Development and Validation of an Athletic Training Knowledge Assessment Tool

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Abstract

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Development and Validation of an Athletic Training Knowledge Assessment Tool

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The Commission on Accreditation of Athletic Training Education (CAATE) requires the integration of the fifth edition of the Athletic Training Education Competencies (Competencies) into the academic content of professional athletic training programs. CAATE also requires athletic training programs to provide outcomes measures that evaluate all aspects of the educational program, including student learning. While assessment tools have been developed based on earlier editions of the Competencies, a tool based on the fifth edition has not yet been published. Therefore, this project sought to develop and validate a knowledge assessment tool that effectively measures the material included in the fifth edition of the Competencies.

To accomplish this aim, test items based on the Competencies were reviewed by an expert panel and then given to students enrolled in professional athletic training programs. Item analysis was performed on the results to establish a test blueprint.
Dedication

To my family: Thank you for your constant love, support, and encouragement throughout the research process and my life.
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Chapter 1: Introduction

The athletic training profession relies on professional education to prepare future practitioners with the knowledge and skills necessary for clinical practice. Program accreditation, curricular requirements, and professional certification are methods to evaluate programs and candidates for quality control.\textsuperscript{1,2}

Different organizations are involved with each of these measures. Professional athletic training programs must maintain accreditation through the Commission on Accreditation of Athletic Training Education (CAATE). CAATE requires the integration of the Athletic Training Education Competencies (Competencies) within curricula.\textsuperscript{3} The Competencies identify the minimum knowledge, skills, and abilities of candidates.\textsuperscript{4} The Board of Certification, Inc. (BOC) grants certification, the national credential of athletic trainers (ATs), to candidates who satisfy the following conditions: obtain a passing score on the certification examination, provide proof of emergency care certification, and graduate from a CAATE-accredited program.\textsuperscript{5}

Now in their fifth edition, the Competencies accompany the CAATE-published accreditation standards; CAATE mandates the inclusion of the Competencies within curricula. The accreditation standards identify the requirements for professional education and the Competencies identify the knowledge, skills, and abilities that students should master. The Competencies involve current athletic training practices while taking into consideration evolution...
of the healthcare system and the skills needed to adapt as new best practices emerge.⁴

The BOC’s Role Delineation Study (RD) is a practice analysis that describes the current state of professional practice by identifying the knowledge, skills, and abilities necessary for professionals based on existing responsibilities of ATs.⁶ Overlap of material exists between the Competencies and the knowledge, skills, and abilities identified by the RD. However, the RD serves as the blueprint for the BOC examination whereas the Competencies provide structure for educational programs.

**Statement of the Problem**

Development of a knowledge assessment tool based on the fifth edition Competencies would provide feedback on student learning and program efficacy. This alignment between the assessment tool’s content and the Competencies would better reflect the presentation of information within the curriculum. By administering the tool electronically, students may be better prepared for the BOC examination as experience with computer-based testing potentially benefits performance on electronically administered high stakes examinations.⁷ The assessment could be used as a measurement of learning and efficacy and could be implemented by programs as an outcomes assessment tool as required by the CAATE standards. While Carr et al⁸ developed an instrument based on the 3rd and 4th editions of the athletic training competencies, a revised version based on the fifth edition has not yet been published.
Specific Aim

- Develop and validate a knowledge assessment tool that effectively measures the material included in the fifth edition of the Athletic Training Education Competencies.

To accomplish this aim, question items were developed based on the fifth edition Athletic Training Education Competencies. Competency content areas were weighted according to their inherent proportion of items. A panel of content experts reviewed items to determine correct competency appropriation. Students enrolled in professional athletic training programs answered the test items to allow for item analysis and to determine reliability and validity.

