictors – in this case, optimal timing of introduction of each Domain within the ATEP. After the optimal timing was established for each Domain, the sequence was compared with institutions with the same/similar sequence to determine the actual first-time passing rates for the overall BOC examination. These analyses helped the researcher identify whether or not timing and progression of Domains augments a student's predictability of success on the certification examination above and beyond previously identified individual academic predictors. Additionally subjective sequencing of Domains that were perceived to best prepare students for first-time success on the BOC examination were compared to actual programmatic sequencing and percentage first-time success on BOC when available.

A Chi square analysis was utilized to determine the strength of perceptions from subjects on ATEP characteristics. Descriptive statistics were computed on all survey items. Multiple survey items allowed the researcher to stratify results to compare between groups (e.g. institutional demographics, length of ATEP).

Chapter 4: Findings

Introduction

The statistical analyses on the results of this study were divided based on subsections of the survey and in regard to type of analyses applied (quantitative versus qualitative). The result headings are Subject Pool and Demographic Statistics, ATEP Structure, BOC Results, Quantitative Perceptions, and Qualitative Perceptions. Within the Subject Pool and Demographic Statistics section, basic frequency distribution and descriptive statistics were applied to subjects and the demographic data obtained. The ATEP Structure was also analyzed through frequency distributions and descriptive statistics. The BOC Results have descriptive statistics on first-time pass percent on the BOC and average Domain score for overall respondents as well as stratified by demographic information.

Additionally Pearson Product Correlation was applied to the introduction of each Domain with the first-time pass percent on the BOC and the respective average Domain score. With the results of the correlation, a Simultaneous Multiple Regression was applied. Initially the Perceptions items were quantitatively assessed through Chi Square Goodness of Fit and Kendall's W analyses. Frequency distribution of the ideal timing of Domain introduction, importance of ATEP components on first-time BOC success, and successful implementation of ATEP components was supplied. Pearson Product Correlation Analyses were applied to ranking of importance of ATEP components on first-time BOC success with first-time pass percent of BOC and individual Domain average scores. The Pearson analysis was also used with ranking of successful implementation of ATEP components with the same factors. The results of all

correlations were utilized with a Multiple Step-wise Forward Regression. The Perceptions items were then analyzed for qualitative value utilizing interpretative data coding and frequency distributions on coding items identified. The complete results are further outlined in the following sections.

Subject Pool and Demographic Statistics

A total of 143 subjects accessed the dual survey, with 27% Instructional Faculty ($n = 38$) and 73% Program Directors ($n = 105$). Survey construct areas had varying numbers of respondents, ranging from 72 for ATEP structure to 32 for BOC Scores (a section requiring qualification) as outlined below in Table 5.

Table 5

Summary of Subjects (N) from Overall Survey and Individual Construct Areas

	<i>N</i>	Instructional Faculty	% of <i>N</i>	Program Director	% of <i>N</i>	% of 143
Accessed survey	143	38	27%	105	73%	100%
ATEP structure	72	19	26%	53	74%	50%
BOC scores	32	*		32	100%	22%
Perceptions	62	18	29%	44	71%	43%
Demographics	62	20	32%	42	68%	43%

Note. *Only Program Directors were asked to provide BOC scores.

There was one additional Program Director and Instructional Faculty that accessed the ATEP Structure content area that supplied information for trimesters and quarters, respectively making the total $N = 74$ for this construct area. These subjects were not retained due to the small sample size of the school unit indicated ($n = 1$ each) and the inability to compare data between semesters, trimesters, and quarters. However the respondents in the BOC Scores construct area does include the Program Director supplying information for the trimester system. This data was retained for use in all

statistical analysis except for correlation with timing of Domain entry, which utilized the semester system (due to sample size and inability to compare within school units). There was an additional respondent to the BOC scores construct area that was removed due to a data entry error. A response of 138 was entered for Domain III average score in which the highest score reported nationally was 22 (CASTLE Worldwide, 2010). Therefore, this respondent's data on BOC scores was removed from analysis.

All NATA districts were represented in the subject pool. The greatest representations were from Districts 3 and 4 ($n = 12$) with Districts 2 and 5 following ($n = 8$). A graphical representation of the complete breakdown of respondents by NATA district can be found in Figure 1.

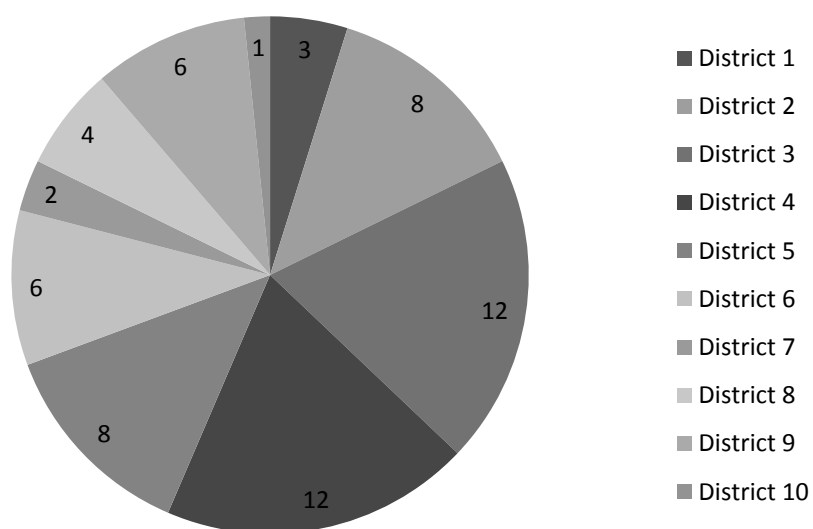


Figure 1. Survey Subjects by NATA District

Respondents were quite equally stratified regarding Carnegie status of the institution (Baccalaureate College $n = 21$; Master College University $n = 23$; Doctoral Research University $n = 18$). A few more private institutions were represented ($n = 34$) as compared to a public funding classification ($n = 27$). Entry-level master programs constituted the minority of survey subjects, with only 8% representation ($n = 5$) with the

remaining respondents awarding a baccalaureate degree ($n = 57$). Length of CAATE accreditation varied from 1-2 years to > 10 years, with the majority of respondents (52%) representing programs with > 10 years of accreditation ($n = 32$). Complete data on length of CAATE accreditation can be found in Figure 2.

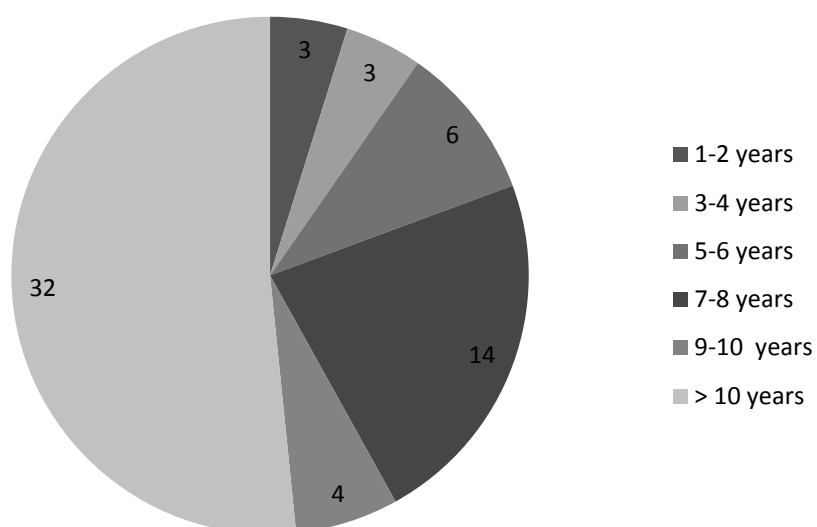


Figure 2. Length of CAATE Accreditation for Survey Subjects

ATEP Structure

The initial question within the construct area of ATEP Structure, identified the semester that a student graduating in 2010 applied to the program. Since the length of Entry-Level Master programs can differ, the results of this question were only analyzed for undergraduate programs and stratified by role. The majority of programs had students admit in the spring of the first year ($n = 25$) but varied from application as a high school senior to spring of the second year. Complete representation of the data can be found below in Figure 3.

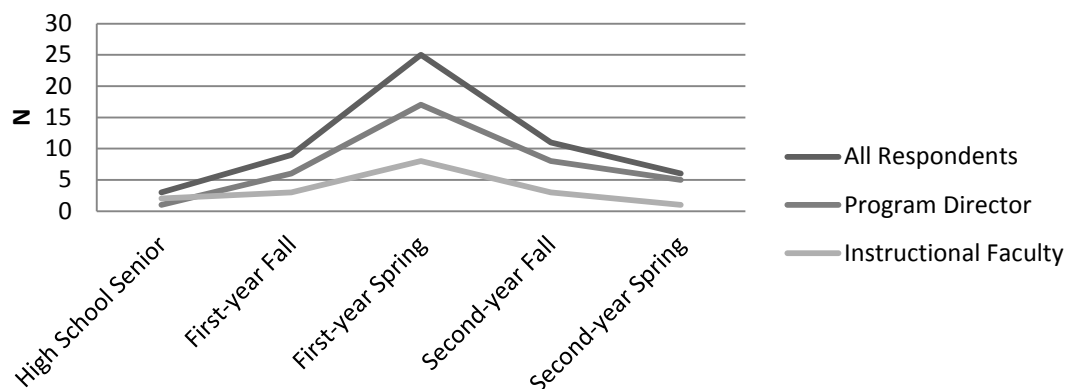


Figure 3. Timing of Admittance for Baccalaureate ATEPs

The respondents also indicated the timing for courses housing 50% of content from each of the NATA Domains of Athletic Training. For purposes of this study, the focus was on the introduction of each Domain. The data was first looked at regarding the mode of semester of entry by Domain as outlined in Table 6.

Table 6

Mode of Reported ATEP Domain Entry

	Timing	N	Total
Domain I	First-year Fall/Spring	25	72
Domain II	Second-year Spring	25	70
Domain III	First-year Fall	27	70
Domain IV	Third-year Fall	28	71
Domain V	Fourth-year Fall	23	71
Domain VI	Fourth-year Fall	28	71

The highest mode was found for Domain IV in third-year fall and Domain VI in fourth-year fall ($n = 28$ of 71 each). This information in isolation does not give a full representation of the data. Table 7 divides the data into complete frequency of occurrence by year. The bolded numbers indicate the two highest frequencies within a given year.

Table 7

Domain Distribution by Year

	First Year	Second Year	Third Year	Fourth Year
Domain I	51	19	2	0
Domain II	11	49	10	0
Domain III	54	15	1	0
Domain IV	12	22	36	1
Domain V	12	9	20	30
Domain VI	14	12	12	33

Note. Bolded items indicate mode.

This table demonstrates that Domains I-III are introduced primarily within the first 2 years of the program, Domain IV within the first 3 years, and Domains V-VI have a much more even distribution of introduction throughout the curricula represented.

BOC Results

It should be noted that the statistics for the BOC results could only be completed on responses from program directors, as these were the only individuals providing information on average Domain scores and first-time BOC passing rates. Within this set of program directors, 32 provided the required information ($N = 32$) and 31 of the 32 (97%) indicated they were on a semester system. Table 8 includes overall descriptive statistics on BOC first-time passing percent and average Domain scores. The mean first-time passing percent reported was 61.59, with average Domain scores ranging from 7.94 for Domain VI to 20.44 for Domain II. First-time passing percents were compared between funding classification and degree awarded for those program directors supplying both BOC scores and demographic information.

Table 8

Descriptive Statistics of First-Time Passing Percents and Domain Average on BOC

	N	Min	Max	M	SD	Var
First-Time Passing Percent on BOC Examination	32	.00	100.00	61.59	28.02	785.10
Domain I – Prevention	31	10.00	16.40	13.37	1.45	2.09
Domain II – Clinical Evaluation and Diagnosis	31	17.00	24.50	20.44	2.16	4.66
Domain III – Immediate Care	31	11.20	18.60	15.19	1.56	2.44
Domain IV – Treatment, Rehabilitation, and Reconditioning	31	13.70	23.90	19.66	2.24	5.00
Domain V – Organization and Administration	31	8.00	11.80	10.29	.93	.87
Domain VI – Professional Responsibility	31	6.30	9.50	7.94	.86	.75

First-time passing percent of private versus public funded institutions was virtually equal ($n = 14$, mean = 62.54%; $n = 16$, mean = 61.78%, respectively). Mean first-time passing percent of institutions awarding a baccalaureate degree was 60.45 ($n = 28$) and was 85.70 ($n = 2$) for programs awarding an entry-level master degree. First-time passing percent was compared in regard to length of baccalaureate-granting programs as outlined below.

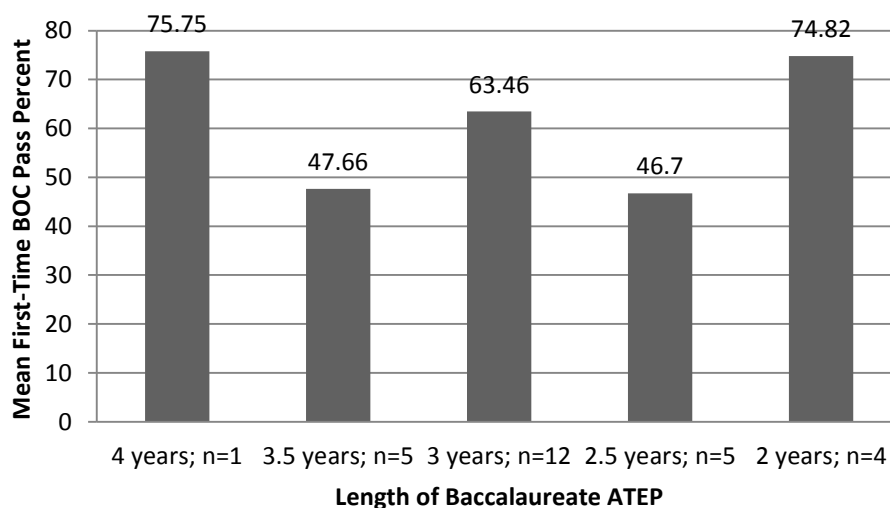


Figure 4. Length of Baccalaureate ATEP with Mean First-time BOC Pass Percent

Data could only be utilized for Program Directors supplying both demographic information and BOC scores, which resulted in a total $n = 28$ for this comparison. No overall trend in regard to length of program and first-time pass percent of BOC can be determined from the data. Both the shortest (2 years, $n = 4$) and longest (4 years, $n = 1$) programs had comparable mean first-time BOC pass percents (74.82 and 75.75, respectively). The highest n ($n = 12$) was for 3-year programs which demonstrated a mean first-time BOC pass percent of 63.46 which is closest to the mean first-time BOC pass percent of the entire subject pool (61.59 from Table 8).

Pearson Product Correlation Analyses were run individually between first introduction (semester) for each Domain (as reported by program directors) with the first-time pass rate and the matching Domain score. Results of these analyses are outlined below in Table 9.

Table 9

Results of Pearson Correlation Analyses

Domain (first introduction)	Average Domain Score	BOC First-Time Pass Rate
I Prevention	.145 (.435)	.141 (.441)
II Clinical Evaluation and Diagnosis	-.105 (.588)	.171 (.366)
III Immediate Care	.143 (.450)	.145 (.437)
IV Treatment, Rehabilitation, and Reconditioning	.113 (.552)	.064 (.734)
V Organization and Administration	-.106 (.577)	.164 (.370)
VI Professional Responsibility	.066 (.731)	.067 (.717)

Simultaneous multiple regression was utilized with the results of the correlation analyses. No significant results were found, as was to be expected with the small sample size. The R square value was 0.129 at a significance level of $p = .750$. Individual

significance values for the coefficients can be found in Table 10.

Table 10

Coefficients Table for Simultaneous Multiple Regression of BOC Results and Domain Entry

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	21.588	26.608		.811	.425
Prevention: First Introduction	-7.636	6.490	-.364	-1.177	.251
Clinical Evaluation and Diagnosis: First Introduction	7.281	7.704	.297	.945	.354
Immediate Care: First Introduction	12.987	8.948	.420	1.451	.160
Treatment, Rehabilitation and Reconditioning: First Introduction	-2.192	5.394	-.106	-.406	.688
Organization and Administration: First Introduction	2.603	3.814	.204	.683	.502
Professional Responsibility: First Introduction	-.497	3.747	-.043	-.133	.896

Note. Dependent Variable: First-Time Passing Percent on BOC Examination

Quantitative Perceptions

All perceptions items were analyzed as a whole group ($N = 62$). The first statistical test to be utilized was Chi Square Goodness of Fit. This was applied to all close-ended perceptions pieces and demonstrated significant differences at $p < .001$ for all items. To further establish the significance of items within this construct area, Kendall's W was used. The highest agreement between respondents was on the ideal

sequencing of Domain introduction (56.6% agreement). Agreement between respondents on ATEP components considered important to first-time success on the BOC exam was 26.2% and only a 10% agreement between respondents on what components were considered implemented successfully in the respondent's institution (complete results are in Table 11).

Table 11

Summary Statistics for Kendall's W on Close-ended Perceptions Items

	Domain Sequence	BOC Success	ATEP Success
Kendall's W ^a	.566	.262	.100
Chi-Square	161.436	125.629	48.911
df	5	8	8
Asymp. Sig.	<.001	<.001	<.001

The prompt provided for Domain sequence was as follows: Please provide a sequence of the Domains that you feel would be best in preparing athletic training students for the BOC examination. In looking at the modes for this item, the sequence provided by respondents was: Prevention; Immediate Care; Clinical Evaluation and Diagnosis; Treatment, Rehabilitation, and Reconditioning; Organization and Administration; and Professional Responsibility. The mode is bolded in Table 12 for this question. The table also includes the overall frequency of selections for this item. Although the consensus resulted in Professional Responsibility (Domain VI) being introduced last, nearly 20% of respondents indicated ideal introduction of this Domain would be at the beginning of the sequence. All Domains other than Organization and Administration (Domain V) had entries for five different placements.

Table 12

Frequency of Domain Introduction by Respondents

Order of Introduc- -tion	Total N	Domain I		Domain II		Domain III		Domain IV		Domain V		Domain VI	
		N	%	N	%	N	%	N	%	N	%	N	%
First	61	28	45.9	3	4.9	18	29.5					12	19.7
Second	60	21	35	6	10	31	51.7	1	1.7			1	1.7
Third	60	5	8.3	41	68.3	8	13.3	3	5	1	1.7	2	3.3
Fourth	60	4	6.7	8	13.3	5	8.3	43	71.7				
Fifth	60	3	5	1	1.7	1	1.7	12	20	37	61.7	6	10
Sixth	61							2	3.3	23	37.7	36	59

Note. Bolded items indicate mode.