Definition of Terms

Accreditation: Recognition that a program meets acceptable educational standards

Athletic Training Education Competencies (Competencies): Provides professional athletic training programs with minimum knowledge, skills, and clinical abilities to be mastered by students

Board of Certification, Inc. (BOC): The independent organization responsible for the credentialing of athletic trainers

Board of Certification (BOC) examination: The required examination for athletic training candidates to achieve certification

Board of Certification Role Delineation Study (RD): A practice analysis of the athletic training profession that prioritizes the critical tasks and essential
competencies for professionals; it defines the content of the BOC examination.

RD is the commonly accepted abbreviation.

**Certification:** Granted by the BOC upon passage of the national credentialing exam. This is not a practice credential.

**Commission on Accreditation of Athletic Training Education (CAATE):** The accrediting body of athletic training education programs

**CAATE-accredited professional athletic training programs:** Programs that prepare students for entry-level practice as an athletic trainer, allow students to become eligible to take the BOC; can be at the baccalaureate or post-baccalaureate level

**National Athletic Trainer's Association (NATA):** The professional membership association for athletic trainers

**Post-baccalaureate professional athletic training programs:** Also known as entry-level Master’s programs

**Post-professional athletic training programs:** Post-certification programs for athletic trainers
Chapter 2: Literature Review

Athletic Training Education

**History.** Athletic training education has undergone numerous changes as the profession has evolved. This evolution has involved changes in leadership, certification, licensure, and accreditation. The National Athletic Trainers’ Association (NATA) was founded in 1950; its growth and development ties closely to changes in athletic training education.\(^9\)

The milestones of the profession during the 1950s and 1960s paved the way for curricular evaluation and program approval within athletic training education. Developing an educational model for professional preparation was one of the NATA’s primary objectives during the 1950s. A curricular model incorporating advanced athletic training, laboratory, and relevant courses from other academic disciplines was adopted in 1959. This model served as a suggestion or framework rather than as a mandate. Ten years later, the NATA officially recognized the first undergraduate athletic training programs.\(^9\)

National certification of athletic training professionals was another early NATA goal; certification provides a universal standard for entrance into professional practice. The NATA established eligibility procedures for the certification examination in 1969. The following individuals were able to challenge the examination: actively practicing professionals who were not yet certified, graduates of NATA-approved educational programs, students who had completed an athletic training apprenticeship, graduates of a physical therapy
program or individuals who applied through special consideration. The first national certification examination was developed in 1970.

The NATA continued to emphasize the quality of athletic training education and the promotion of the profession. *Guidelines for the Development and Implementation of NATA Approved Undergraduate Athletic Training Programs*, a document that helped establish programmatic standards, was published in 1983. In addition, the responsibility for programmatic accreditation shifted from an internal agency, the NATA, to an external accrediting body, CAATE.

**Accreditation.** Athletic training accreditation has been the responsibility of different entities over the years. Before athletic training education programs could seek accreditation through an external agency, the profession first had to gain recognition as an allied health profession by the American Medical Association (AMA). This recognition came in 1990. Subsequently, accreditation responsibilities were assumed by the Commission on Allied Health Education and Accreditation (CAHEA), the accrediting branch of the AMA. CAHEA’s accreditation of athletic training educational programs helped prove the legitimacy of the field, because use of an outside accrediting agency more closely aligns athletic training with other allied health professions, improves recognition and respect, and strengthens the credential. Under this umbrella, an athletic training-specific review committee was formed, the Joint Review Committee on Athletic Training (JRC-AT). In the mid-90s, CAHEA’s
responsibilities were handed over to the Commission on Accreditation of Allied Health Education Programs (CAAHEP), a newly established free standing agency sponsored by the AMA. Beginning in 2003, JRC-AT was reorganized into an independent accrediting agency. In 2006, its title became CAATE. The Council for Higher Education Accreditation officially recognized CAATE in 2007.

Institutions and individuals may view accreditation as a means of quality assurance. Accreditation also acts as a form of continuous quality improvement, because it incorporates ongoing programmatic assessment and necessary modifications. The CAATE accreditation standards require outcomes assessment and the development of an ongoing plan to document and regularly assess the educational program.