Other than one outlier, respondents believed Organization and Administration should be introduced fifth or sixth in the sequence.

Results for mode (bolded) and frequency of ratings on importance of ATEP components on first-time BOC success can be found in Table 13. The mode for all items was “agree” other than Learning Over Time and Ratio of Instructors to Students which warranted a “strongly agree” rating by respondents. Only three items (Length of Clinical Program, Length of Didactic Program, and Number of Hours in Major) resulted in a “strongly disagree” response. The majority of responses were either positive (agree/strongly agree) or neutral for all components in this item.

Table 13

*Frequency of Ratings on Importance of ATEP Components on First-time BOC**Success*

Prompt: I believe that each of the following components are important to first-time success on the BOC examination											
ATEP Components	Total N	Strongly Disagree				Neutral		Agree		Strongly Agree	
		N	%	N	%	N	%	N	%	N	%
Learning Over Time	62					3	4.8	22	36	37	59.7
Length of Clinical Program	62	1	1.6	4	6.5	11	17.7	27	44	19	30.6
Length of Didactic Program	61	1	1.6	4	6.6	12	19.7	26	43	18	29.5
Number of Hours in Major	62	1	1.6	9	14.5	24	38.7	25	40	3	4.8
Percent of Instructor Workload Dedicated to Teaching	62			7	11.3	15	24.2	35	57	5	8.1
Qualifications of Instructors	62			3	4.8	7	11.3	34	55	18	29
Ratio of Instructors to Students	62			2	3.2	5	8.1	22	36	33	53.2
Sequencing of Content within Courses	61					6	9.7	37	61	18	29.5
Sequencing of Courses	62			3	4.8	6	9.7	33	53	20	32.3

Note. Bolded items indicate mode.

Similar results were found for the final item in the perceptions construct area in regard to the distribution of positive and/or neutral responses, as outlined in Table 14. The “strongly agree” mode only applied to Learning Over Time when respondents considered what components were implemented successfully in his/her institution’s program. The “strongly disagree” responses were still minimal, but concentrated within one component (Percent of Instructor Workload Dedicated to Teaching).

Table 14

Frequency of Ratings on Successful Implementation of ATEP Components

Prompt: I believe that each of the following components are implemented successfully in my institution's athletic training education program											
ATEP Components	Total N	Strongly Disagree				Neutral				Strongly Agree	
		N	%	N	%	N	%	N	%	N	%
Learning Over Time	62			1	1.6	3	4.8	27	43.5	31	50
Length of Clinical Program	62			3	4.8	2	3.2	29	46.8	28	45.2
Length of Didactic Program	62			1	1.6	3	4.8	31	50	27	43.5
Number of Hours in Major	61			2	3.3	11	18	32	52.5	16	26.2
Percent of Instructor Workload Dedicated to Teaching	62	2	3.2	7	11	10	16	31	50	12	19.4
Qualifications of Instructors	62			1	1.6	8	13	32	51.6	21	33.9
Ratio of Instructors to Students	62			6	9.7	3	4.8	27	43.5	26	41.9
Sequencing of Content within Courses	62			1	1.6	6	9.7	35	56.5	20	32.3
Sequencing of Courses	62			3	4.8	4	6.5	30	48.4	25	40.3

Note. Bolded items indicate mode.

Ranking of ATEP components in regard to importance to first-time success on the BOC and successful implementation within institution's ATEP were each correlated with overall first-time passing percent and average Domain score from the BOC Results section. Table 15 outlines results of ranking of components in relation to importance for success on first-time success on the BOC.

Table 15

*Results of Pearson Correlations Between Important ATEP Components and BOC**Scores*

Prompt: I believe that each of the following components are important to first-time success on the BOC examination	Average Domain Score						
	First-Time Passing %	I	II	III	IV	V	VI
Learning Over Time	-0.116	-0.195	-0.044	0.004	-0.108	-0.078	-0.075
Length of Clinical Program	-0.149	-0.226	-0.173	-0.323	-0.251	-0.119	0.155
Length of Didactic Program	-0.099	-0.206	-0.168	-0.262	-0.355	-0.148	0.088
Number of Hours in Major	-0.052	-0.114	-0.237	-0.303	-0.192	-0.161	0.065
Percent Workload Dedicated to Teaching	-0.090	-0.180	-0.028	-0.151	-0.035	-0.036	0.149
Qualifications of Instructors	0.418*	0.316	0.329	0.402*	0.298	0.299	0.302
Ratio of Instructors to Students	-0.096	-0.138	-0.122	-0.010	-0.237	0.013	0.062
Sequencing of Content within Courses	0.009	0.088	-0.150	-0.266	-0.069	-0.279	-0.045
Sequencing of Courses	-0.099	-0.120	-0.193	-0.075	-0.225	-0.171	-0.061

Note. *statistically significant at $p < .05$

Qualifications of Instructors had positive significant correlations with both overall first-time pass percent ($r = 0.418$, $p = .030$) and average Domain III score ($r = 0.402$, $p = .031$).

Multiple significant correlations were discovered within these same components as ranked regarding successful implementation in the institution's ATEP as outlined in Table 16. No item was correlated with overall success on the BOC, but items were

correlated positively with three out of the six Domains. Ratio of Instructors to Students had a significant correlation ($r = -0.410$, $p = .027$) with Domain IV, as did Sequencing of Content within Courses with Domain VI ($r = 0.427$, $p = .021$).

Table 16

Results of Pearson Correlations Between Successful ATEP Components and BOC

Scores

Prompt:	I believe that each of the following components are implemented successfully in my institution's athletic training education program						
	First-Time Passing %	Average Domain Score					
		I	II	III	IV	V	VI
Learning Over Time	-0.040	0.156	0.360	0.222	0.104	0.198	0.084
Length of Clinical Program	0.045	0.070	0.043	-0.007	0.047	0.016	0.318
Length of Didactic Program	-0.083	-0.126	-0.207	-0.211	-0.193	-0.269	0.171
Number of Hours in Major	0.083	0.060	0.010	-0.150	-0.076	-0.183	0.023
Percent Workload Dedicated to Teaching	-0.274	0.094	0.258	-0.075	-0.079	0.113	0.034
Qualifications of Instructors	0.062	0.039	-0.036	-0.237	-0.040	-0.010	0.119
Ratio of Instructors to Students	-0.281	-0.164	0.039	-0.183	-	-0.164	-0.180
Sequencing of Content within Courses	0.203	0.305	0.004	-0.016	0.298	-0.066	0.427*
Sequencing of Courses	0.325	0.405*	0.166	0.118	0.439*	0.125	0.527**

Note. *statistically significant at $p < .05$; **statistically significant at $p < .01$

The most striking result came from Sequencing of Courses demonstrating significant correlation with three of the six Domains (Domain I, IV, and VI). Correlation with Domain I and IV were significant at $p < .05$ ($r = .405$ and $r = .439$, respectively) and

Domain VI was significant at $p < .01$ ($r = .527$).

A Multiple Step-wise Forward Regression was also conducted on the results. Results of this study only revealed one factor, ranking of importance on Qualifications of Instructors as significant in predicting first-time success on the BOC. The model summary from this analysis demonstrated an R square value of .174 ($p < .05$) indicating that 17.4% of variation in first-time passing percent was explained by this factor. Additionally the coefficients demonstrated that for every 1-unit increase (i.e., from agree to strongly agree), first-time passing percent increased by 14.54% ($t = 2.298$, $p < .05$). The ranking of importance on Qualifications of Instructors also demonstrated significant correlation with average score for Domain III (Immediate Care). The R square value was .162 ($p < .05$) indicating that 16.2% of variation in Domain III score was explained by this factor. With every 1-unit increase in the ranking of importance of this item, the Domain score increases by .224% ($t = 2.309$, $p < .05$) as indicated by the coefficients.

The average score for Domain I (Prevention) was linked with ranking of successful implementation of Sequencing of Courses. The analysis demonstrated an R square value of .164 ($p < .05$) indicating that 16.4% of variation in Domain I score was explained by this factor. However, for every 1-unit increase, the Domain score increased by 6.72% ($t = 2.301$, $p < .05$). Domain IV (Treatment, Rehabilitation, and Reconditioning) was predicted by two items ranked as implemented successfully in the ATEP: Sequencing of Courses and Ratio of Instructors to Students. The R square value for this regression was .353 ($p < .01$). The coefficient values for this analysis are found in Table 17.

Table 17

*Coefficients Table for Step-wise Multiple Regression of Domain IV Score**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	20.422	3.067		6.658	.000
I believe that each of the following components are implemented successfully in my institution's athletic training education program: Ratio of Instructors to Students	-1.321	.522	-.399	-2.530	.018
I believe that each of the following components are implemented successfully in my institution's athletic training education program: Sequencing of Courses	1.183	.434	.430	2.723	.011

Note. *Dependent Variable: What was the average score for Treatment, Rehabilitation, and Reconditioning (Domain IV) in 2010 from your institution?

Although 35.3% of variation in Domain IV score was explained by these predictors, when Sequencing of Courses remained the same, every 1-unit increase in Ratio of Instructors to Students resulted in a 1.32% decrease in Domain IV score. When Ratio of Instructors to Students remained the same, every 1-unit increase in Sequencing of Courses resulted in a 1.18% increase in Domain IV score.

The final multiple regression was applied to predictors for Domain VI (Professional Responsibility) score, which were ranking Sequencing of Courses and Sequencing of Content within Courses as being implemented successfully in the institution's ATEP. The R square value was .280 ($p < .05$) demonstrating that 28% of the variation in Domain VI score was explained by ranking of these two factors. The summary of the coefficients is included in Table 18. If ranking of Sequencing of Courses remained the same, for every 1-unit increase in Sequencing of Content within Courses, Domain VI score decreased by 0.124%. If ranking of Sequencing of Content within Courses remained the same, for every 1-unit increase in ranking of Sequencing of Courses, the Domain VI score increased by 0.66%.

Table 18

*Coefficients Table for Step-wise Multiple Regression of Domain VI Score**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	5.558	.899		6.180	.000
I believe that each of the following components are implemented successfully in my institution's athletic training education program: Sequencing of Content within Courses	-.124	.397	-.102	-.312	.758
I believe that each of the following components are implemented successfully in my institution's athletic training education program: Sequencing of Courses	.660	.350	.614	1.885	.071

Note. *Dependent Variable: What was the average score for Professional Responsibility (Domain VI) in 2010 from your institution?

Qualitative Perceptions

Whereas the close-ended perception items were analyzed quantitatively, the open-ended perception items were analyzed for qualitative value. Open-ended perception items included reasoning for order of Domain entry, items ranked important for first-time success on the BOC exam, items ranked as being implemented successfully in

institution's ATEP, and any other characteristics respondents felt were important to first-time success on the BOC examination. Each of these items is discussed in-depth in the following paragraphs.

Subject's reasoning for order of Domain entry was coded into 350 ($N = 350$) items from 44 respondents ($N = 44$, instructional faculty = 14, program director = 30). These items resulted in multiple coding areas as outlined in Figure 5.

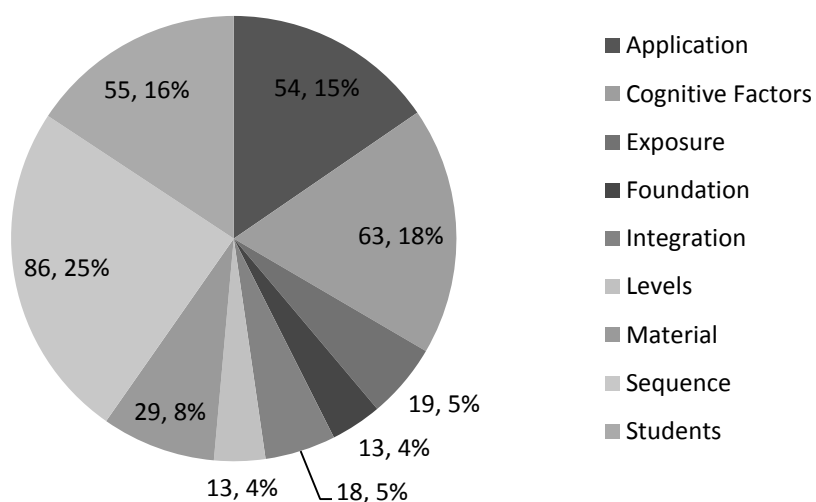


Figure 5. Coded Items for Order of Domain Entry Beneficial for BOC Exam Success

The major areas included application ($n = 54$, 15%), cognitive factors ($n = 63$, 18%), sequence ($n = 86$, 25%), and students ($n = 55$, 16%). Cognitive factors listed included comprehend, grasp, know, knowledge, learn, prepare, review, and understand.

Multiple respondents addressed the complicated nature of ordering an ideal introduction of Domain content. One respondent covered multiple trends in the following response:

Part of the sequencing is related to clinical education. For example, students are likely to see immediate care more often than some other skills, and they may have

more opportunity to do this as a student, so we place it earlier in our curriculum.

The second aspect is the amount of foundational knowledge required for a domain. Students need a solid background in anatomy and what injuries/conditions are before they are able to learn clinical evaluation and diagnosis. Lastly, regarding professional responsibility and organization and administration, we have found that students struggle with grasping those concepts early in the program, and have a much better appreciation for and interest in those areas when they get them as Juniors and Seniors, rather than Sophomores.

A primary reason given was application of skills in the clinical experience which was supported by multiple respondents. This program director emphasized information from multiple sources in sequencing content areas:

Sequencing allows for the highest level of clinical practice during clinical experiences. Domain introduction correlates with the ACI responses to surveys regarding the most useful clinical skills allowing for the greatest clinical involvement in patient care. Consideration is also given to the introduction of knowledge and skills after appropriate foundational info is taught and to assure the student is sufficiently developed for type of decision making and learning needed to learn the content.

Another program director recognized the need for practice of psychomotor skills and an inherent order that enables easier acquisition of skills in the following quote:

Students should be first introduced to the areas they need to practice the most and will need to be able to apply immediately. After students know what to do in an emergency, how to evaluate and treat injury and illness then they can move on to

other skills that are more easily grasped.

The order for other respondents depended upon student characteristics. One respondent explained the sequence should be “Based on student’s maturity levels, I feel this is a good outline of what they need to learn, plus what they will get exposure to as they go along in their clinical experiences.” The respondents recognized that students grow throughout their academic careers and concluded, “As the students learn more each year they will be able to understand why you are doing the things outlined in the next domain.” Which is why one program director put Professional Responsibility late in the sequence due to “maturity and grasp of field necessary for professional responsibility.”

Whereas the respondents have emphasized application of knowledge, exposure, student characteristics, and sequence of information, this instructional faculty respondent came from a different approach. The respondent cited transferability of knowledge in saying, “Emergency and immediate care is very transferable across many injuries and provides a good basis of care and understanding treatment relationships.” Another viewpoint was that certain Domains provide unifying concepts such as “How administrative duties impact [the] ability to perform the other domains. Having the administrative theory could help students formulate a more organized approach to evaluation, diagnosis, immediate care, and treatment.” Foundational information was emphasized, but differences in opinion occurred as to what should constitute the foundation. One program director stated,

I believe that prevention, immediate care, and professional responsibility should be introduced first as the foundation of AT. This allows the ATS to have a strong understanding of the profession prior to entering into Domains II and IV. In

addition, prevention and immediate care support a successful clinical experience which helps the ATS get off to a good start.

A different respondent “chose to put professional responsibility first due to the students’ needs to understand why we do what we do and the reasoning behind why it matters to us and our profession.” A program director took a more objective approach in stating that “how we introduce the domains and then review them throughout our curriculum is somewhat based on the old and new Bloom’s Taxonomy. Where the base knowledge needs to be gained before students can analyze, synthesis, and evaluate.” This more holistic approach was echoed by an instructional faculty who stated,

students need to understand the profession of AT, as a framework. I don’t see the domains so much as a sequence as intertwined pieces. Each domain relates to the other and the knowledge should be taught to the students in an integrated manner.

Comments related to rankings of identified ATEP components being considered important to first-time success on the BOC examination consisted of 228 ($N = 228$) coded responses from 29 subjects ($N = 29$, instructional faculty = 10, program director = 19). The coded responses were subdivided into neutral ($n = 84$, 37%), important ($n = 131$, 57%), and unimportant ($n = 13$, 6%). The neutral coded responses are depicted in Figure 6 below. Major themes were the student ($n = 31$, 41%), faculty ($n = 19$, 23%) and success ($n = 17$, 20%).

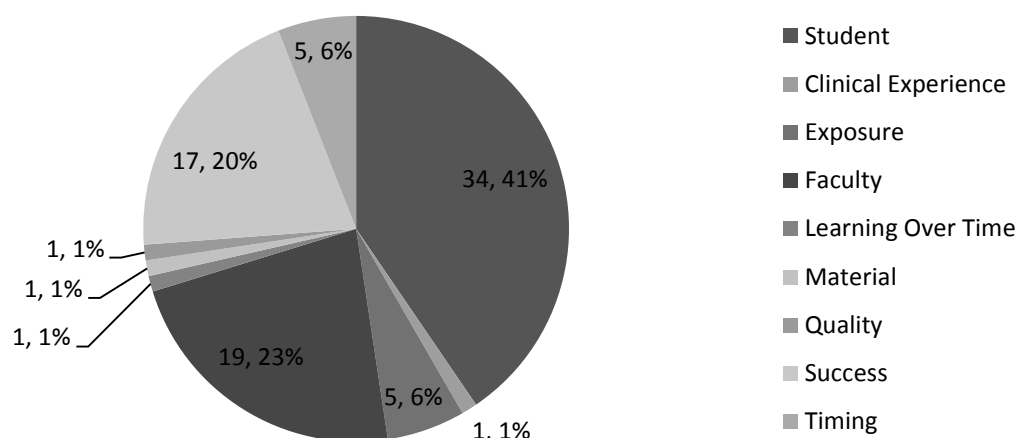


Figure 6. Neutral Coded Responses for Factors Important to First-time Success on the BOC

Student ($n = 31$, 24%) remained a major category in responses coded as important along with material ($n = 21$, 16%) and timing ($n = 14$, 11%) as depicted in Figure 7.

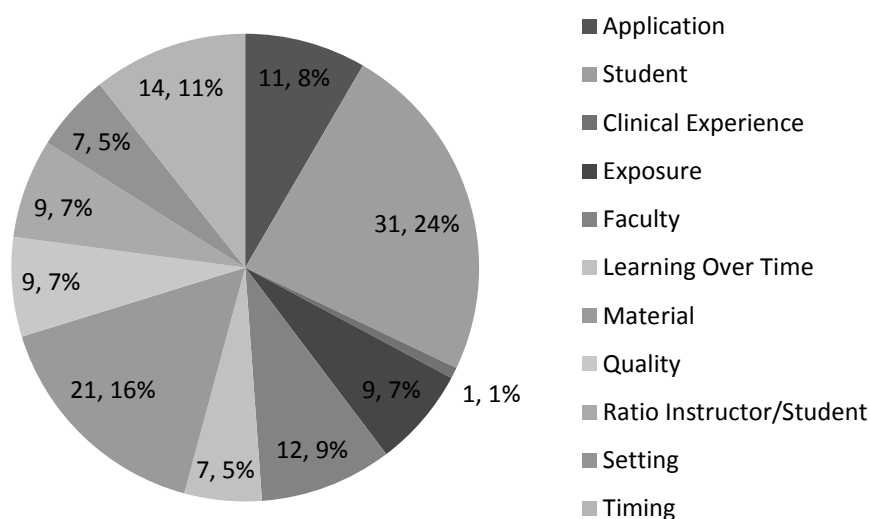


Figure 7. Important Coded Responses for Factors Important to First-time Success on the BOC

Compared to the neutral coded responses, the responses coded important were

more evenly dispersed among areas. Factors coded as unimportant were exposure ($n = 2$), faculty ($n = 3$), and timing ($n = 8$). Themes within the student construct area included: cognitive learning, experience of the student, preparation of the student, and student characteristics. The faculty construct area had similar themes of experience, preparation, and characteristics of faculty as well as workload, approved clinical instructors, and experience being more important than degrees earned.

Some respondents were very supportive of the ATEP components listed being important to success on the BOC such as in the following statement:

All of these are very important to the preparation of students for the exam. I think one or two of these areas can be slightly weaker in a program (i.e., maybe a high ratio of students to instructors) and students can still be successful, but breakdown of too many of these areas will lead to problems.

Other respondents were less supportive of programmatic components and instead put the onus on the students:

Well I really don't know how much of the above [listed program components] dictates BOC success. Ultimately it is up to the commitment of the student to take advantage of the experiences and instruction his/her institution is offering and take initiative to prepare for the exam.

This sentiment was echoed in the following comment, "Success on the BOC does not necessarily depend on any of these things – success is more reliant on the student and what s/he is able to comprehend and think critically." Whereas the respondents above seemed to put responsibility on the student rather than the program, some respondents felt that the program played a major role, but not in quantifiable ways. One instructional

faculty stated, “I don’t think much of it [success on the BOC] has to do with anything quantifiable so much as it has to do with the quality of hours, program, and instructor/courses.” This concept of ‘quality’ was well supported by program directors as well. One program director commented, “I don’t feel that the length of time of the program really matters as long as there are enough experiences to provide a beneficial learning environment. I think the quality and time devoted to students is what is most important.” Linking length and time of programmatic components with quality was supported by this respondent,

I believe individualized attention for the ATS didactically and clinically is very important to first time success. I support quality of time over quantity of time but agree that a minimum length for the clinical and didactic program completion is important to success.

Another program director expanded on this thought by saying, “More QUALITY time spent in the clinical and didactic settings will allow students to better develop that knowledge as a tool rather than as an answer to an exam question.”

The following respondent based his/her response on the ultimate preparation of students:

Since the BOC is designed to test a student’s readiness to practice as an ATC, I feel that learning over time and strong clinical experiences are the two most important factors in preparing students for being successful in their careers. They need to learn the skills, but also have the chance to practice them in the field.

The importance of Learning Over Time was supported in this quote, “Learning over time is by far the best way for a student to get experience and understanding in the profession.

Lower instructor to student ratios lead to better experiences for the student, both in the clinic and classroom settings.” Respondents were split on the importance of Qualifications of Instructors. One respondent stated, “Experience of instructors, especially approved clinical instructors is the heart beat of the program.” Whereas another respondent did not feel that years of experience were important, “Instructor qualifications are NOT better with higher degrees or years of experience.” This sentiment was supported by the following, “The amount of degrees an instructor has does not equate to a good instructor. That is an individual quality that many clinical instructors without terminal degrees are excellent at.” Quality, Time, and Qualifications of Instructors were contrasted by this instructional faculty, “I feel that it is important to learn over time so that you can retain the knowledge. I also feel that it matters more the quality of time you put in, more so than the qualifications of the instructors.”

More comments regarding instructional faculty included, “I feel that those who are instructors must also be well qualified and more importantly devoted to the education of students. Educating the students cannot be in ones spare time it has to be a priority.” A related comment was in support of the importance of workload percentage dedicated to teaching, “The workload percentage is very important, as the ability an instructor has to the class allows for better class prep and better student knowledge and understanding.” Another respondent felt that ratio of instructor to student aided in student comprehension: “Students instructed in smaller groups by quality instructors seem to have better comprehension of material as the instructors are able to present the material in different ways as well as take more time with individuals.”

Learning Over Time and clinical experiences were paired by some respondents

and others paired Learning Over Time with sequencing of content/courses, like from this program director,

I believe learning over time, sequencing of both the content and courses are very important for success in taking the BOC. The content of courses as well as classes themselves should be structure in a way where the information learned is logical and builds. Students may not understand the ‘why’ if they first do not have foundational information. I also think that a student needs to see or be exposed to information multiple times and in a variety of ways.

Another program director had similar thoughts,

Learning material over time assists with reducing the ‘memorization’ factor that many students use to study for exams. Because most of our courses are based utilizing a hands-on approach where content is first introduced then practiced, it has proven to be more successful. We also build on each concept from semester to semester and thread topics throughout the entire content.

However, some respondents rated quality and instructors over the importance of sequencing. One program director said, “Course sequencing is different in institutions but all may have the same results on BOC not because of when it is taught but rather the quality of what is taught.” The importance of instructors was highlighted in the following statement, “Those who teach the students will be the ones to make the content applicable more so than sequencing.”

Respondents were asked to further explain the rankings of identified ATEP components being successfully implemented in his/her institution’s ATEP of which 26 responded ($N = 26$, instructional faculty = 10, program director = 16). Of these

comments, 152 ($N = 152$) items were coded and divided into neutral comments ($n = 65$, 43%), important factors ($n = 13$, 9%), unimportant factors ($n = 2$, 1%), ATEP strengths ($n = 41$, 27%) and ATEP weaknesses ($n = 31$, 20%). Unimportant factors commented on were Ratio of Instructor to Student and Percent of Instructor Workload Dedicated to Teaching. Factors considered important consisted of more subject areas, but limited responses per item as demonstrated in Table 19.

Table 19

Important ATEP Factors as Reported by Respondents

Item	N
Application	1
ATS characteristics	1
Clinical experience	1
Cognitive factors	2
Components – ATEP (LOT, instructor qualifications)	2
Environment	1
Material	2
Program characteristics	1
Time	2

Neutral coded responses covered a wide variety of topics as outlined in Figure 8.

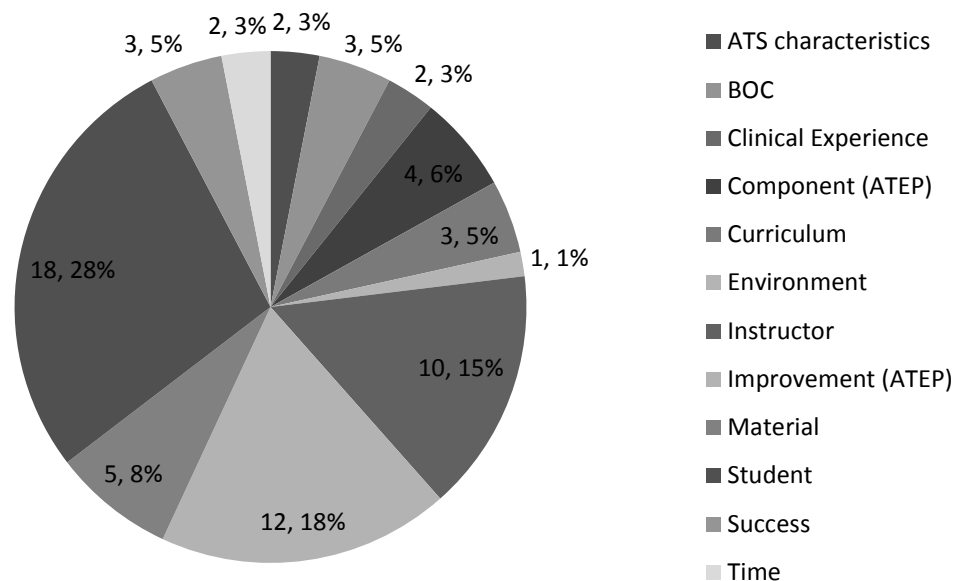


Figure 8. Neutral Coded Responses for ATEP Components Implemented Successfully

The majority of these coded responses involved referencing instructors ($n = 10, 15\%$), ATEP improvements ($n = 12, 18\%$), or students within the program ($n = 18, 28\%$).

Comments regarding ATEP improvements were widespread and branched into what respondents considered strengths of his/her institution's ATEP. An instructional faculty stated, "We've spent a lot of time reassessing and rearranging courses for the benefit of our students. Hopefully, the current arrangement will be successful." A program director who felt the current structure was beneficial still stated:

What is being done currently has proven to be successful, but we are in the process of revamping our curriculum to best serve the students' needs. We have changed the sequencing of some of the courses to allow for more 'practice' time.

Another respondent echoed the sentiment of continuing to improve programmatic structure in this statement: "We've played around with our content sequencing and are considering a revamp of our curriculum in order to make things more cohesive, so I

believe those are working right now, but we are trying to make it even better.”

Breakdown of responses coded as ATEP strengths is provided in Figure 9.

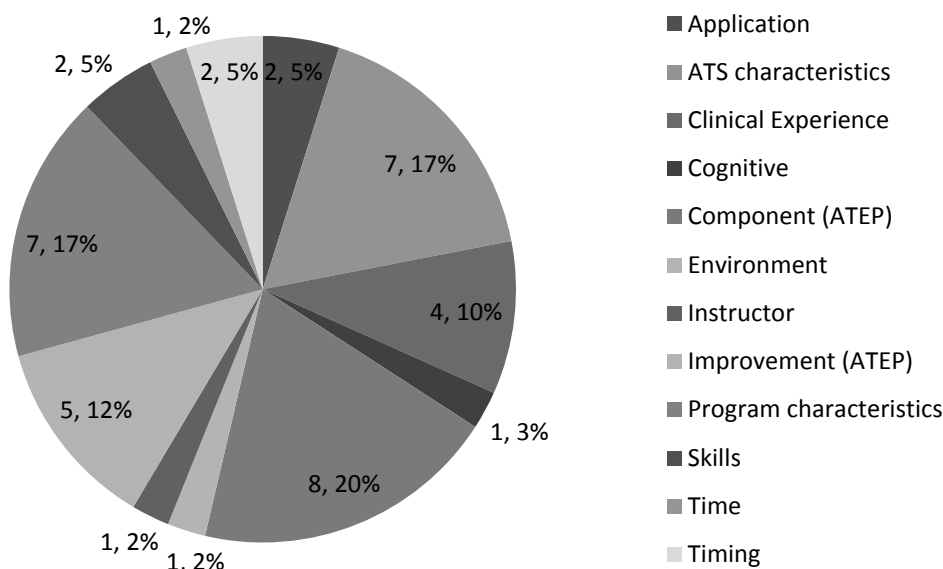


Figure 9. Responses Coded as ATEP Strengths

The ATEP components referenced included Number of Hours in Major ($n = 1$), Qualifications of Instructors ($n = 2$), Learning Over Time ($n = 2$), Ratio of Instructors to Students ($n = 1$), Sequence of Content within Courses ($n = 1$), and Sequencing of Courses ($n = 1$). Positive programmatic characteristics included intense, strong, unity, and size. An instructional faculty commented that “we have low student to instructor ratios, letting the students feel a sense of family and unity in the program. Since they are familiar with the instructors, they feel comfortable asking questions.” A different respondent credited the size of the program as a programmatic strength in saying, “we are able to evaluate where our weak spots in the BOC exam are and adapt quickly with a smaller size program.” ATEP improvement ($n = 5$, 12%) and clinical experience ($n = 4$, 10%) were also construct areas within strengths of ATEPs. A program director spoke to both areas

in this quote: “We are also working to restructure the practical experience to provide optimal learning environments – looking at the novice to mastery level students and where they are placed in their clinical rotations.”

Figure 10 below indicates the distribution of ATEP weaknesses coded into the categories listed. The ATEP components referenced included limited Number of Hours in Major ($n = 2$), Instructor Qualifications ($n = 6$), Sequence of Courses ($n = 5$), Ratio of Instructors to Students ($n = 1$), and Percent Workload Dedicated to Teaching ($n = 3$).

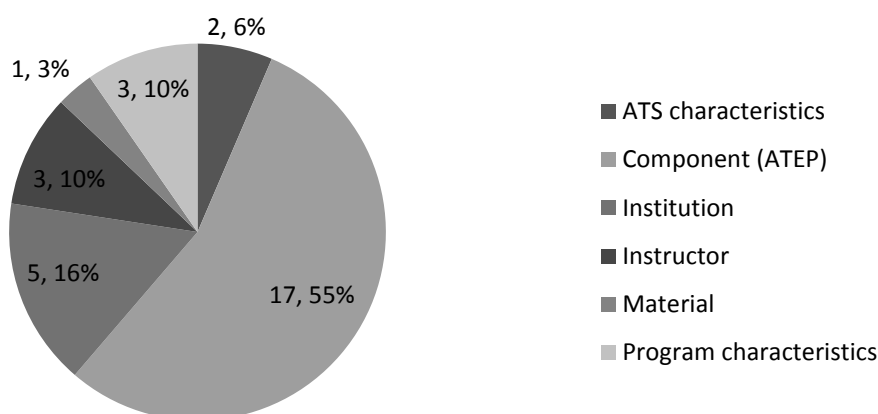


Figure 10. Comments Coded as ATEP Weaknesses

Program characteristics commented on length of program being too long, too many students, and turnover of faculty and staff. In referencing negative student characteristics, one respondent stated that, “our students are burnt out and uninvolved as seniors” and cited the length of the program as the cause of the deficit.

In speaking to instructor workload and qualifications, one program director stated that “it is hard to find quality ACI’s who are experienced and truly desire to teach...it always seems their athletic commitment overwhelms them...or they have a difficult time giving up control of their athletes, especially when they have a demanding coach.” An

instructional faculty echoed this sentiment in a slightly different yet revealing manner:

“Trying to instruct students as well as provide good care/service in the athletic training room and allow students to learn in the clinical setting as well as be efficient in treatment becomes a huge struggle at times.”

All comments directed at the overall institution were coded as weaknesses (no neutral, important, unimportant, or strength coding of this construct) as demonstrated in the following quotes. One program director felt like the program had too few hours and believed the institution was largely responsible: “I think we need more ATEP courses but our university has a high percentage of degree hours delegated to general education courses.” A different respondent echoed this sentiment and further reflected upon the impact the institution has on the program in the following statement: “Sequencing courses outside of our department is difficult and we have little control in that regard. Also, our institution does not support/reward/recognize clinical time for instructional faculty and hours within the major are tightly bound with few electives.”

The last open-ended prompt asked respondents to comment on any other factors that he/she felt were important in preparation for first-time success on the BOC exam. A total of 31 respondents (instructional faculty = 9, program director = 22) utilized this prompt providing a variety of responses (152 total items coded). The major trends identified are outlined in Figure 11 below.

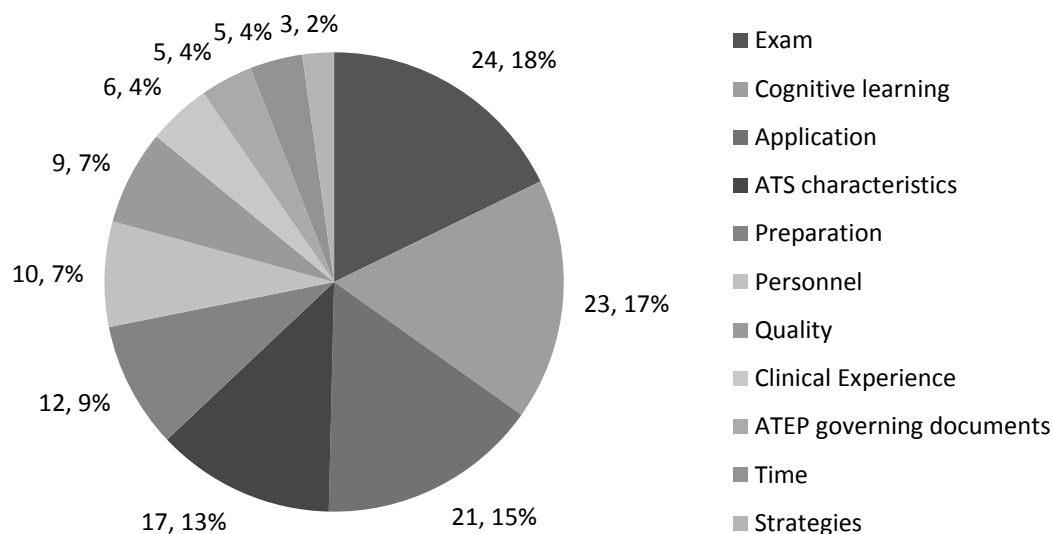


Figure 11. Trends in Other Factors Important to First-time Success on the BOC Exam

Half of the trends were directed towards the exam itself, cognitive learning (further discussed later), and application of knowledge/skills. Respondents also identified that characteristics of the individual student are impactful on first-time success on the examination (13%), with less popular factors being, preparation (9%), quality of program (7%), clinical experience (4%), ATEP governing documents (4%), time (4%), and test-taking/study strategies (2%). The cognitive skills ($n = 23$) that were mentioned covered a variety of facets including knowledge ($n = 5$, 22%), learning ($n = 8$, 35%), review ($n = 7$, 30%), and understanding ($n = 3$, 13%).