**Credentialing.** Similar to accreditation’s evaluation of program quality, credentialing offers the public a quality assurance measure of individual practitioners. The BOC is responsible for granting the nationally recognized credential, ATC™, to qualified individuals. While states require that individuals are in good standing with the BOC as part of their regulation of athletic training, ATC™ does not grant an individual the right to practice.

Until 2004, individuals who received professional preparation through either the internship route or academic programs were eligible to take the BOC certification examination. As of the January 2004 examination window, all candidates are required to be graduates of a CAATE-accredited athletic training educational program. Currently, degree conferral from an accredited program,
maintaining emergency care certification, and obtaining a passing score on the BOC certification examination are requirements for certification.\textsuperscript{5}

\textbf{BOC examination.} In addition to playing an important role in certification, BOC examination scores are a key piece in the outcomes measure requirements of the accreditation standards.\textsuperscript{3} According to CAATE Accreditation Standard 11, programs must have a 3-year aggregate first-time pass rate on the BOC examination of at least 70\%.\textsuperscript{3} Programs must publish this information.

Obtaining a passing score on the BOC examination represents that an individual meets the minimum standard required to maintain public safety. These scores may not fully reflect one’s knowledge of the material contained in the Competencies as the BOC examination blueprint comes from the RD, a document that describes the current state of athletic training practice.\textsuperscript{5,6} While the material of the RD is incorporated into the Competencies, the Competencies include additional knowledge and skills. These documents are published by different entities and serve different purposes.

\textbf{Academic Success.} Academic success, like success on the BOC examination, may not have a direct correlation to an individual’s knowledge of the material. One measure of academic success is grade point average (GPA). GPA represents overall course performance, but may not accurately depict the knowledge of an individual or the ability to apply this knowledge clinically. GPA does not reflect course difficulty or possible disparities among institutions. Using self-reported data, Middlemas et al\textsuperscript{13} attempted to determine if a relationship
existed between cumulative GPA and BOC examination scores and found that they did not appear to be linked. GPA is just one of many factors that should be considered when evaluating student performance or predicting long-term success.

**Curricular Development.** While a curricular model was proposed in the late 1950s, the varying pathways to certification and lack of programmatic accreditation caused this model to be more theory than practice. Since the elimination of an internship route to certification, focus has shifted to educational programs and thereby curricula development.

In keeping with the 2004 change in candidate eligibility, institutions seeking to transition from internship programs to accredited status had to make curricular decisions. To transition, many institutions adopted a stock curriculum out of convenience, which resulted in courses linked to specific competency categories. Inherently, this cohort curriculum offered little flexibility.\(^4\)

The NATA Professional Education Committee addressed the inherent curricular inflexibility in the fifth edition of the Competencies, which were released in early 2012. This edition acknowledges that the opportunity to learn is everywhere, affording flexibility to the academic program. However, knowledge and skills should be included in both didactic and clinical education. This edition also better integrates knowledge and skills within content areas and better reflects the comprehensiveness of patient care via the reorganization of clinical integration proficiencies to emphasize the interrelatedness of the content areas.\(^4\)
Providing flexibility within the academic program allows for knowledge acquisition outside the traditional sequence. Rather than having a programmatic checkpoint to gauge student comprehension at each level of the cohort curriculum, evidence of knowledge acquisition and application may be demonstrated throughout didactic, laboratory, or clinical education.

**Distinctions between athletic training programs.** Currently, CAATE recognizes three distinct types of athletic training programs: professional, post-professional, and residency. Professional programs prepare individuals for entry-level practice and grant eligibility to challenge the BOC examination; these programs exist at both baccalaureate and post-baccalaureate levels. Post-professional programs prepare ATs for advanced clinical practice and provide the opportunity to participate in scholarship while earning an advanced degree. Residency programs, another form of post-professional education, focus on specialized content and evidence-based practice in advancing clinical practice; these result in a certificate of completion rather than a degree.