Multiple respondents commented on exposing the students to components of the structure of the BOC exam itself. One respondent stated it was important for students to “[have] more time to prepare for the exam by having access to mock exams. Learning the exam format for some students is as necessary as the material of the exam.” This was supported by a Program Director relaying the following: “Our first time passing rate for 2010 was 50%, 2011 was 100%. I believe a major difference was utilization of BOC

practice exams that allowed students to become familiar and comfortable with the test and question format.” Other exam components were highlighted as well, such as timing of taking the exam. One Program Director stated, “We believe that it is too difficult for students to try to meet all requirements for graduation, seek out graduate assistantships, take GREs AND study for the BOC let alone be excellent/effective in all of those responsibilities.”

Many comments combined the perceived effect of exam preparation on the students’ demeanor such as this comment, which supported a combination approach: “Understanding the test and strategies to approach the questions...being comfortable and confident in the material across the domains.” A Program Director saw the importance of linking the BOC preparation to individual student characteristics in this quote,

Understanding the design of the exam along with concentrated review of competencies based on individual needs makes a difference. I have our ATS rate their knowledge and understanding of each competency and compare their assessment to that of the instructional faculty. Then we gear the study strategy to match.

Another Program Director discussed the limitations within each student in saying,

Good students pass the exam and poor students don’t. I think the factors listed, if done well, can help some of the middle students. But by far, I think it comes down to the overall quality of the student (maturity, work ethic, educational preparation prior to and in college, etc.).

Another respondent echoed the importance of the student and his/her motivation in speaking to a “student’s willingness to spend time out of class to really learn, and not just

rely on learning for the test.” This sentiment was supported by a Program Director who stated, “Practice, practice, practice. Students have to want to learn. If all they do is read it in a book and watch but never DO it they will never be able to make clinical decisions on their own.”

Multiple respondents discussed the importance of application in the clinical setting, decision-making, etc. One respondent spoke directly to this in the following excerpt,

Getting students to learn is different than getting them to make decisions. That seems to be the biggest trouble right now. If a student applies what they learn in class to the clinical setting EARLY, usually these are the best students on the exam. They have made decisions and can think on their feet, like on the BOC exam.

There was support of this sentiment in this quote, “Students must do more than learn the knowledge – they MUST be able to apply that knowledge to clinical situations using critical thinking.” Another respondent spoke to the characteristics of the clinical experience in stating, “Exposure to a wide variety of clinical experiences with hands on learning time is essential. Not just observing but actually doing things that they learn in the classroom.” However, one respondent felt that the experience is largely impacted by Approved Clinical Instructors and Clinical Instructors, as highlighted in this quote,

A huge key to the success on the BOC exam is going to be the experience the students are getting at their assigned clinical sites. The ACI/CI should be allowing the students to get the experience and as much hands on as they can given the level of learning they have received. This will help the students learn

and gain confidence in what they are doing which will in return help them perform better in the classroom also.

All of the areas respondents commented on are covered in some extent in the CAATE's standards for athletic training programs as recognized by this respondent,

It really is about quality, so a program can meet the CAATE standards and teach the competencies on paper, but still not have a high quality program that prepares students for the BOC. Programs need to continually re-evaluate the quality of their program, not just if they are meeting expectations on paper. I think the CAATE standards are helping move programs in this direction, but I am looking forward to how these changes impact BOC success rate in upcoming years.

Summary

Study subjects included a total of 143 subjects accessing the dual survey, with 27% Instructional Faculty ($n = 38$) and 73% Program Directors ($n = 105$). Survey construct areas had varying numbers of respondents, ranging from 72 for ATEP structure to 33 for BOC Scores. Baccalaureate athletic training programs admitted students from senior year of high school through to the spring of the second year of college, with the majority of programs admitting the spring of the first year ($n = 25$). Timing of Domain introduction demonstrates that Domains I-III were introduced primarily within the first two years of the program, Domain IV within the first three years, and Domains V-VI have a much more even distribution of introduction throughout the curricula represented. Data regarding BOC results indicated that the average first-time pass percent was 61.59, with average Domain scores ranging from 7.94 for Domain VI to 20.44 for Domain II. Pearson Product Correlation Analyses between first introduction (semester) for each

Domain with the first-time pass rate and the matching Domain score resulted in no significant correlations. Simultaneous multiple regression was also utilized with this data. No significant results were found, as was to be expected with the small sample size and no significant correlations demonstrated within the data.

The Perceptions construct area was analyzed with Chi Square Goodness of Fit which demonstrated significant differences at $p < .001$ for all items. The significance of items was further established with Kendall's W with agreement ranging from 10% on what ATEP components were considered implemented successfully in his/her own institution to 56.6% agreement on the ideal sequencing of Domain introduction. The mode of entry for introduction of Domain content was as follows: Prevention; Immediate Care; Clinical Evaluation and Diagnosis; Treatment, Rehabilitation, and Reconditioning; Organization and Administration; and Professional Responsibility. Frequency ratings on importance of ATEP components on first-time BOC success demonstrated a mode of "agree" on all items other than Learning Over Time and Ratio of Instructors to Students which warranted a "strongly agree" rating by respondents. The same items ranked regarding successful implementation in his/her institution's athletic training education program was "agree" for all items other than a mode of "strongly agree" for Learning Over Time. Items ranked as important to first-time success on the BOC exam demonstrated significant correlations between Qualifications of Instructors to first-time pass rate ($r = .418, p < .05$) and average score for Domain III ($r = .402, p < .05$). The same ATEP items ranked regarding successful implementation in the institution's ATEP demonstrated no correlation with overall success on the BOC, but items were correlated positively with three out of the six Domains. Although multiple ATEP components

correlated with average Domain scores, Sequencing of Courses demonstrated significant correlation with three of the six Domains (Domain I, IV, and VI). The final result within this construct area came from Multiple Step-wise Forward Regressions on items deemed significant. The most impactful result came from the model summary of Qualifications of Instructors and first-time pass percent on the BOC which demonstrated an R square value of .174 ($p < .05$) indicating that 17.4% of variation in first-time passing percent is explained by ranking of importance of Qualifications of Instructors. Additionally the coefficients demonstrated that for every 1-unit increase (i.e., from agree to strongly agree), first-time passing percent increased by 14.54% ($t = 2.298$, $p < .05$).

The qualitative information obtained on the Perceptions items included explanation of ordering of Domain entry with 350 ($N = 350$) coded items and major areas identified of application ($n = 54$, 15%), cognitive factors ($n = 62$, 18%), sequence ($n = 86$, 25%), and students ($n = 55$, 16%). Comments related to rankings of identified ATEP components being considered important to first-time success on the BOC examination consisted of 228 ($N = 228$) coded responses subdivided into neutral ($n = 84$, 37%), important ($n = 131$, 57%), and unimportant ($n = 13$, 6%). The neutral coded responses resulted in major themes of student ($n = 31$, 41%), faculty ($n = 19$, 23%) and success ($n = 17$, 20%). Student ($n = 31$, 24%) remained a major category in responses coded as important along with material ($n = 21$, 16%) and timing ($n = 14$, 11%). Factors coded as unimportant were exposure ($n = 1$), faculty ($n = 3$), and timing ($n = 8$).

Respondents were also asked to further explain the rankings of identified ATEP components being successfully implemented in his/her institution's ATEP of which 152 ($N = 152$) items were coded and divided into neutral comments ($n = 65$, 43%), important

factors ($n = 13$, 9%), unimportant factors ($n = 2$, 1%), ATEP strengths ($n = 41$, 27%) and ATEP weaknesses ($n = 31$, 20%). Unimportant factors commented on were Ratio of Instructor to Student and Percent of Instructor Workload Dedicated to Teaching. Factors considered important were application, ATS characteristics, clinical experience, cognitive factors, components of ATEP, environment, material, program characteristics, and time. Neutral coded responses covered a wide variety of topics with the majority of the coded responses involving references to instructors ($n = 10$, 15%), ATEP improvements ($n = 12$, 18%), or students within the program ($n = 18$, 28%). ATEP strengths saw themes of ATS characteristics ($n = 7$, 17%), ATEP components ($n = 8$, 20%), ATEP improvements ($n = 5$, 12%), and program characteristics ($n = 7$, 17%). The distribution of ATEP weaknesses were mainly focused on ATEP components ($n = 17$, 55%) with the next largest category directed toward institutional based weaknesses ($n = 5$, 16%). The last open-ended prompt asked respondents to comment on if there were any other factors that he/she felt were important in preparation for first-time success on the BOC exam. Half of the trends identified in the 152 ($N = 152$) items coded were directed towards the exam itself ($n = 24$, 18%), cognitive learning ($n = 23$, 17%), and application of knowledge/skills ($n = 21$, 15%). Further discussion of the results, limitations of the study, implications for practice, and direction of further research is provided in the following section.

Chapter 5: Conclusion, Recommendations, and Discussion

Restatement of the Problem

Multiple studies have investigated the relationship of athletic training student characteristics and the possible effect such characteristics may have on his/her performance on the Board of Certification (BOC) examination. The overall results of these studies demonstrate that academic measures are most influential (Draper, 1989; Harrelson et al., 1997; Middlemas et al., 2001), which is supported by studies in other healthcare professions (Balogun, 1988; Balogun et al., 1986; Dell & Halpin, 1984; Feldt & Donahue, 1989; Foti & DeYoung, 1991; Horns et al., 1991; Jenks et al., 1989; Lengacher & Keller, 1990; Roehrig, 1988; Yocom & Scherubel, 1985). However, there are no studies that have investigated the effect of the programmatic structure on a student's success. Although each program is unique, all ATEPs have one common goal – to prepare competent, entry-level athletic trainers equipped to impact both the profession and patient population in a positive manner. The profession as a whole has deemed the BOC examination to be the benchmark for measuring entry-level competence. Therefore, studying the relationship of programmatic structure to success on the BOC examination has the potential to strengthen not only our programs, but our students and the profession as a whole.

This study was designed to examine the progression of BOC Domain content within athletic training courses and the introduction of Domain content within the curriculum of the ATEP on first-time pass rate of the BOC exam for 2010 graduates. The researcher believes that the ideal Domain progression would be Immediate Care (Domain III), Prevention (Domain I), Clinical Evaluation and Diagnosis (Domain II), followed by

Treatment, Rehabilitation and Reconditioning (Domain IV), Organization and Administration (Domain V) and Professional Responsibility (Domain VI) without regard to order for the last three Domains. It is also hypothesized that earlier implementation of Domain content within course progression would result in higher first-time success rate of the overall BOC examination. In addition to objective data gathered, the researcher would like to gauge the perceptions of athletic training education program directors and instructional faculty regarding importance of specific ATEP characteristics on preparing students for success on the BOC examination.

The following research questions guided this investigation:

1. Does the sequence of Domain content within an ATEP's curriculum influence first-time success on the BOC examination?
2. Does timing of introduction of Domain content within an ATEP's curriculum influence first-time success on the BOC examination?
3. What are the perceptions of important programmatic components in relation to first-time success on the BOC examination of ATEP directors and/or instructional faculty?
4. Are program directors' and/or instructional faculty's perceptions of importance of programmatic components in relation to first-time success on the BOC examination predictive of institutional first-time success on the BOC examination?

Invited study subjects included all CAATE-accredited ATEP directors and associated instructional faculty. Participants were e-mailed a study introduction and link to the survey instrument which was split into the appropriate program director or

instructional faculty veins upon selection of role within the ATEP. The researcher-developed surveys aimed to gather data outlining program specifics, BOC examination results, perceptions of ATEP characteristics, and institutional demographics. Pearson Product correlation analyses were utilized to determine strength and direction of relationships between school unit that a Domain is introduced and 1) percentage first-time success on the BOC and 2) average individual Domain score. Establishing correlational significance laid the groundwork for utilizing a multiple regression analysis to identify optimal timing of introduction of each Domain within the ATEP structure. Strength of perceptions among both program directors and instructional faculty were established utilizing Chi square analysis. Qualitative responses provided in the survey data were coded utilizing an interpretive method of data coding (Miles & Huberman, 1994). Finally, overall descriptive statistics were computed on all survey items.

During data analysis, it was perceived that the Chi Square Goodness of Fit did not fully represent the Perceptions construct area. Therefore, it was decided to apply Kendall's W to assess the percent agreement of respondents on items in this survey section. It was also determined that more information would be gained in correlating the ranking of ATEP components in the Perceptions construct area with the first-time pass percent on the BOC and the average Domain scores from the BOC. The statistical analyses added after the proposal included the following: Kendall's W on close-ended Perceptions items; Pearson Product Correlation Analysis between independent variables of (1) ranking of importance of ATEP components to first-time success on the BOC and (2) ranking of successful implementation of ATEP components within the institution's program with the dependent variables of (1) first-time pass percent on the BOC and (2)

average Domain scores; and Multiple Step-wise Forward Regression on significant items from the correlations of the two ATEP components items and the BOC scores.

Study subjects included a total of 143 subjects accessing the dual survey, with 27% Instructional Faculty ($n = 38$) and 73% Program Directors ($n = 105$). Survey construct areas had varying numbers of respondents, ranging from 72 for ATEP structure to 33 for BOC Scores. Baccalaureate athletic training programs admitted students from senior year of high school through to the spring of the second year of college, with the majority of programs admitting the spring of the first year ($n = 25$). Timing of Domain introduction demonstrates that Domains I-III were introduced primarily within the first two years of the program, Domain IV within the first three years, and Domains V-VI have a much more even distribution of introduction throughout the curricula represented. Data regarding BOC results indicated that the average first-time pass percent was 61.59, with average Domain scores ranging from 7.94 for Domain VI to 20.44 for Domain II. Pearson Product Correlation Analyses between first introduction (semester) for each Domain with the first-time pass rate and the matching Domain score resulted in no significant correlations. Simultaneous multiple regression was also utilized with this data. No significant results were found, as was to be expected with the small sample size and no significant correlations demonstrated within the data.

The Perceptions construct area was analyzed with Chi Square Goodness of Fit which demonstrated significant differences at $p < .001$ for all items. The significance of items was further established with Kendall's W with agreement ranging from 10% on what ATEP components were considered implemented successfully in his/her own institution to 56.6% agreement on the ideal sequencing of Domain introduction. The

mode of entry for introduction of Domain content was as follows: Prevention; Immediate Care; Clinical Evaluation and Diagnosis; Treatment, Rehabilitation, and Reconditioning; Organization and Administration; and Professional Responsibility. Frequency ratings on importance of ATEP components on first-time BOC success demonstrated a mode of “agree” on all items other than Learning Over Time and Ratio of Instructors to Students, which warranted a “strongly agree” rating by respondents. The same items ranked regarding successful implementation in an institution’s athletic training education program were “agree” for all items other than a mode of “strongly agree” for Learning Over Time. Items ranked as important to first-time success on the BOC exam demonstrated significant correlations between Qualifications of Instructors to first-time pass rate ($r = .418, p < .05$) and average score for Domain III ($r = .402, p < .05$). The same ATEP items ranked regarding successful implementation in the institution’s ATEP demonstrated no correlation with overall success on the BOC, but items were correlated positively with three out of the six Domains. Although multiple ATEP components correlated with average Domain scores, Sequencing of Courses demonstrated significant correlation with three of the six Domains (Domain I, IV, and VI). The final result within this construct area came from Multiple Step-wise Forward Regressions on items deemed significant. The most impactful result came from the model summary of Qualifications of Instructors and first-time pass percent on the BOC which demonstrated an R square value of .174 ($p < .05$) indicating that 17.4% of variation in first-time passing percent is explained by ranking of importance of Qualifications of Instructors. Additionally, the coefficients demonstrated that for every 1-unit increase (i.e., from “agree” to “strongly agree”), first-time passing percent increased by 14.54% ($t = 2.298, p < .05$).

The qualitative information obtained on the Perceptions items included explanation of ordering of Domain entry with 350 ($N = 350$) coded items and major areas identified of application ($n = 54$, 15%), cognitive factors ($n = 62$, 18%), sequence ($n = 86$, 25%) and students ($n = 55$, 16%). Comments related to rankings of identified ATEP components being considered important to first-time success on the BOC examination consisted of 228 ($N = 228$) coded responses subdivided into neutral ($n = 84$, 37%), important ($n = 131$, 57%), and unimportant ($n = 13$, 6%). The neutral coded responses resulted in major themes of student ($n = 31$, 41%), faculty ($n = 19$, 23%) and success ($n = 17$, 20%). Student ($n = 31$, 24%) remained a major category in responses coded as important along with material ($n = 21$, 16%) and timing ($n = 14$, 11%). Factors coded as unimportant were exposure ($n = 1$), faculty ($n = 3$), and timing ($n = 8$).

Respondents were also asked to further explain the rankings of identified ATEP components being successfully implemented in his/her institution's ATEP of which 152 ($N = 152$) items were coded and divided into neutral comments ($n = 65$, 43%), important factors ($n = 13$, 9%), unimportant factors ($n = 2$, 1%), ATEP strengths ($n = 41$, 27%) and ATEP weaknesses ($n = 31$, 20%). Unimportant factors commented on were Ratio of Instructor to Student and Percent of Instructor Workload Dedicated to Teaching. Factors considered important were application, ATS characteristics, clinical experience, cognitive factors, components of ATEP, environment, material, program characteristics, and time. Neutral coded responses covered a wide variety of topics with the majority of the coded responses involving references to instructors ($n = 10$, 15%), ATEP improvements ($n = 12$, 18%), or students within the program ($n = 18$, 28%). ATEP strengths saw themes of ATS characteristics ($n = 7$, 17%), ATEP components ($n = 8$, 20%), ATEP improvements

($n = 5$, 12%), and program characteristics ($n = 7$, 17%). The distribution of ATEP weaknesses were mainly focused on ATEP components ($n = 17$, 55%) with the next largest category directed toward institutional based weaknesses ($n = 5$, 16%). The last open-ended prompt asked respondents to comment on if there were any other factors that he/she felt were important in preparation for first-time success on the BOC exam. Half of the trends identified in the 152 ($N = 152$) items coded were directed towards the exam itself ($n = 24$, 18%), cognitive learning ($n = 23$, 17%), and application of knowledge/skills ($n = 21$, 15%).

Discussion of Results

Findings of this study will be subdivided into the following headings: Subject Pool and Demographic Statistics, ATEP Structure, BOC Results, and Perceptions Quantitative and Qualitative Data.