CAATE accreditation requirements for professional programs are the same regardless of degree type. While student academic preparation and programmatic structure may differ, the same accreditation standards apply to both baccalaureate and post-baccalaureate professional programs, which require the incorporation of the Competencies. Both result in preparation and eligibility to sit for the BOC examination.
Learning

**Educational model.** As athletic training curricula continue to evolve in light of revised editions to the RD and the Competencies, it is important to recognize the basis of the educational model. While athletic training has similarities to apprenticeships and the medical school model, its incorporation of competency-based education also aligns closely with mastery learning. Mastery learning focuses on demonstrating satisfactory performance before advancing to new material; it is most appropriate for quantifiable content. Athletic training education exhibits a modified version of mastery learning due to emphasis on critical thinking and clinical skills in addition to knowledge. Another distinction between standard mastery learning and that employed in athletic training education is the lack of required sequence. While foundational knowledge must be present to achieve competence at higher levels, competencies may be addressed in any order or setting.

**Knowledge and skills.** Emphasis in athletic training has shifted away from quantitative toward qualitative. Requiring a specific number of clinical hours took precedence in the internship route of certification, but accredited professional programs are proficiency-based. Proficiency-based measures take into account the “big picture” of knowledge and skills that an entry-level professional should possess. Proving that an individual actually possesses the knowledge and skills outlined by the Competencies can be helpful for the student and their educational program.
The Competencies involve demonstrating competence, skill development, and conceptual understanding. The first attribute is a performance goal whereas the latter two fall into the category of mastery goals. Both types of goals motivate and encourage individuals to discover meaning rather than simply memorizing. Goals must be appropriate in difficulty, detail, and duration in order for them to motivate effectively.\(^{18}\) Feedback also plays a role in motivation and goals. Providing students with regular feedback through assessment can aid in the establishment and evaluation of goals.

**Competency-based education.** Athletic training, like other allied health professions, integrates competency-based education in academic preparation. Competency-based education incorporates a learning progression as students pass specific benchmarks as part of the advancement toward the outcome goals. Interest in this approach has increased due to the emphasis it places on the abilities acquired by a student rather than time spent on the material. This focus on outcomes and promoting student engagement aligns with the requirements placed on programs and institutions by governing bodies.\(^{19}\) Established medical competencies aim to provide outcome measures; cumulatively they represent an individual’s ability to demonstrate appropriate knowledge, skills, and clinical decision making. In athletic training, the Competencies serve as a guideline because they provide the minimum educational content. However, programs can supplement this material based on the specializations of its staff or its institutional context.\(^3\) Competencies set a standard, but do not dictate a specific approach or
limit what material can be addressed. In this way, competency-based education in athletic training makes universal comparisons difficult because each program has autonomy in assessment.

**Competencies.** The revision and reorganization of the athletic training content areas in the fifth edition of the Competencies sought to omit redundancy and better reflect the current state of the profession. This clarification may allow professional programs to better represent and convey material. An exploratory study based on the 3rd and 4th editions of the competencies revealed that ATs did not feel well prepared in 50% of the 12 content areas. Perceptions of each content area’s importance differed based on clinical practice setting; these differences enforce that the entry-level professional should be well prepared in all the content areas for successful practice in any setting.

**Acquisition and retention.** When examining knowledge progression and retention, long-term retention should also be a key consideration. Recall and recognition measures are often used to assess long-term retention. Assessing retention involves pretesting to establish a baseline used to calculate knowledge gained. In order to avoid confounding the calculation of knowledge, one must acknowledge that material can be learned outside a course. When considering knowledge gained from a professional program, the need for pretesting is diminished.

Due to the independence of the Competencies from specific courses, pretesting may not be appropriate in athletic training education. The revised
CAATE Standards allow for students to learn clinically as well as in the academic setting. The method and sequence of information transmission is unimportant, as the Competencies are not required to be presented in a particular order or be related to a particular course. The Competencies only require that program present the material and the student demonstrates proficiency.

Assessment

Outcomes. In recent years, accreditation agencies as well as state and federal governing bodies have exerted increasing pressure on institutions of higher learning to demonstrate student learning. Institutions have responded to this pressure by requiring departments and programs to more closely monitor and measure the extent to which they are meeting established objectives.