Subject Pool and Demographic Statistics. At the time of the study, 371 undergraduate and 25 entry-level master athletic training programs were on record with the CAATE. The largest sample of program directors for the survey was in the construct area of ATEP structure which had 53 ($n = 53$) which is 13% of the 396 programs listed on the CAATE website at the time of the study. A smaller sample size existed for the BOC Scores construct area. Access to this construct area was limited to program directors who met the qualifying criteria of being accredited and in good standing with the CAATE during 2009-2010 and receiving an Individual School Report on the 2010 Board of Certification Athletic Trainer's Certification Examination. This qualifying criteria explains the smaller sample size for this construct area. There is not a central database listing the total number of instructional faculty per accredited program;

therefore, a total number for the instructional faculty subject pool was unable to be established. The highest sample size for instructional faculty completing a construct area was 20 ($n = 20$) for demographic information. One probable reason for this number to be significantly less than that of the program director sample size is the fact that the study design relied on program directors to forward the e-mail including study introduction and survey link to the respective instructional faculty. This limitation to the study design resulted from the lack of a central instructional faculty database.

All of the NATA districts were represented in the sample. Regardless of small sample size, the distribution of Carnegie status and funding classification was well represented. Even though subjects representing institutions awarding an entry-level master degree had a small representation ($n = 5$), the total percent was comparable to the national percentile. The entry-level master subjects constituted 8% of the total sample, whereas entry-level master programs make up 6% of the overall number of accredited athletic training programs nationwide. Therefore, the distribution of subject representing baccalaureate programs versus entry-level master programs can be considered a representative sample of the whole.

ATEP Structure. Prior to entry into this construct area, subjects indicated what school unit was utilized (e.g., semester, trimester, or quarter). Due to the small representation of trimesters and quarters ($n = 1$ each) and the inability to compare between school unit, only respondents utilizing the semester system were retained. Results from ATEP Structure established the mode for admittance into a baccalaureate program as spring of the first year ($n = 25$), indicating a minimum of a 3-year curriculum whereas accrediting standards only require a 2-year curriculum (CAATE, 2008b).

However, programs ranged from a two-year ($n = 6$) to a 4-year curriculum ($n = 3$) within the subjects reporting data from baccalaureate-granting programs ($n = 37$). Since the length of entry-level master programs is not standardized, the length of programs could not be established with the data collected. However, information on introduction of Domain content was able to be utilized for all respondents regardless of degree awarded. The mode of first entry of Domains in courses with 50% or more content related to the Domain indicated that Domain I and Domain III are primarily introduced the first-year, Domain II introduced second-year spring, Domain IV introduced third-year fall, and Domains V-VI introduced fourth-year fall. When considering the two highest frequencies of introduction of Domain content by year, the first year includes Domains I and III, second year includes Domains II and IV, third year includes Domains IV-V, and fourth year includes Domains V-VI. In general, this reflects the ideal sequence (Table 20) of Domain introduction as pertaining to best preparing students for the BOC examination provided by respondents in the Perceptions construct area, which was Domain I, III, II, IV, V, and VI.

Table 20

Ideal Domain Sequence Versus Reported Domain Sequence

Ideal Sequence	Reported Sequence
Domain I – Prevention	Domain III – Immediate Care
Domain III – Immediate Care	Domain I – Prevention
Domain II – Clinical Evaluation and Diagnosis	Domain II – Clinical Evaluation and Diagnosis
Domain IV – Treatment, Rehabilitation and Reconditioning	Domain IV – Treatment, Rehabilitation and Reconditioning
Domain V – Organization and Administration	Domain VI – Professional Responsibility
Domain VI – Professional Responsibility	Domain V – Organization and Administration

Actual sequence of Domain introduction within programs as supplied by respondents was Domain III, I, II, IV, VI, and V, which switches the introduction of the first two and last two Domains as compared with mode of ideal sequence provided. The reported sequence follows the hypothesized sequence presented by the researcher for the order of the first three Domains since the researcher did not order the last three Domains (IV, V, and VI), believing that timing for these Domains was less important to success on the BOC exam.

BOC Results. The average first-time passing percent of the BOC examination as provided by qualifying program directors was 61.59, which is comparable to the national average for the same testing year (60.7%) (CASTLE Worldwide, 2010). Average Domain scores are also comparable to the national averages (CASTLE Worldwide, 2010). First-time passing percent of private-funded versus public-funded institutions was virtually equal ($n = 14$, mean = 62.54%; $n = 16$, mean = 61.78%, respectively). No national data is available to compare in this regard or in comparing degree programs. Results of this study showed a wide disparity in scores between baccalaureate degree-granting programs ($n = 28$, mean = 60.45%) and master degree-granting programs ($n = 2$, mean = 85.70%). Although the sample size of entry-level master programs is quite small (6% of the total n for this data set), it is the same percentage of the whole as compared to percentage of entry-level master programs nationally. It is difficult to determine if this disparity in scores is representative of the whole with such a small sample size, even though the percentages are representative. The results of the Pearson Product Correlation Analyses between first introduction (semester) for each Domain with first-time pass rate and the matching Domain score resulted in no significant correlations. In turn, the Simultaneous Multiple Regression returned no significant results. Therefore, the results

of this study indicate that timing and/or sequence of introduction of Domain content does not influence either first-time success on the BOC or individual Domain scores. This is supported in the literature through multiple studies in allied health education programs finding predictive links primarily through student academic achievement means (Balogun, 1988; Balogun et al., 1986; Dell & Halpin, 1984; Draper, 1989; Feldt & Donahue, 1989; Foti & DeYoung, 1991; Harrelson et al., 1997; Horns et al., 1991; Jenks et al., 1989; Lengacher & Keller, 1990; Middlemas et al., 2001; Roehrig, 1988; Yocom & Scherubel, 1985).

Perceptions Quantitative and Qualitative Data. Chi Square Goodness of Fit established that responses for each item in the close-ended perceptions area (ideal Domain sequence, ranking of ATEP components regarding importance for first-time success on the BOC, and ranking of ATEP components regarding successful implementation in his/her ATEP), both the whole question and individual order of Domains/ranking of ATEP components were statistically different, meaning that the rankings of a particular item were not random allotment, but the differences in ranking were statistically significant at $p < .001$. This was more fully supported by the results of the Kendall's W test. Agreement between respondents in regard to complete answers to each question varied but was still significant at $p < .001$. The least agreement between respondents (10%) was in regard to successful implementation of components within the institution's ATEP. This is to be expected as each program is unique and results should demonstrate the least amount of agreement between respondents. A slightly higher, but still minimal, agreement between respondents (26.2%) occurred for ranking of ATEP components deemed important to first-time success on the BOC exam. With this

disparity in agreement on programmatic components, it may be expected that the same disparity would occur in depicting ideal Domain sequence in regard to successfully preparing a student for taking the BOC exam. However, that was not the case. There was a 56.6% agreement between respondents regarding sequencing Domain content. Even though the educators represented held little agreement for ATEP components as being impactful on student success on the BOC, they had a much higher agreement on a Domain sequence that he/she believed would be impactful on student success on the BOC.

Even though there was a high agreement between respondents in regards to ideal Domain sequence, there are still some interesting trends. As stated previously, the sequence of the Domains that the respondents felt would be best in preparing athletic training students for the BOC exam was: Prevention ($n = 28$, 45.9%); Immediate Care ($n = 31$, 51.7%); Clinical Evaluation and Diagnosis ($n = 41$, 68.3%); Treatment, Rehabilitation and Reconditioning ($n = 43$, 71.7%); Organization and Administration ($n = 37$, 61.7%); and Professional Responsibility ($n = 36$, 59%). The third and fourth entries had the highest agreement between respondents with first entry having the lowest. Other Domains with percentages for first entry were Domain II ($n = 3$, 4.9%), Domain III ($n = 18$, 29.5%), and Domain VI ($n = 12$, 19.7%). Domain II and III found their final placement for mode in third and second entry, respectively. However, Domain VI's placement was in sixth entry. Domains I-III were represented well within the first three placements, and also received the highest frequency within the first three placements. The fact that Domain VI had nearly 20% representation in first placement but ended up in sixth placement with 59% representation demonstrates an interesting split with some

respondents viewing this content as foundational and others viewing it as capstone material. All Domains other than Organization and Administration (Domain V) had entries for five different placements. Other than one outlier, respondents believed Organization and Administration should be introduced fifth or sixth in the sequence. Therefore, in regard to agreement within a Domain, Domain V had the highest agreement in placement between respondents. Domains I-III had no placement for sixth entry whereas Domain IV and V had no placement for first entry. The overall trend demonstrated that respondents believed that Domains I-III contained more foundational material than Domains IV or V. With Domain V being concentrated in fifth or sixth entry (with one outlier placing it at third entry), this demonstrates a strong belief that Domain V contains more capstone material that builds upon the foundational material of the prior Domains. There was a split of categorizing Domain VI as foundational versus capstone material as discussed previously.

The qualitative responses for this item were coded into 350 ($N = 350$) items from 44 respondents ($N = 44$, instructional faculty = 14, program director = 30). The major areas included application ($n = 54$, 15%); cognitive factors ($n = 63$, 18%) such as comprehend, grasp, know, knowledge, learn, prepare, review and understand; sequence ($n = 86$, 25%); and students ($n = 55$, 16%). Multiple respondents addressed the complicated nature of ordering an ideal introduction of Domain content. One respondent covered multiple trends in the following response:

Part of the sequencing is related to clinical education. For example, students are likely to see immediate care more often than some other skills, and they may have more opportunity to do this as a student, so we place it earlier in our curriculum.

The second aspect is the amount of foundational knowledge required for a domain. Students need a solid background in anatomy and what injuries/conditions are before they are able to learn clinical evaluation and diagnosis. Lastly, regarding professional responsibility and organization and administration, we have found that students struggle with grasping those concepts early in the program, and have a much better appreciation for and interest in those areas when they get them as Juniors and Seniors, rather than Sophomores.

A primary reason given was application of skills in the clinical experience, which was supported by multiple respondents. This program director emphasized information from multiple sources in sequencing content areas:

Sequencing allows for the highest level of clinical practice during clinical experiences. Domain introduction correlates with the ACI responses to surveys regarding the most useful clinical skills allowing for the greatest clinical involvement in patient care. Consideration is also given to the introduction of knowledge and skills after appropriate foundational info is taught and to assure the student is sufficiently developed for type of decision making and learning needed to learn the content.

This viewpoint is closely related to the concept of scaffolding, referenced by several theorists such as Jerome Bruner. Some adjectives utilized to describe/define the general concept of scaffolding include temporary, adjustable, indispensable for higher-level work, connects multiple points, and systematic support, to name a few (Dempsey et al., 2001; Keefe & Walberg, 1992). Additional characteristics of educational scaffolding include supporting reflective learning (Dempsey et al., 2001), problem solving, higher

order thinking, and bridging from current ability to increasing levels of competence (Keefe & Walberg, 1992). The ultimate goal of scaffolding as stated by Jerome Bruner is to transform a spectator into a participant (Bransford et al., 1999). An important component to helping with this transition is integration of theory and practice as noted by the respondent. Students engaging in application of psychomotor skills need to have “sequenced access to activities...which moves from those where imperfect performance has negligible consequences through to activities that have high levels of criticality and where mistakes carry significant consequences” (Billett, 2002, p. 32). This opportunity to apply the skills through an active process helps to cement what the student has learned cognitively (Bransford et al., 1999). This thought was supported by a program director who recognized the need for practice of psychomotor skills and an inherent order that enables easier acquisition of skills in the following quote:

Students should be first introduced to the areas they need to practice the most and will need to be able to apply immediately. After students know what to do in an emergency, how to evaluate and treat injury and illness then they can move on to other skills that are more easily grasped.

The importance of practice is supported in educational research. Physical practice not only provides internal physiological cues that help increase smoothness and precision (Gagne, 1977) but has also demonstrated structural change in the brain, specifically with practice in a complex environment (Bransford et al., 1999). However, it is important to remember that individual motor skills are often parts of a larger procedure, of which a procedure is “an intellectual skill, often a rule determining sequence (a sequential rule), with which certain subordinate rules are also associated” (Gagne, 1977, p. 214). Practice

needs to focus on individual skills, promoting precision and timing, and also the overall procedure which is considered a cognitive activity. When the individual components demonstrate proficiency, the student can focus on the cognitive aspect of the procedure without getting bogged down by perfecting both cognitive and psychomotor aspects. Research shows that practicing the procedure without competence of the individual skills does not promote overall proficiency (Gagne, 1977). Continued practice helps with routinization of both thought processes and psychomotor activities which “frees practitioners’ attention for monitoring what are often rapidly changing situations and for taking a more meta-like perspective on their action ” to where “even when there is no emergency, experienced people typically prefer to do many things quickly and smoothly if they are confident of their own proficiency” (Eraut, 2004, p. 261).

This exposure and experience cited above comes with time as recognized by the following respondent who stated that the sequence was “based on student’s maturity levels,” and explained, “I feel this is a good outline of what they need to learn, plus what they will get exposure to as they go along in their clinical experiences.” The respondents also recognized that students grow throughout his/her careers and “as the students learn more each year they will be able to understand why you are doing the things outlined in the next domain.” Regardless of what level the student has attained, educational research emphasizes the importance of recognizing “incomplete understandings, the false beliefs, and naïve renditions” already present in a learner in order to “build on these ideas in ways that help each student achieve a more mature understanding” (Bransford et al., 1999, p. 10). Research has shown that using this information as a starting point to guide new instruction results in enhanced learning (Bransford et al., 1999). Instructors being able to

recognize what knowledge a student brings with them can also help the student start to recognize personalized knowledge in order to “build upon it, improve it, and make decisions in the face of uncertainty” (Bransford et al., 1999, p. 120).

Foundational information was also emphasized by respondents but differences in opinion occurred as to what should constitute the foundation. One program director stated,

I believe that prevention, immediate care, and professional responsibility should be introduced first as the foundation of AT. This allows the ATS to have a strong understanding of the profession prior to entering into Domains II and IV. In addition, prevention and immediate care support a successful clinical experience which helps the ATS get off to a good start.

A different respondent “chose to put professional responsibility first due to the students needs to understand why we do what we do and the reasoning behind why it matters to us and our profession,” whereas another program director put Professional Responsibility late in the sequence due to “maturity and grasp of field necessary for professional responsibility.” These conflicting views support the importance of guidance in learning, as emphasized by cognitive psychologist Robert Gagne (1997), which helps ensure that the students understand the purpose of the structure/sequence being utilized. He stated “as a minimum, guidance of thinking informs the learner of the goal of the activity, the general form of the solution; this amount of guidance appears to be required if learning is to occur at all” (Gagne, 1977, p. 163). This requires focus on both the learner and the environment, which does not happen by chance.

Another viewpoint from respondents was that certain Domains provide unifying

concepts such as “how administrative duties impact [the] ability to perform the other domains. Having the administrative theory could help students formulate a more organized approach to evaluation, diagnosis, immediate care, and treatment.” A different respondent cited transferability of knowledge in saying, “emergency and immediate care is very transferable across many injuries and provides a good basis of care and understanding treatment relationships.” Although some material is more readily transferable across disciplines/domains, there are educational techniques that can be employed to aid in this phenomenon. During instruction of content, providing examples, practice, and instruction within multiple contexts and demonstrating wide application of material promotes flexible transfer (Bransford et al., 1999; Gagne, 1977). Balancing specificity of applied principles, as well as broad generalizations also aids in successful transfer (Bransford et al., 1999). This will help in promoting a holistic approach as outlined by an instructional faculty who stated,

Students need to understand the profession of AT, as a framework. I don’t see the domains so much as a sequence as intertwined pieces. Each domain relates to the other and the knowledge should be taught to the students in an integrated manner.

In regard to ranking of importance of ATEP components on first-time BOC success, all items received some negative rankings (“disagree” or “strongly disagree”) except for Learning Over Time and Sequencing of Content within Courses. Learning Over Time received only 4.8% ($n = 3$) “neutral” rankings and 59.7% ($n = 37$) rankings of “strongly agree” resulting in a mode of “strongly agree”. Ratio of Instructors to Students also had a mode of “strongly agree” ($n = 33$, 53.2%) with only 7 rankings of either “disagree” ($n = 2$, 3.2%) or “neutral” ($n = 5$, 11.3%). Although Sequencing of Content

within Courses had no negative rankings, the mode was “agree” ($n = 37$, 61%). The mode of “agree” was consistent with the remainder of the ATEP components (Length of Clinical Program, Length of Didactic Program, Number of Hours in Major, Percent of Instructor Workload Dedicated to Teaching, Qualifications of Instructors, and Sequencing of Courses). Number of Hours in Major received the highest number of negative rankings (“strongly disagree” $n = 1$, 1.6%; “disagree” $n = 9$, 14.5%) and a large proportion of “neutral” ($n = 24$, 38.7%) which was barely outweighed by the rankings of “agree” ($n = 25$, 40%). Length of Clinical Program and Length of Didactic program also received a “strongly disagree” ranking ($n = 1$, each) and some rankings of “disagree” ($n = 4$, each). Although not receiving any votes for “strongly disagree,” Percent Workload Dedicated to Teaching had 11.3% of respondents ranking of “disagree” ($n = 7$) and 24.2% ranking of “neutral” ($n = 15$) which was the second highest percentage for “neutral” responses following Number of Hours in Major. Qualifications of Instructors and Sequencing of Courses both had minimal rankings of “disagree” ($n = 3$, each). Qualifications of Instructors had 84% of the responses being positive (“agree” or “strongly agree”) with Sequencing of Courses receiving 85% positive responses.

Comments related to rankings of identified ATEP components being considered important to first-time success on the BOC examination consisted of 228 ($N = 228$) coded responses from 29 subjects ($N = 29$, instructional faculty = 10, program director = 19). The coded responses were subdivided into neutral ($n = 84$, 37%), important ($n = 131$, 57%), and unimportant ($n = 13$, 6%). Major themes of neutral responses were the student ($n = 31$, 41%), faculty ($n = 19$, 23%), and success ($n = 17$, 20%). Student ($n = 31$, 24%) remained a major category in responses coded as important along with material ($n = 21$,

16%) and timing ($n = 14$, 11%). Compared to the neutral coded responses, the responses coded important were more evenly dispersed among areas. Factors coded as unimportant were exposure ($n = 2$), faculty ($n = 3$), and timing ($n = 8$). Themes within the student construct area included cognitive learning, experience of the student, preparation of the student, and student characteristics. The faculty construct area had similar themes of experience, preparation, and characteristics of faculty as well as workload, approved clinical instructors, and experience being more important than degrees earned.