In order for assessments to serve as outcome measures of student learning and achievement, the scope of measurement must be understood. When making a high-stakes decision, such as determining program effectiveness or individual competency, multiple measures must be used due to the limitations of validity and reliability of a single measure.

Educational programs often use data from low-stakes tests to obtain and present outcomes measures. Despite the convenience of this method, test taker motivation may influence the applicability of the findings, as examinees may not sense personal consequences associated with their performance. Scores are valid only if examinees’ effort matches their actual level of proficiency.
Students may perceive institutional or programmatic assessments as low-stake tests, resulting in invalid scores due to students not exerting their best effort.

Outcome measures are becoming more important to the education system due to programs’ accountability to institutions, accrediting bodies, and governing boards. This ongoing evaluation and modification requires the implementation of assessment tools. Carr et al. developed an assessment tool for athletic training educational programs based on the 3rd and 4th edition competencies that focuses on the overall knowledge of graduating seniors. While this focus on the final product may be important for measuring program efficacy, it does not provide feedback to students still enrolled in the program.

Furthermore, the CAATE accreditation standards require the development and assessment of a plan by professional programs to evaluate their effectiveness. While the plan’s specifics are up to the discretion of the institution, it must be a comprehensive and regular assessment that takes into account all aspects of the educational program. Student learning is one of these aspects; assessing student knowledge can demonstrate student learning.

**Evaluation method.** The information age has brought with it electronic administration of cumulative, placement, and credentialing exams. In order for the electronic versions of exams to be worthwhile, they must be comparable to concurrently available paper and pencil measures. The BOC examination adopted an electronic administration in June 2007. Since the BOC examination transitioned completely from a three-part (written, practical, simulation)
assessment to an electronic assessment, it was not necessary for the test modes to be equivalent because they were not administered simultaneously. However, test items were required to demonstrate proper psychometrics. Subject matter experts are involved in writing and reviewing new items, which are incorporated into the examination as nonscored items to evaluate their difficulty and discrimination.

Electronic and paper-and-pencil administration modes of common standardized assessments have shown comparable validity, consistency, and scaling. In addition, examinees may prefer electronic assessment due to readability and ease of recording answers. Test mode effect describes an individual student’s ability to score higher based on test administration, whether electronic or paper-and-pencil. This effect could be the result of a number of factors. Students in health care professions with practice in computer-based tests may score higher on computerized credentialing exams. Providing athletic training students with opportunities to take cumulative tests electronically may positively influence performance on the BOC examination.

**Design.** The Competencies can be assessed using different summative assessment instruments. Recall and recognition items, which assess basic levels of knowledge, can be measured through multiple-choice (MC) style items. MC items and objective tests have questionable validity, because the cueing effect can influence their results. The cueing effect describes the phenomenon in which one chooses the correct answer based on term recognition rather than
actual recall. However, MC questions seem to offer reliability in evaluating factual knowledge.

There are pros and cons for using MC exams to evaluate student performance. MC tests may only show a test taker’s ability to recall information; this represents the foundation or lowest level of clinical competency. However, quality item development can focus on synthesis of knowledge rather than simply recall. It is important to consider integrating clinical application with foundational knowledge. Without this basic understanding, one’s ability to demonstrate clinical proficiency can be compromised. Even so, scoring well on a cognitive exam does not guarantee effective professional practice.

**Feedback.** Feedback is an integral part of student learning. In the classroom setting, feedback shows potential discrepancies between educators’ expectations and students’ demonstrated understanding. Traditionally, there is a delay in feedback on comprehensive assessments. While some research suggests that immediate feedback improves student learning more effectively than delayed feedback, a study in an upper level athletic training class showed that students’ scores did not differ significantly based on the timeline of feedback. However, student satisfaction was higher with immediate feedback.

From the standpoint of the educational program, feedback provides a way to evaluate methods and make improvements. While these processes are not necessarily time-sensitive, they are ongoing. Feedback measurements, such as
test scores, may be part of a program’s accountability to its institution or accrediting body.

Feedback is also an important component of competency-based education. Assessments aim to enhance student learning by documenting performance. These data allow for identification of performance gaps and promotion of student responsibility. While programs give individuals feedback through course grades and subjective evaluations, comprehensive knowledge assessments may provide students with the big picture view of their understanding and track their progress throughout the educational program. In one medical education study, tri-yearly progressive testing complete with feedback was shown to significantly affect licensing exam performance. By providing quantitative feedback about knowledge exhibited through an assessment, students may be able to alter habits and increase performance on the BOC examination.

**Instrument development.** For proper development of an instrument, a blueprint for test items must be established. This blueprint takes into consideration the test’s purpose and content. Once these are established, test items need to be examined to determine how well the purpose and content are represented. Establishing the test’s scope helps determine whether construct underrepresentation or construct irrelevant variance are present. Construct underrepresentation occurs when a test is too narrowly focused whereas construct irrelevant variance describes the inclusion of inappropriate
By identifying these discrepancies, items can be altered to increase alignment with the blueprint.

The development of test items is a process that begins with deciding on question type. The tool developed in this research uses selected response or MC questions due to the ease of scoring these items and the BOC examination’s employment of this item type. Once the stem or question part of the test item and the key or correct answer have been written, plausible wrong answer choices called distractors can be added. The plausibility of the distractors corresponds to an item’s difficulty.

**Validity and reliability.** In order for the results from an instrument to have meaning, the instrument’s validity and reliability must be established. Validity describes an instrument’s ability to measure what it is intended to measure. Validity demonstrates that test scores are meaningful based on evidence. Since the same instrument can serve a variety of purposes, each purpose should have data to back up its use.

The traditional view of validity used face, content, criterion related, and construct validity when developing new survey instruments. However, contemporary validity focuses on how validity evidence helps establish overall validity; several sources of validity evidence exist. The alignment of test items to content areas helps prove test content evidence; judgment from content experts is often incorporated. Validity evidence also takes into consideration the response processes of a test taker. If the interrelatedness of items follows a
predicted pattern, they provide evidence for validity.\textsuperscript{35} These components of the unified validity concept differ from the traditional view of validity in which one, distinct type of validity was enough to declare a test valid.

Reliability measures consistency or an instrument’s ability to produce similar results if repeated. Establishment of reliability can occur by giving the same instrument to the same group of individuals twice, known as test-retest reliability. Cronbach’s alpha, a measure of internal consistency, can be also used as an index of reliability.\textsuperscript{37} In contrast to test-retest reliability, Cronbach’s alpha only requires one test administration, because it relies on the assumption that each of the test items measures the same trait on the same scale.
Chapter 3: Methods

Overview

This study involved a multi-phase developmental design to create and validate an assessment tool based on the Athletic Training Education Competencies fifth edition. Item analysis was undertaken to set up the tool for future individual and programmatic assessment. This chapter will describe the creation of the instrument, its deployment, and methods of data analysis.

Phase I

Test blueprint design. Individual test items were developed based on published resources and clinical experience, 113 in total. Each test item aligned with a content area as described in the Competencies. The Competencies document has eight content areas; each content area contains specific competency items that enumerate the knowledge, skill, and abilities that should be acquired through athletic training education. The Competencies were used to establish a percentage breakdown for the test blueprint calculated via the proportion of competency items in each content area (see Figure 1).
**Inherent Weight of Competency Content Areas**

![Percentage breakdown of ideal test blueprint based on content area weights.](image)

**Figure 1.** Percentage breakdown of ideal test blueprint based on content area weights.

**Expert panel review.** Recruitment of content experts occurred based on affiliation with CAATE-accredited professional athletic training programs. Recruitment occurred via an email, which detailed this study, provided informed consent, and included part of the test blueprint for evaluation (see Appendices B and C). Of the 22 individuals contacted, 8 chose to participate. These 8 participants were split into 4 pairs; each pair evaluated a set of 25-30 test items. Each item was aligned with a specific competency item and experts determined whether alignments were appropriate. In order for test item to be retained, both experts who evaluated the item had to agree with its alignment.
Phase II