Some respondents were very supportive of the ATEP components listed being important to success on the BOC as seen in statements such as the following:

All of these are very important to the preparation of students for the exam. I think one or two of these areas can be slightly weaker in a program (i.e., maybe a high ratio of students to instructors) and students can still be successful, but breakdown of too many of these areas will lead to problems.

Other respondents were less supportive of programmatic components and instead put the onus on the students:

Well I really don't know how much of the above [listed program components] dictates BOC success. Ultimately it is up to the commitment of the student to take advantage of the experiences and instruction his/her institution is offering and take initiative to prepare for the exam.

This sentiment was echoed in the following comment, "Success on the BOC does not necessarily depend on any of these things – success is more reliant on the student and what s/he is able to comprehend and think critically." This mindset is not discredited in the literature to date, as the primary factors linked to success on the BOC have occurred

within student rather than programmatic characteristics (Draper, 1989; Harrelson et al., 1997; Middlemas et al., 2001) other than route of eligibility for the exam (Starkey & Henderson, 1995) which is no longer a factor.

Whereas the respondents above seemed to put responsibility on the student rather than the program, some respondents felt that the program played a major role, but not in quantifiable ways. One instructional faculty stated, “I don’t think much of it [success on the BOC] has to do with anything quantifiable so much as it has to do with the quality of hours, program, and instructor/courses.” This concept of ‘quality’ was well supported by program directors as well. One program director commented, “I don’t feel that the length of time of the program really matters as long as there are enough experiences to provide a beneficial learning environment. I think the quality and time devoted to students is what is most important.” Linking length and time of programmatic components with quality was supported by this respondent,

I believe individualized attention for the ATS didactically and clinically is very important to first time success. I support quality of time over quantity of time but agree that a minimum length for the clinical and didactic program completion is important to success.

Another program director expanded on this thought by saying, “More QUALITY time spent in the clinical and didactic settings will allow students to better develop that knowledge as a tool rather than as an answer to an exam question.” The following respondent based his/her response on the ultimate preparation of students:

Since the BOC is designed to test a student’s readiness to practice as an ATC, I feel that learning over time and strong clinical experiences are the two most

important factors in preparing students for being successful in their careers. They need to learn the skills, but also have the chance to practice them in the field.

As this respondent alluded, the goal of athletic training education programs is to prepare competent, entry-level athletic trainers. The curriculum outline provided by the NATA's Athletic Training Educational Competencies are based on the current BOC Role Delineation Study (CAATE, 2008a; CAATE, 2008b) which is created by "experts" in athletic training content and validated by the common body of athletic trainers (including all levels of expertise from novice to accomplished) (NATABOC, 2004c). The curriculum content within athletic training relies on input from experts in order to help provide the foundation for expertise; therefore, it may be helpful to briefly delve into the characteristics of an expert. Experts have not only attained a "rich body of knowledge about subject matter" (Bransford et al., 1999, p. 9) but have connected and structured the knowledge around core principles which helps condition the information into an applicable format aiding not only comprehension but promoting transfer of knowledge to novel situations/problems/contexts (Bransford et al., 1999). According to Miller, an expert's ability to recall vast amounts of information seemingly instantaneously relies on the ability to "chunk" information into meaningful patterns (as cited in Bransford et al., 1999, pp. 20-21). Once these internal patterns are established, it is only a matter of time before meaningful patterns are recognized in a variety of situations (increasing transfer) (Bransford et al., 1999) which contributes to an expert's "ability to use their knowledge...[that] has been implicitly organized as a result of considerable experience for rapid, efficient and effective use" (Eraut, 2004, p. 254). Relevant points for curriculum design include centering curriculum around the "core concepts" of a domain,

providing bridges for meaningful organization of material within and across domains, and creating internal structure of information which is more important than a surface treatment of a vast amount of material (Bransford et al., 1999). This research also suggests that providing students with experiences to observe, participate, learn, and practice both cognitive and psychomotor skills in a way that promotes recognition of meaningful patterns is vital to a successful program (Bransford et al., 1999). An approach to curriculum, designed to meet these suggestions, must show integration of theory and practice, cognitive knowledge and psychomotor skills, with a “both/and” mindset essential for positive change (Clapton et al., 2006). While keeping this research in mind, educators may be able to more formally structure and quantify the allusive concept of ‘quality’ that these respondents have emphasized.

Respondents were split on the importance of Qualifications of Instructors. One respondent stated, “Experience of instructors, especially approved clinical instructors is the heart beat of the program.” Whereas another respondent did not feel that years of experience were important and stated, “Instructor qualifications are NOT better with higher degrees or years of experience.” This sentiment was supported by the following comment: “The amount of degrees an instructor has does not equate to a good instructor. That is an individual quality that many clinical instructors without terminal degrees are excellent at.” Quality, time, and Qualifications of Instructors were contrasted by this instructional faculty, “I feel that it is important to learn over time so that you can retain the knowledge. I also feel that it matters more the quality of time you put in, more so than the qualifications of the instructors.” More comments regarding instructional faculty included, “I feel that those who are instructors must also be well qualified and more

importantly devoted to the education of students. Educating the students cannot be in ones spare time it has to be a priority.” A related comment was in support of the importance of workload percentage dedicated to teaching: “The workload percentage is very important, as the ability an instructor has to the class allows for better class prep and better student knowledge and understanding.” Another respondent felt that ratio of instructor to student aided in student comprehension and concluded, “Students instructed in smaller groups by quality instructors seem to have better comprehension of material as the instructors are able to present the material in different ways as well as take more time with individuals.” Educational research emphasizes the importance of an instructor to merge both content area expertise with pedagogical knowledge and be able to gauge a student’s progress, recognize ‘cognitive barriers’ to learning, and create a learning environment/opportunity conducive to student success (Bransford et al., 1999). Therefore the role of the instructor is highly supported by educational research and should not be discredited by athletic training educators.

Learning Over Time and clinical experiences were paired by some respondents while others paired Learning Over Time with sequencing of content/courses, like from this program director,

I believe learning over time, sequencing of both the content and courses are very important for success in taking the BOC. The content of courses as well as classes themselves should be structured in a way where the information learned is logical and builds. Students may not understand the ‘why’ if they first do not have foundational information. I also think that a student needs to see or be exposed to information multiple times and in a variety of ways.

Another program director had similar thoughts,

Learning material over time assists with reducing the ‘memorization’ factor that many students use to study for exams. Because most of our courses are based utilizing a hands-on approach where content is first introduced then practiced, it has proven to be more successful. We also build on each concept from semester to semester and thread topics throughout the entire content.

However, some respondents rated quality and instructors over the importance of sequencing. One program director said, “Course sequencing is different in institutions but all may have the same results on BOC not because of when it is taught but rather the quality of what is taught.” This respondent was correct in stating that sequencing is not a magical key to unlock success for a student. In fact, research shows that for any type of curriculum an ideal sequence for all students does not exist (Bruner, 1966; Cooper et al., 2004; Gagne, 1977). In effect, the “ideal” sequence includes “many tracks leading to the same general goal” (Bruner, 1966, p. 71) with “continual adaptation and exploration” of learning strategies (Cooper et al., 2004, p. 187) while recognizing “that a degree of uncertainty and unpredictability is a necessary and healthy part of any functioning complex system” (Cooper et al., 2004, p. 186). However, this does not discredit the fact that within education it is important to start with simpler steps and work toward more complex entities (Billett, 2002; Gagne, 1977; Keefe & Walberg, 1992) which cannot be accomplished without including the concept of sequencing.

When the same ATEP components were ranked regarding successful implementation in the institution’s ATEP, Learning Over Time continued with a mode of “strongly agree”. All other components resulted in a mode of “agree.” Additionally all

items had at least one negative ranking (“disagree” or “strongly disagree”). Learning Over Time only had 4.8% ($n = 3$) “neutral” rankings in addition to the 1 ($n = 1$) ranking of “disagree” resulting in the vast majority of respondents giving it a positive ranking (“agree” or “strongly agree”). Length of Didactic Program had the same number of “neutral” and “disagree” rankings as Learning Over Time with the difference in mode moving from “strongly agree” to “agree” with 50% ($n = 31$) of respondents. Length of Clinical Program had 4.8% ($n = 3$) “disagree” rankings with 3.2% ($n = 2$) “neutral” rankings. The “agree” mode had 46.8% ($n = 29$) of respondents with only one more respondent than “strongly agree” ($n = 28$). The highest disagreement rankings came from Percent Workload Dedicated to Teaching with $n = 3$ “strongly disagree” (3.2%) and $n = 7$ “disagree” (11%). Ratio of Instructors to Students had 9.7% ($n = 6$) “disagree” in regard to this component being successfully implemented and a mode of “agree” ($n = 27$, 43.5%) only being one respondent less than “strongly agree” ($n = 26$, 41.9%). Number of Hours in Major had the highest amount of “neutral” responses ($n = 11$, 18%) out of any of the component rankings in this item. Qualifications of Instructors and Sequencing of Content within Courses had one ranking of “disagree” each with 13% ($n = 8$) and 9.7% ($n = 6$) rankings of “neutral,” respectively. Sequencing of Courses had $n = 7$ responses of either “neutral” or “disagree” with a mode of “agree” ($n = 30$, 48.4%).

Respondents were also asked to further explain the rankings of identified ATEP components being successfully implemented in his/her institution’s ATEP of which 152 ($N = 152$) items were coded and divided into neutral comments ($n = 65$, 43%), important factors ($n = 13$, 9%), unimportant factors ($n = 2$, 1%), ATEP strengths ($n = 41$, 27%) and ATEP weaknesses ($n = 31$, 20%). Unimportant factors commented on were Ratio of

Instructor to Student and Percent of Instructor Workload Dedicated to Teaching. Factors considered important were application, ATS characteristics, clinical experience, cognitive factors, components of ATEP, environment, material, program characteristics, and time. Neutral coded responses covered a wide variety of topics with the majority of the coded responses involving references to instructors ($n = 10$, 15%), ATEP improvements ($n = 12$, 18%), or students within the program ($n = 18$, 28%). ATEP strengths saw themes of ATS characteristics ($n = 7$, 17%), ATEP components ($n = 8$, 20%), ATEP improvements ($n = 5$, 12%), and program characteristics ($n = 7$, 17%). The distribution of ATEP weaknesses were mainly focused on ATEP components ($n = 17$, 55%) with the next largest category directed toward institutional-based weaknesses ($n = 5$, 16%).

Comments regarding ATEP improvements were widespread and branched into what respondents considered strengths of their institution's ATEP. An instructional faculty stated, "We've spent a lot of time reassessing and rearranging courses for the benefit of our students. Hopefully, the current arrangement will be successful." A program director who felt the current structure was beneficial still stated:

What is being done currently has proven to be successful, but we are in the process of revamping our curriculum to best serve the students' needs. We have changed the sequencing of some of the courses to allow for more 'practice' time.

Another respondent echoed the sentiment of continuing to improve programmatic structure in this statement: "We've played around with our content sequencing and are considering a revamp of our curriculum in order to make things more cohesive, so I believe those are working right now, but we are trying to make it even better." These comments echo the "continual adaptation and exploration" (Cooper et al., 2004, p. 187)

needed for successful curricula.

Positive programmatic characteristics included intense, strong, unity, and size. An instructional faculty commented that “We have low student to instructor ratios, letting the students feel a sense of family and unity in the program. Since they are familiar with the instructors, they feel comfortable asking questions.” A different respondent credited the size of the program as a programmatic strength in saying, “We are able to evaluate where our weak spots in the BOC exam are and adapt quickly with a smaller size program.” ATEP improvement and clinical experience were also construct areas within strengths of ATEPs. A program director spoke to both areas in this quote: “We are also working to restructure the practical experience to provide optimal learning environments – looking at the novice to mastery level students and where they are placed in their clinical rotations.” This pairing of cognitive tasks with psychomotor skills as well as considering the student’s level of expertise are all well-supported strategies within educational research (Bransford et al., 1999).

Some ATEP weaknesses included program characteristics commenting on length of program being too long, too many students, and turnover of faculty and staff. In referencing negative student characteristics, one respondent stated that, “Our students are burnt out and uninvolved as seniors” and cited the length of the program as the cause of the deficit. In speaking to instructor workload and qualifications, one program director stated that “It is hard to find quality ACI’s who are experienced and truly desire to teach...it always seems their athletic commitment overwhelms them...or they have a difficult time giving up control of their athletes, especially when they have a demanding coach.” An instructional faculty echoed this sentiment in a slightly different yet

revealing manner: “Trying to instruct students as well as provide good care/service in the athletic training room and allow students to learn in the clinical setting as well as be efficient in treatment becomes a huge struggle at times.”

Overall trends in ranking of ATEP components both in regard to important to first-time success on the BOC exam and in successful implementation warrant comparison. In regard to importance of ATEP components for first-time success on the BOC, the top ranked items are Learning Over Time, Sequencing of Content within Courses, and Ratio of Instructors to Students with the lowest ranked items being Number of Hours in Major, Percent of Instructor Workload Dedicated to Teaching, and Length of Didactic Program when considering percentage of positive responses (ranking of “agree” or “strongly agree”). The top ranked items for components implemented successfully in the respondent’s ATEP were Learning Over Time, Length of Clinical Program, and Length of Didactic Program in regard to percentage of positive responses. The lowest ranked items were Number of Hours in Major, Percent of Instructor Workload Dedicated to Teaching, and Ratio of Instructors to Students. Some of the items from this construct area may be influenced by the institutional structure (e.g., Number of Hours in Major, Percent of Instructor Workload Dedicated to Teaching, and Ratio of Instructors to Students) whereas others may be more fully controlled by the ATEP directors/instructional faculty (e.g., Learning Over Time, Sequencing of Content within Courses, and Sequencing of Courses). This institutional restriction was commented on by multiple respondents and coded as weaknesses in ATEP components implemented successfully in the respondent’s institution. One program director felt like the program had too few hours and believed the institution was largely responsible as reflected in this

quote: “I think we need more ATEP courses but our university has a high percentage of degree hours delegated to general education courses.” A different respondent echoed this sentiment and further reflected upon the impact the institution has on the program in the following statement: “Sequencing courses outside of our department is difficult and we have little control in that regard. Also, our institution does not support/reward/recognize clinical time for instructional faculty and hours within the major are tightly bound with few electives.”

Learning Over Time was both considered important to first-time success on the BOC and as being implemented well in ATEPs, which is an encouraging finding. This suggests that educators are successfully implementing this component that respondents feel is important and that the CAATE emphasizes. Even though respondents felt that the Length of Didactic Program was one of the least important factors regarding first-time success on the BOC, many educators supported the Length of the Didactic Program in his/her institution. Interestingly, Ratio of Instructors to Students was among the highest ranked items for important to first-time success on the BOC but one of the lowest as being implemented successfully in the respondent’s ATEP. This indicates a disparity between what is considered important and what is being applied within the structure of the program. This may be due to institutional restrictions; however, if educators feel that it is important, it warrants further investigation as to the reason for the lack of successful implementation. Length of Clinical Program was considered implemented successfully but was not considered important to first-time success on the BOC. Sequencing of Content within Courses was considered important to first-time success on the BOC but was not considered implemented well. Although this item may be difficult and/or time-

consuming to implement well, it is typically within the control of the ATEP director/instructional faculty. Additionally the concept of Learning Over Time has been linked to sequencing (Carr et al., 2007). Therefore, if Learning Over Time is considered important to first-time success on the BOC and considered implemented well in the ATEP, it is disheartening to discover that sequencing of material does not follow the same trend since the two are inherently linked.

The last open-ended prompt asked respondents to comment on whether or not there were any other factors important in preparation for first-time success on the BOC exam. A total of 31 respondents (instructional faculty = 9, program director = 22) utilized this prompt providing a variety of responses (152 total items coded). Half of the trends were directed towards the exam itself, cognitive learning, and application of knowledge/skills. Respondents also identified that characteristics of the individual student are impactful on first-time success on the examination (13%), with less popular factors being preparation (9%), quality of program (7%), clinical experience (4%), ATEP governing documents (4%), time (4%), and test-taking/study strategies (2%). The cognitive skills ($n = 23$) that were mentioned covered a variety of facets including knowledge ($n = 5$, 22%), learning ($n = 8$, 35%), review ($n = 7$, 30%), and understanding ($n = 3$, 13%).

Multiple respondents commented on exposing the students to components of the structure of the BOC exam itself. One respondent stated it was important for students to “[Have] more time to prepare for the exam by having access to mock exams. Learning the exam format for some students is as necessary as the material of the exam.” This was supported by a Program Director relaying the following: “Our first time passing rate for

2010 was 50%, 2011 was 100%. I believe a major difference was utilization of BOC practice exams that allowed students to become familiar and comfortable with the test and question format.” Other exam components were highlighted as well, such as timing of taking the exam. One Program Director stated, “We believe that it is too difficult for students to try to meet all requirements for graduation, seek out graduate assistantships, take GREs AND study for the BOC let alone be excellent/effective in all of those responsibilities.”

Many comments combined the perceived effect of exam preparation on the students’ demeanor such as this comment, “Understanding the test and strategies to approach the questions...being comfortable and confident in the material across the domains.” A Program Director saw the importance of linking the BOC preparation to individual student characteristics in this quote,

Understanding the design of the exam along with concentrated review of competencies based on individual needs makes a difference. I have our ATS rate their knowledge and understanding of each competency and compare their assessment to that of the instructional faculty. Then we gear the study strategy to match.

Another Program Director discussed the limitations within each student in saying,

Good students pass the exam and poor students don’t. I think the factors listed, if done well, can help some of the middle students. But by far, I think it comes down to the overall quality of the student (maturity, work ethic, educational preparation prior to and in college, etc.).

Yet another respondent echoed the importance of the student and his/her motivation in

speaking to a “student’s willingness to spend time out of class to really learn, and not just rely on learning for the test.” This sentiment was supported by a Program Director who stated, “Practice, practice, practice. Students have to want to learn. If all they do is read it in a book and watch but never DO it they will never be able to make clinical decisions on their own.”