Recruitment. Participants were required to be at least 18 years of age and currently enrolled students in CAATE-accredited professional athletic training programs. Both baccalaureate and post-baccalaureate professional students were eligible. Recruitment occurred through program directors via the contact information found on the CAATE website. A recruitment email detailing the study and containing a link to the assessment was sent to the program directors of all the CAATE-accredited professional programs for dispersal to all currently enrolled students (see Appendix C). Some institutional review boards prohibited program directors from forwarding this recruitment email; other program directors may have chosen not to invite their students to participate.

Data collection. Test items were administered via Qualtrics®, an online survey software. The initial page of the assessment tool included informed consent information (see Appendix D). Participants accepted the terms of the informed consent by choosing to continue to the knowledge assessment tool. The data collection included demographics such as age, sex, institution, program type, and terms of athletic training education completed. The knowledge assessment portion of the tool included 25 items. The initial two items in this section were the same for every participant and were chosen in an attempt to decrease test anxiety. The other 23 items were randomly administered by the software.
**Data storage.** Demographic information was recorded and kept within Qualtrics in a password protected file. Participants’ names were not recorded in the assessment.

**Analysis.** Data analysis occurred after the necessary number of participants had completed the online assessment tool. Each item needed to have more than 25 responses. Discrimination index values were calculated based on the upper and lower quartiles. While discrimination values between 0.2 and 0.39 are generally considered acceptable, criterion-referenced standards are negatively skewed, therefore, a discrimination index threshold of 0.1 was adopted. Item difficulty was calculated based on the proportion of correct responses. The National Organization for Competency Assurance, now known as the Institute for Credentialing Excellence, sets forth an acceptable difficulty range for criterion-referenced standards of 0.33-0.92. Other sources classify 0.3-0.7 as good difficulty and 0.71-0.9 as easy. Considering both scales, an acceptable difficulty range of 0.32-0.92 was established. Items meeting both criteria, difficulty and discrimination, were retained. Due to the randomization administration of the test items, a reliability value cannot be determined.
Chapter 4: Results

Expert Panel

An expert panel reviewed the test items. Each pair of reviewers evaluated a set of 25 to 30 items to determine if items were aligned with the appropriate competency. Reviewers initialed their determination in the appropriate column, either agree or disagree. A column for comments provided reviewers with space to explain the reasoning behind their determination. For an item to remain in the item pool, both experts responsible for that item had to agree that its alignment was correct. Of the 113 test items given to the expert panel, reviewers determined that 98 items aligned properly. Table 1 categorizes the initial test items by their status following expert panel review.
Table 1. Results of Expert Panel by Item

<table>
<thead>
<tr>
<th>Expert Panel Determination</th>
<th>Items</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Experts Agreed with</td>
<td>EBP01, EBP02, EBP04, EBP06, EBP07, PHP01, PHP02, PHP04, PHP06, PHP07, PHP08, PHP09, PHP11, PHP12, PHP13, PHP15, PHP17, PHP18, PHP19, PHP22, PHP23, PHP24, PHP25, PHP26, CE01, CE02, CE03, CE04, CE05, CE06, CE07, CE08, CE11, CE12, CE13, CE14, CE15, CE16, CE18, CE19, CE21, CE22, CE23, AC19, AC20, AC01, AC03, AC04, AC06, AC07, AC08, AC09, AC10, AC11, AC12, AC13, AC14, AC15, AC16, TI01, TI02, TI03, TI04, TI05, TI06, TI07, TI09, TI10, TI11, TI12, TI13, TI14, TI15, TI16, TI17, TI18, TI19, PS01, PS02, PS03, PS04, PS05, PS09, PS06, PS07, PS08, HA01, HA02, HA03, HA04, HA05, HA06, PD01, PD02, PD03, PD04, PD06, PD07</td>
<td>86.72%</td>
</tr>
<tr>
<td>Alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Items Retained)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Expert Agreed with</td>
<td>EBP03, PHP03, PHP05, PHP14, PHP16, PHP27, CE09, CE10, CE17, CE20, AC02, AC17, TI08, PD05</td>
<td>12.38%</td>
</tr>
<tr>
<td>Alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Items Discarded)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both Experts Disagreed with</td>
<td>PHP20</td>
<td>0.88%</td>
</tr>
<tr>
<td>Alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Items Discarded)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: EBP, evidence-based practice; PHP, prevention and health promotion; CE, clinical examination and diagnosis; AC, acute care of injury and illness; TI, therapeutic interventions; psychosocial strategies and referral; HA, healthcare administration; PD, professional development and responsibility.
Test Administration