Multiple respondents discussed the importance of application in the clinical setting, decision-making, etc. One respondent spoke directly to this in the following excerpt,

Getting students to learn is different than getting them to make decisions. That seems to be the biggest trouble right now. If a student applies what they learn in class to the clinical setting EARLY, usually these are the best students on the exam. They have made decisions and can think on their feet, like on the BOC exam.

There was support of this sentiment in this quote, “Students must do more than learn the knowledge – they MUST be able to apply that knowledge to clinical situations using critical thinking.” Another respondent spoke to the characteristics of the clinical experience in stating, “Exposure to a wide variety of clinical experiences with hands on learning time is essential. Not just observing but actually doing things that they learn in the classroom.” However, one respondent felt that the experience is largely impacted by the Approved Clinical Instructors and Clinical Instructors as highlighted in this quote,

A huge key to the success on the BOC exam is going to be the experience the students are getting at their assigned clinical sites. The ACI/CI should be allowing the students to get the experience and as much hands on as they can

given the level of learning they have received. This will help the students learn and gain confidence in what they are doing which will in return help them perform better in the classroom also.

All of the areas respondents commented on are covered in some extent in the CAATE's standards for athletic training programs as recognized by this respondent,

It really is about quality, so a program can meet the CAATE standards and teach the competencies on paper, but still not have a high quality program that prepares students for the BOC. Programs need to continually re-evaluate the quality of their program, not just if they are meeting expectations on paper. I think the CAATE standards are helping move programs in this direction, but I am looking forward to how these changes impact BOC success rate in upcoming years.

When ranking of ATEP components in regard to importance to first-time success on the BOC were correlated with first-time pass percent and average Domain scores, one item demonstrated multiple significant correlations: Qualifications of Instructors. There was a positive significant correlation with overall first-time pass percent ($r = 0.418$, $p = .030$) and average Domain III score ($r = 0.402$, $p = .031$). This item had an overall mode of "agree" and even some rankings of "disagree" ($n = 3$). It was not among the highest agreement or the lowest, not warranting strong positive or negative agreement. However, with results of the Multiple Step-wise Forward Regression, it not only was significant to first-time pass percent, but explained 17.4% of the variation ($r^2 = .174$, $p < .05$) and every 1-unit increase of ranking indicated a 14.54% increase in first-time pass percent ($t = 2.298$, $p < .05$). Although the respondents did not categorize this ATEP component as highly important, it is the first programmatic component to demonstrate influence on the

success rate on the BOC, first-time or otherwise, in the literature at this time. The qualifications of instructors were not specified; however, the overall importance of a teacher's expertise is supported by educational literature (Bransford et al., 1999). Being an expert in a field, athletic training or otherwise, is not enough. An instructor must merge content area expertise with pedagogical knowledge and "understand in a pedagogically reflective way...not only [knowing their] own way around a discipline, but must know the 'conceptual barriers' likely to hinder others" (McDonald & Naso as quoted in Bransford et al., 1999, p. 144). The Multiple Stepwise Forward Regression for Qualifications of Instructors with average Domain III (Immediate Care) score resulted in a R square value of .162 ($p < .05$) indicating that 16.2% of variation in Domain III score was explained by this factor. A minimal increase in score was demonstrated with every 1-unit increase, .224% ($t = 2.309$, $p < .05$). Throughout the results of the study, Qualifications of Instructors was the only item to be linked with either first-time pass percent or average Domain III score. Since this ATEP component was not emphasized by the respondents and yet demonstrated a significant impact, it warrants a heavier consideration by athletic training educators than indicated by the respondents. It has the possibility of having a positive and/or negative impact on student success on the BOC and program success through the influence on first-time pass rate which is now linked to accreditation status through the CAATE (CAATE, 2011).

When these same ATEP components as ranked according to successful implementation in the institution's ATEP were correlated with BOC data, no component demonstrated a significant correlation with first-time pass percent, but multiple components demonstrated significant correlations with a variety of average Domain

scores. Ratio of Instructors to Students was considered one of the top items in important to BOC success but was one of the lowest items in regard to being implemented successfully. When it came to correlational significance, the ranking of Ratio of Instructors to Students held significant correlation with Domain IV average score ($r = -.410$, $p = .027$). Domain IV also had a positive significant correlation with ranking of Sequencing of Courses ($r = .439$, $p = .017$) which not among the highest ranked items for important to BOC success or successful ATEP implementation. Even though respondents did not feel Sequencing of Courses to be important, the quantitative data helped establish its importance, as it was the only factor that demonstrated significance with three out of the six Domain scores. This component also was linked to Domain I ($r = .405$, $p = .029$) and Domain VI ($r = .527$, $p = .003$) scores. Domain VI was also linked to Sequencing of Content within Courses ($r = .427$, $p = .021$) which was ranked highly as one of the components important to first-time success on the BOC exam.

This data gave further information when results from the Multiple Step-wise Forward Regression were considered. The average score for Domain I (Prevention) was linked with ranking of successful implementation of Sequencing of Courses. The analysis demonstrated an R square value of .164 ($p < .05$) indicating that 16.4% of variation of Domain I score was explained by this factor. Additionally for every 1-unit increase in ranking, the Domain score increased by 6.72% ($t = 2.301$, $p < .05$). Domain IV (Treatment, Rehabilitation, and Reconditioning) was predicted by two items: Ratio of Instructors to Students and Sequencing of Courses. The R square value for this regression was .353 ($p < .01$). Although 35.3% of variation in Domain IV was explained by these predictors, when Sequencing of Courses remained the same, every 1-unit

increase in Ratio of Instructors to Student resulted in a 1.32% decrease in Domain IV score due to a negative rather than positive correlation. When Ratio of Instructors to Students remained the same, every 1-unit increase in Sequencing of Courses resulted in a 1.18% increase in Domain IV score. The final multiple regression was applied to predictors for Domain VI (Professional Responsibility) score which were Sequencing of Content within Courses and Sequencing of Courses. The R square value was .280 ($p < .05$) demonstrating that 28% of the variation of Domain VI score was explained by ranking of these two factors. If ranking of Sequencing of Courses remained the same, for every 1-unit increase in Sequencing of Content within Courses, Domain VI score decreased by .124%. If ranking of Sequencing of Content within Courses remained the same, for every 1-unit increase in ranking of Sequencing of Courses, the Domain VI score increased by .66%. Although the coefficients did not always demonstrate a large increase/decrease in score with a 1-unit change in ranking (ranging from 1.32% decrease to a 6.72% increase) for items ranked in regard to successful implementation within the respondent's ATEP, there was anywhere from a 16.4-35.3% of variation of Domain score being explained by a programmatic component. These numbers have room for improvement, but are significant since no programmatic factor has been linked with average Domain score prior to this study.

Even though Learning Over Time received a mode of “strongly agree” on both ranking areas, it did not demonstrate predictive power on any aspect of the BOC exam. As was stated earlier, Learning Over Time is inherently linked with sequencing. Even though there were two items related to sequencing that were ranked twice each (resulting in four instances of sequencing being ranked), there was only one time where one of

these items was considered as one of the top important components: Sequencing of Content within Courses in regard to important to first-time success on the BOC. However, from a predictive perspective, sequencing was much more important than Learning Over Time as it demonstrated positive correlational significance with average Domain scores at a $p < .05$ level (Domain I, IV, and VI) and a $p < .01$ level (Domain VI). It is possible that there is a disconnect between the role that sequencing plays in the entire Learning Over Time concept or that the other factors related to Learning Over Time (synthesis, integration, reflection and critical thinking) (Carr et al., 2007) skewed the effect of Learning Over Time or were emphasized by the respondents rather than the sequencing component.

Limitations

One limitation of this study was the sample size. At the time of the study, 371 undergraduate athletic training programs were on record with the CAATE and 25 entry-level master programs. The largest sample of program directors for the survey was in the construct area of ATEP structure which had 53 ($n = 53$), which is 13% of the 396 programs listed on the CAATE website at the time of the study. There is not a central database listing the total number of instructional faculty per accredited program; therefore, a total number for the instructional faculty subject pool was unable to be established. The highest sample size for instructional faculty completing a construct area was 20 ($n = 20$) for demographic information. One probable reason for this number to be significantly less than that of the program director sample size is the fact that the study design relied on program directors to forward the e-mail including study introduction and survey link to the respective instructional faculty. This limitation to the study design

resulted from the lack of a central instructional faculty database. It is possible that lengthening the survey collection window or opening the survey at a different time of year may have helped with increasing survey respondents. From a quantitative perspective, the small sample size may limit the applicability of the findings.

The researcher's lack of familiarity of the structure of entry-level master programs created a limitation in the survey items included for programmatic structure. Due to this limitation, the length of master degree programs was unable to be established with the data that was collected. Foresight into this area could have prevented this limitation from occurring and allowed master degree programs to be compared in regard to length of program.

The limitation of the study as not being truly mixed methods eliminated the possibility of follow-up with specific respondents to expand upon responses or provide further information in regard to interpretations of the questions presented. Structuring this study as mixed method would have given the researcher the ability to further expand on some of the findings and thereby strengthen the results and provide more data to guide further research in this area.

Implications for Practice

The perceptions ranking of ATEP components could be formatted into a programmatic evaluation and given to the program director and instructional faculty within a program to identify strengths, weaknesses, and areas for improvement. Findings of this study suggest that specific attention should be paid in regard to ranking of Qualifications of Instructors, Ratio of Instructors to Students, Sequencing of Content within Courses, and Sequencing of Courses, since these areas have demonstrated

predictive power for first-time success on the BOC and/or average Domain score(s). It is important to recognize that some of the items may be influenced by the institutional structure (e.g., Number of Hours in Major, Percent Workload Dedicated to Teaching, and Ratio of Instructors to Students) whereas others may be more fully controlled by the ATEP directors/instructional faculty (e.g., Learning Over Time, Sequencing of Content within Courses, and Sequencing of Courses). Applying the perceptions ranking of ATEP components in the two formats (important to success on the BOC and implemented well in the ATEP) may demonstrate disconnect between items ranked as important and those being implemented well. This may occur due to institutional restrictions; however, if educators feel that it is important, it warrants further investigation as to the reason for the lack of successful implementation. Other items may be within the control of the ATEP director/instructional faculty, and although the components may require a considerable amount of time and effort to implement well, the success of our students and the overall future of our profession should be considered worth the effort.

Results from this study indicate that respondents consider Domains I-III to contain foundational material and Domain V to contain capstone material. Domain IV tended to fall in the middle, not quite foundational, yet not fully capstone. However, respondents were divided on whether Domain VI should be introduced first in the sequence or last, demonstrating a split of opinion whether this material should be considered foundational or capstone. Perceiving this content as appropriate for first-year students or as too advanced for first-year students and more appropriate for graduating students has the potential to make a great impact on the curricula, how the instructors treat the material, and, in turn, how the students receive the material. Therefore, it is

important for educators creating and maintaining curricula not only to recognize personal viewpoints but also to be aware of the view of the instructional faculty on Domain VI content.

In terms of sequencing Domain content introduction, one respondent stated, “Sequencing allows for the highest level of clinical practice during clinical experiences. Domain introduction correlates with ACI responses to surveys regarding the most useful clinical skills allowing for the greatest clinical involvement in patient care.” Students engaging in application of psychomotor skills need to have “sequenced access to activities...which moves from those where imperfect performance has negligible consequences through to activities that have high levels of criticality and where mistakes carry significant consequences” (Billett, 2002, p. 32). This opportunity to apply the skills through an active process helps to cement what the student has learned cognitively (Bransford et al., 1999). However, it is important to remember that individual motor skills are often parts of a larger procedure, of which a procedure is “an intellectual skill, often a rule determining sequence (a sequential rule), with which certain subordinate rules are also associated” (Gagne, 1977, p. 214). Practice needs to focus on individual skills, promoting precision and timing, and also the overall procedure which is considered a cognitive activity. When the individual components demonstrate proficiency, the student can focus on the cognitive aspect of the procedure without getting bogged down by perfecting both cognitive and psychomotor aspects. Research shows that practicing the procedure without competence of the individual skills does not promote overall proficiency (Gagne, 1977). Sequencing in the context of pairing knowledge gained with exposure in clinical education is paramount. Educators in and out of the classroom need

to recognize that physical practice helps cement cognitive learning, but that physical practice of a procedure (e.g., a knee evaluation) without the component parts mastered (e.g., palpation, range of motion testing, individual special tests) will not result in improved performance of the procedure.

Within sequencing of the Domain content, it is also important to maintain a holistic approach as emphasized by this instructional faculty:

Students need to understand the profession of AT, as a framework. I don't see the domains so much as a sequence as intertwined pieces. Each domain relates to the other and the knowledge should be taught to the students in an integrated manner.

From an educational theory standpoint, one of the greatest ways to create a holistic approach is to promote transfer of material by providing examples, practice, and instruction within multiple contexts and demonstrating wide application of knowledge (Bransford et al., 1999; Gagne, 1977). Balancing specificity of applied principles, as well as broad generalizations also aids in successful transfer to novel situation and/or alternate contexts (Bransford et al., 1999), such as applying the physics principle of strain not only to biomechanics, but for identifying mechanisms of injury in evaluation, and type of physiological damage in order to create a treatment plan including modalities and rehabilitation.

When considering what ATEP components are important for preparing athletic training students for first-time success on the BOC examination, one respondent based his/her reasoning on the ultimate preparation of the students:

Since the BOC is designed to test a student's readiness to practice as an ATC, I feel that learning over time and strong clinical experiences are the two most

important factors in preparing students for being successful in their careers. They need to learn the skills, but also have the chance to practice them in the field.

As this respondent acknowledges, the goal of athletic training education programs is to prepare competent, entry-level athletic trainers. The curriculum outline provided by the NATA's Athletic Training Educational Competencies is based on the current BOC Role Delineation Study (CAATE, 2008a; CAATE, 2008b) which is created by "experts" in athletic training content and validated by the common body of athletic trainers (including all levels of expertise from novice to accomplished) (NATABOC, 2004c). According to Miller, experts' ability to recall vast amounts of information seemingly instantaneously relies on the ability to "chunk" information into meaningful patterns (as cited in Bransford et al., 1999, pp. 20-21). Once these internal patterns are established, it is only a matter of time before meaningful patterns are recognized in a variety of situations (increasing transfer) (Bransford et al., 1999) which contributes to an expert's "ability to use their knowledge...[that] has been implicitly organized as a result of considerable experience for rapid, efficient and effective use" (Eraut, 2004, p. 254). Relevant points for curriculum design include centering curriculum around the "core concepts" of a domain, providing bridges for meaningful organization of material within and across domains, and creating internal structure of information which is more important than a surface treatment of a vast amount of material (Bransford et al., 1999). This research also suggests that providing students with experiences to observe, participate, learn, and practice both cognitive and psychomotor skills in a way that promotes recognition of meaningful patterns is vital to a successful program (Bransford et al., 1999). An approach to curriculum, designed to meet these suggestions, must show integration of

theory and practice, cognitive knowledge and psychomotor skills, with a “both/and” mindset essential for positive change (Clapton et al., 2006). While keeping this research in mind, educators may be able to more formally structure and quantify the allusive concept of a ‘quality’ athletic training education program.

As discussed previously, ranking of importance of Qualifications of Instructors accounted for 17.4% of variation of first-time pass percent on the BOC examination and a 1-unit increase in ranking equated to a 14.54% increase in first-time pass percent. Although the respondents did not categorize this ATEP component as highly important, it is the first programmatic component to demonstrate influence on the success rate on the BOC, first-time or otherwise, in the literature at this time. The qualifications of instructors were not specified, however, the overall importance of a teacher’s expertise is supported by educational literature (Bransford et al., 1999). Being an expert in a field, athletic training or otherwise, is not enough. An instructor must merge content area expertise with pedagogical knowledge and “understand in a pedagogically reflective way...not only [knowing their] own way around a discipline, but [they] must know the ‘conceptual barriers’ likely to hinder others” (McDonald & Naso as quoted in Bransford et al., 1999, p. 144). Therefore, the role of the instructor is highly supported by educational research and should not be discredited by athletic training educators. It is also important to recognize the role strain that may be occurring within formal instructional faculty as well as in Approved Clinical Instructors. This was recognized by one program director who stated, “It is hard to find quality ACI’s who are experienced and truly desire to teach...it always seems their athletic commitment overwhelms them...or they have a difficult time giving up control of their athletes, especially when

they have a demanding coach.” An instructional faculty echoed this sentiment in a slightly different yet revealing manner: “Trying to instruct students as well as provide good care/service in the athletic training room and allow students to learn in the clinical setting as well as be efficient in treatment becomes a huge struggle at times.”

Implications for Future Research

With the increase in entry-level master degree programs in athletic training, it would be beneficial to complete an additional study with the aim of obtaining a larger sample size to determine if there is a disparity in BOC first-time pass rates between degree programs. Does focusing all of the students’ academic energies on athletic training related courses, obtaining more mature students, and other characteristics of an entry-level master program result in higher first-time passing percent on the BOC as compared to entry-level undergraduate programs? A larger sample size would also be beneficial to compare the perceptions of program directors versus instructional faculty in what is considered important in programmatic structure.

Expansion of the current study to include a true mixed-methods design to gain further insight to the relationship between qualitative strengths of an ATEP and quantitative strengths of an ATEP would also be beneficial. This may be more realistically applied to a case study focusing one program or a small cluster of programs. This type of study would also allow comparison between what ATEP components are considered important and what components are considered implemented well to see if there is a disconnect within a specific program. Whatever design structure is implemented, the findings of programmatic characteristics influencing BOC scores calls for further investigation to more fully determine the impact that ATEP structure has on

the success of students on the BOC examination. The disparity between ranking Learning Over Time as being highly important and implemented very well but a lack of correlation to BOC success also warrants further study. It would be beneficial to start with a qualitative study of athletic training educators to help establish the practical definition, application of Learning Over Time, and current assessment formats. Currently there is limited research on Learning Over Time specific to the athletic training community even though the concept is highly emphasized by the CAATE.

In regard to other factors important for preparation for first-time success on the BOC, a large portion of the responses were directed toward BOC exam exposure, preparation, mock exams, etc. A future study directed specifically toward the impact of BOC exam preparation materials, software, or review strategies on first-time success on the BOC may be beneficial.

Summary

From the results of this study, the first two research questions looking at sequence of Domain content and timing of Domain content influencing first-time success on the BOC, it was established that neither the sequence nor timing of Domain content had a measurable influence on first-time success on the BOC examination. In regard to the third research question related to gathering perceptions of important programmatic components in relation to first-time success on the BOC examination, a plethora of data was gathered and analyzed. Additionally the ranking of Qualifications of Instructors demonstrated predictive power for overall first-time pass percent on the BOC providing answer to the fourth research question. Although this item was the only one to correlate specifically to the overall pass rate, Qualification of Instructors, Ratio of Instructors to

Students, Sequencing of Content within Courses, and Sequencing of Courses each correlated positively to at least one of the average Domain scores. These findings suggest that perceptions of importance of ATEP components and actual implementation of ATEP components are more influential on BOC success than sequence or timing of Domain content. This is supported by educational literature which states that for any type of curriculum an ideal sequence for all students does not exist (Bruner, 1966; Cooper et al., 2004; Gagne, 1977). In effect the “ideal” sequence includes “many tracks leading to the same general goal” (Bruner, 1966, p. 71) with “continual adaptation and exploration” of learning strategies (Cooper et al., 2004, p. 187) while recognizing “that a degree of uncertainty and unpredictability is a necessary and healthy part of any functioning complex system” (Cooper et al., 2004, p. 186). However, this does not discredit the fact that within education it is important to start with simpler steps and work toward more complex entities (Billett, 2002; Gagne, 1977; Keefe & Walberg, 1992) which cannot be accomplished without including the concept of sequencing. This is supported by findings in this study in which ranking of successful implementation of Sequencing Content within Courses correlated with Domain VI score and successful implementation of Sequencing of Courses correlated with Domain II, IV, and VI scores, the most correlations of any ATEP component studied.

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Appendix A

Program Director Survey of Athletic Training Education Program Structure and
Perceptions of Impactful Programmatic Characteristics on First-time Success
on the BOC Examination

Please answer the following questions as each pertains to a traditional athletic training student regarding ATEP course progression for the **2010 graduating class**. Consider the following definitions to answer each question.

Domains - knowledge required to practice as an athletic trainer as identified by the BOC's Fifth Edition Role Delineation Study, divided into six (6) practice domains.
Good Standing - an ATEP not on any type of probationary status with CAATE.
Individual School Report – document sent to institutions from the BOC at the conclusion of a testing year summarizing examination outcomes for the institution. This report is only sent to institutions having five (5) or more students sit for the certification examination during one testing year or when student(s) sign a BOC Release of Information Form.

1. Please select school units your institution utilizes.

- _____ Semesters
 _____ Trimesters
 _____ Quarters

Survey splits to offer unit-specific answers based on selection

Utilize the following scale to provide the numeric equivalent for the semester/trimester/quarter to answer each question.

- | | | |
|-----------------------|----------------------------------|--------------------------------|
| 1. First-year Fall | 1. First-year First Trimester | 1. First-year First Quarter |
| 2. First-year Spring | 2. First-year Second Trimester | 2. First-year Second Quarter |
| 3. Second-year Fall | 3. First-year Third Trimester | 3. First-year Third Quarter |
| 4. Second-year Spring | 4. Second-year First Trimester | 4. First-year Fourth Quarter |
| 5. Third-year Fall | 5. Second-year Second Trimester | 5. Second-year First Quarter |
| 6. Third-year Spring | 6. Second-year Third Trimester | 6. Second-year Second Quarter |
| 7. Fourth-year Fall | 7. Third-year First Trimester | 7. Second-year Third Quarter |
| 8. Fourth-year Spring | 8. Third-year Second Trimester | 8. Second-year Fourth Quarter |
| | 9. Third-year Third Trimester | 9. Third-year First Quarter |
| | 10. Fourth-year First Trimester | 10. Third-year Second Quarter |
| | 11. Fourth-year Second Trimester | 11. Third-year Third Quarter |
| | 12. Fourth-year Third Trimester | 12. Third-year Fourth Quarter |
| | | 13. Fourth-year First Quarter |
| | | 14. Fourth-year Second Quarter |
| | | 15. Fourth-year Third Quarter |
| | | 16. Fourth-year Fourth Quarter |

2. Please indicate when a student applied to the ATEP for the 2010 graduates. _____

3. Please list the course(s) that have 50% or more content directly related to Domain I – Prevention.

Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____

4. Please list the course(s) that have 50% or more content directly related to Domain II – Clinical Evaluation and Diagnosis.
- | | |
|--------------------|----------------------|
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
5. Please list the course(s) that have 50% or more content directly related to Domain III – Immediate Care.
- | | |
|--------------------|----------------------|
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
6. Please list the course(s) that have 50% or more content directly related to Domain IV – Treatment, Rehabilitation and Reconditioning.
- | | |
|--------------------|----------------------|
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
7. Please list the course(s) that have 50% or more content directly related to Domain V – Organization and Administration.
- | | |
|--------------------|----------------------|
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
8. Please list the course(s) that have 50% or more content directly related to Domain VI – Professional Responsibility.
- | | |
|--------------------|----------------------|
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
| Course name: _____ | Course timing: _____ |
9. Was your ATEP accredited and in good standing with the CAATE during 2009-2010?
 _____ Yes _____ No
Qualifying question: survey transitions to perceptions if the ATEP was not accredited and in good standing during 2009-2010
10. Did your ATEP receive an Individual School Report on the 2010 Board of Certification Athletic Trainer's Certification Examination?
 _____ Yes _____ No
Qualifying question: survey transitions to perceptions if institution did not receive Individual School Report

Please refer to the Individual School Report on the 2010 Board of Certification Athletic Trainer's Certification Examination issued to your school when answering the following questions. Please provide the answers in decimal form, up to two (2) decimal places for questions 11-17.

11. What was the first time passing percentage of students challenging the BOC exam in 2010 from your institution? _____
12. What was the average score for Prevention (Domain I) in 2010 from your institution? _____
13. What was the average score for Clinical Evaluation and Diagnosis (Domain II) in 2010 from your institution? _____
14. What was the average score for Immediate Care (Domain III) in 2010 from your institution? _____
15. What was the average score for Treatment, Rehabilitation, and Reconditioning (Domain IV) in 2010 from your institution? _____
16. What was the average score for Organization and Administration (Domain V) in 2010 from your institution? _____
17. What was the average score for Professional Responsibility (Domain VI) in 2010 from your institution? _____
18. Please provide a sequence of the Domains that you feel would be best in preparing athletic training students for the BOC examination.

Introduced first: Domain _____
 Introduced second: Domain _____
 Introduced third: Domain _____
 Introduced fourth: Domain _____
 Introduced fifth: Domain _____
 Introduced sixth: Domain _____

19. Please briefly explain the reasoning behind your sequencing of Domains.

20. I believe that each of the following components are important to first-time success on the BOC examination.

5 – strongly agree 4 – agree 3 – neutral 2 – disagree 1 – strongly disagree

Learning over time	5	4	3	2	1
Length of clinical program	5	4	3	2	1
Length of didactic program	5	4	3	2	1
Number of hours in major	5	4	3	2	1
Percent of instructor workload dedicated to teaching	5	4	3	2	1
Qualifications of instructors (e.g. degrees earned, specialty certifications, years of experience)	5	4	3	2	1
Ratio of instructors to students	5	4	3	2	1
Sequencing of content within courses	5	4	3	2	1
Sequencing of courses	5	4	3	2	1

21. Please briefly explain the reasoning behind items ranked as each pertains to importance in preparation for first-time success on the BOC examination.

22. I believe that each of the following components are implemented successfully in my institution's athletic training education program.

5 – strongly agree 4 – agree 3 – neutral 2 – disagree 1 – strongly disagree

Learning over time	5	4	3	2	1
Length of clinical program	5	4	3	2	1
Length of didactic program	5	4	3	2	1
Number of hours in major	5	4	3	2	1
Percent of instructor workload dedicated to teaching	5	4	3	2	1
Qualifications of instructors (e.g. degrees earned, specialty certifications, years of experience)	5	4	3	2	1
Ratio of instructors to students	5	4	3	2	1
Sequencing of content within courses	5	4	3	2	1
Sequencing of courses	5	4	3	2	1

23. Please briefly explain the reasoning behind items ranked as each pertains successful implementation in your institution's athletic training education program.
24. Please identify any other components you believe are important to first-time success on the BOC examination.

Institutional Demographic Information:

25. In what National Athletic Trainer's Association District does your institution reside?

<input type="checkbox"/> District 1	<input type="checkbox"/> District 2	<input type="checkbox"/> District 3
<input type="checkbox"/> District 4	<input type="checkbox"/> District 5	<input type="checkbox"/> District 6
<input type="checkbox"/> District 7	<input type="checkbox"/> District 8	<input type="checkbox"/> District 9
<input type="checkbox"/> District 10		

26. What is the Carnegie Research status of your institution?

☐ Doctoral Research University

☐ Master College University

☐ Baccalaureate College

27. What is the funding classification of your institution?

☐ Public

☐ Private

28. What entry-level athletic training degree is awarded at your institution?

☐ Baccalaureate degree

☐ Master's degree

29. How long has your ATEP been accredited by the CAATE?

<input type="checkbox"/> 1-2 years	<input type="checkbox"/> 3-4 years	<input type="checkbox"/> 5-6 years
<input type="checkbox"/> 7-8 years	<input type="checkbox"/> 9-10 years	<input type="checkbox"/> >10 years

Appendix B

Survey of Athletic Training Education Program Structure and Instructional Faculty
Perceptions of Impactful Programmatic Characteristics on First-time Success
on the BOC Examination

Please answer the following questions as each pertains to a traditional athletic training student regarding ATEP course progression for the **2010 graduating class**. Consider the following definition when answering each question.

Domains - knowledge required to practice as an athletic trainer as identified by the BOC's Fifth Edition Role Delineation Study, divided into six (6) practice domains.

1. Please select school units your institution utilizes.

_____ Semesters

_____ Trimesters

_____ Quarters

Survey splits to offer unit-specific answers based on selection

Utilize the following scale to provide the numeric equivalent for the semester/trimester/quarter to answer each question.

- | | | |
|-----------------------|----------------------------------|--------------------------------|
| 1. First-year Fall | 1. First-year First Trimester | 1. First-year First Quarter |
| 2. First-year Spring | 2. First-year Second Trimester | 2. First-year Second Quarter |
| 3. Second-year Fall | 3. First-year Third Trimester | 3. First-year Third Quarter |
| 4. Second-year Spring | 4. Second-year First Trimester | 4. First-year Fourth Quarter |
| 5. Third-year Fall | 5. Second-year Second Trimester | 5. Second-year First Quarter |
| 6. Third-year Spring | 6. Second-year Third Trimester | 6. Second-year Second Quarter |
| 7. Fourth-year Fall | 7. Third-year First Trimester | 7. Second-year Third Quarter |
| 8. Fourth-year Spring | 8. Third-year Second Trimester | 8. Second-year Fourth Quarter |
| | 9. Third-year Third Trimester | 9. Third-year First Quarter |
| | 10. Fourth-year First Trimester | 10. Third-year Second Quarter |
| | 11. Fourth-year Second Trimester | 11. Third-year Third Quarter |
| | 12. Fourth-year Third Trimester | 12. Third-year Fourth Quarter |
| | | 13. Fourth-year First Quarter |
| | | 14. Fourth-year Second Quarter |
| | | 15. Fourth-year Third Quarter |
| | | 16. Fourth-year Fourth Quarter |

2. Please indicate when a student applied to the ATEP for the 2010 graduates. _____

3. Please list the course(s) that have 50% or more content directly related to Domain I – Prevention.

Course name: _____ Course timing: _____

Course name: _____ Course timing: _____

Course name: _____ Course timing: _____

Course name: _____ Course timing: _____

4. Please list the course(s) that have 50% or more content directly related to Domain II – Clinical Evaluation and Diagnosis.

Course name: _____ Course timing: _____

Course name: _____ Course timing: _____

Course name: _____ Course timing: _____

Course name: _____ Course timing: _____

5. Please list the course(s) that have 50% or more content directly related to Domain III – Immediate Care.

Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____

6. Please list the course(s) that have 50% or more content directly related to Domain IV – Treatment, Rehabilitation and Reconditioning.

Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____

7. Please list the course(s) that have 50% or more content directly related to Domain V – Organization and Administration.

Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____

8. Please list the course(s) that have 50% or more content directly related to Domain VI – Professional Responsibility.

Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____
Course name: _____	Course timing: _____

9. Please provide a sequence of the Domains that you feel would be best in preparing athletic training students for the BOC examination.

Introduced first: Domain ____

Introduced second: Domain ____

Introduced third: Domain ____

Introduced fourth: Domain ____

Introduced fifth: Domain ____

Introduced sixth: Domain ____

10. Please briefly explain the reasoning behind your sequencing of Domains.

11. I believe that each of the following components are important to first-time success on the BOC examination.

5 – strongly agree 4 – agree 3 – neutral 2 – disagree 1 – strongly disagree

Learning over time	5	4	3	2	1
Length of clinical program	5	4	3	2	1
Length of didactic program	5	4	3	2	1
Number of hours in major	5	4	3	2	1
Percent of instructor workload dedicated to teaching	5	4	3	2	1

Qualifications of instructors (e.g. degrees earned, specialty certifications, years of experience)	5	4	3	2	1
Ratio of instructors to students	5	4	3	2	1
Sequencing of content within courses	5	4	3	2	1
Sequencing of courses	5	4	3	2	1

12. Please briefly explain the reasoning behind items ranked as each pertains to importance in preparation for first-time success on the BOC examination.

13. I believe that each of the following components are implemented successfully in my institution's athletic training education program.

5 – strongly agree 4 – agree 3 – neutral 2 – disagree 1 – strongly disagree

Learning over time	5	4	3	2	1
Length of clinical program	5	4	3	2	1
Length of didactic program	5	4	3	2	1
Number of hours in major	5	4	3	2	1
Percent of instructor workload dedicated to teaching	5	4	3	2	1
Qualifications of instructors (e.g. degrees earned, specialty certifications, years of experience)	5	4	3	2	1
Ratio of instructors to students	5	4	3	2	1
Sequencing of content within courses	5	4	3	2	1
Sequencing of courses	5	4	3	2	1

14. Please briefly explain the reasoning behind items ranked as each pertains successful implementation in your institution's athletic training education program.

15. Please identify any other components you believe are important to first-time success on the BOC examination.

Institutional Demographic Information:

16. In what National Athletic Trainer's Association District does your institution reside?

_____ District 1	_____ District 2	_____ District 3
_____ District 4	_____ District 5	_____ District 6
_____ District 7	_____ District 8	_____ District 9
_____ District 10		

17. What is the Carnegie Research status of your institution?

_____ Doctoral Research University
_____ Master College University
_____ Baccalaureate College

18. What is the funding classification of your institution?

_____ Public
_____ Private

19. What entry-level athletic training degree is awarded at your institution?

☐ Baccalaureate degree

☐ Master's degree

20. How long has your ATEP been accredited by the CAATE?

☐ 1-2years ☐ 3-4 years ☐ 5-6 years

☐ 7-8 years ☐ 9-10 years ☐ >10 years

Appendix C

Program Director Introductory Letter with Informed Consent

Dear Athletic Training Program Director,

I am inviting you to participate in a web survey entitled **Program Director Survey of Athletic Training Educational Program Structure and Perceptions of Impactful Programmatic Characteristics on First-time Success on the BOC Examination**. This project is a research investigation that will culminate in my doctoral dissertation. The purpose of this study is to investigate relationships between progression of BOC Domain content within courses and the introduction of Domain content within the ATEP on first-time pass rate of the BOC exam for the 2010 graduates. The researcher would also like to gauge the perceptions of athletic training education program directors regarding importance of specific ATEP characteristics on preparing students for success on the BOC examination. You must be a program director for an accredited entry-level athletic training educational program to participate in this study.

The survey includes the construct areas of program specifics, Board of Certification examination results, perceptions of Athletic Training Education Program characteristics, and institutional demographics. The time commitment is approximately 15 minutes.

If you choose to participate in this study, you will need to click the “Yes” option below granting your consent to participate in the study, answer the questionnaire completely, and submit the completed questionnaire. The web survey is confidential. The responses cannot be traced and data will be encoded during submission. A minimal risk exists for data to be intercepted during submission. Filling out the survey confirms that you consent to participate in this study. The results of this study will be retained for three years in compliance with federal guidelines.

I intend to submit the results of this study for publication. If you would like a copy of the project’s results, please email me with the requested information. You may also contact me with any other questions or concerns at XXX. If you have any questions about your rights as a research subject, you may contact Dr. Franki Burch, IRB Institutional Administrator, Gardner-Webb University Institutional Review Board Committee at XXX or e-mail at XXX. Thank you for your time and consideration.

Sincerely,

Matthea S. Hungerford, MS, LAT, ATC
Curriculum and Instruction Doctoral Candidate
School of Education
Gardner-Webb University
XXX

Appendix D

Instructional Faculty Introductory Letter with Informed Consent

Dear Athletic Training Program Instructor,

I am inviting you to participate in a web survey entitled **Survey of Athletic Training Educational Program Structure and Instructional Faculty Perceptions of Impactful Programmatic Characteristics on First-time Success on the BOC Examination**. This project is a research investigation that will culminate in my doctoral dissertation. The purpose of this study is to gauge the perceptions of athletic training education program instructional faculty regarding importance of specific ATEP characteristics on preparing students for success on the BOC examination. You must be an athletic training program instructor in an accredited entry-level athletic training educational program to participate in this study.

The survey includes the construct areas of program specifics, perceptions of Athletic Training Education Program characteristics, and institutional demographics. The time commitment is approximately 10 minutes.

If you choose to participate in this study, you will need to click the “Yes” option below granting your consent to participate in the study, answer the questionnaire completely, and submit the completed questionnaire. The web survey is confidential. The responses cannot be traced and data will be encoded during submission. A minimal risk exists for data to be intercepted during submission. Filling out the survey confirms that you consent to participate in this study. The results of this study will be retained for three years in compliance with federal guidelines.

I intend to submit the results of this study for publication. If you would like a copy of the project’s results, please email me with the requested information. You may also contact me with any other questions or concerns at XXX. If you have any questions about your rights as a research subject, you may contact Dr. Franki Burch, IRB Institutional Administrator, Gardner-Webb University Institutional Review Board Committee at XXX or e-mail at XXX. Thank you for your time and consideration.

Sincerely,

Matthea S. Hungerford, MS, LAT, ATC
Curriculum and Instruction Doctoral Candidate
School of Education
Gardner-Webb University
XXX