Test items were housed by Qualtrics®, an online survey software. During a 7-day period, 142 examinees started the assessment with 116 submitting a completed assessment. Demographic information such as program type, terms completed, and age was collected. Participants were 21.31 ± 3.09 years of age and had completed 4.6 ± 1.9 terms of athletic training education. Participants were able to classify terms as semesters, trimesters, and quarters, with 97% classifying their terms as semesters.

Participants represented 45 professional programs. While participation from all active professional programs was requested, the voluntary nature of the study led to variance in institutional representation. One institution was represented by 12 participants; the other institutions represented each had no more than 5 participants.

Based on provided descriptions, participants identified their program type. Professional baccalaureate programs were described as undergraduate programs resulting in a Bachelor degree at completion whereas professional post-baccalaureate programs were described as graduate degree programs culminating in a Master degree. The distribution of participants between these degree types does not appear to be an accurate representation of the population; 2.3% of participants were students in post-baccalaureate programs whereas post-baccalaureate programs account for over 8% of professional programs.
The initial two items on the assessment were the same for each participant and were chosen in an attempt to decrease test anxiety because they were considered easier. These two items had 130 responses. Qualtrics® randomized the remaining 96 items and showed 23 of these test items to each examinee. At least 25 participants answered each item; Table 2 contains the breakdown of participants per item.

### Table 2. Participants by Item

<table>
<thead>
<tr>
<th>Item Numbers</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBP02, CE11, AC01, AC15, PS01, PS05, HA01</td>
<td>26</td>
</tr>
<tr>
<td>EBP04, PHP18, PHP19, PHP24, CE07, CE16, CE19, CE21, CE23, AC03, AC09, TI02, TI03, TI11, TI16</td>
<td>27</td>
</tr>
<tr>
<td>EBP01, EBP06, EBP07, PHP01, PHP04, PHP13, PHP26, CE01, CE15, CE18, AC20, AC14, TI09, TI10, TI12, TI15, PS03, PS09, HA05, PD06</td>
<td>28</td>
</tr>
<tr>
<td>PHP06, PHP08, PHP09, PHP12, PHP15, PHP17, PHP22, PHP25, CE02, CE04, CE05, CE13, AC19, AC07, AC10, AC11, TI01, TI04, TI13, TI14, PS04, PS06, PS07, PS08, HA02, HA04, HA06, PD01, PD07</td>
<td>29</td>
</tr>
<tr>
<td>PHP02, PHP07, PHP11, PHP23, CE06, CE12, CE14, AC04, AC06, AC08, AC12, AC13, TI05, TI06, TI07, TI17, TI18, HA03, PD03, PD04</td>
<td>30</td>
</tr>
<tr>
<td>CE03, CE22, TI19, PS02, PD02</td>
<td>31</td>
</tr>
</tbody>
</table>

Note: The initial two items were the same on every assessment; 130 responses were collected for each (CE08 and AC16).
**Item Discrimination**

Item discrimination describes a test item’s ability to separate high and low performers. The discrimination index scores were determined by comparing the scores of the upper and lower quartiles. Positive discrimination values demonstrate that high scoring individuals were more likely to answer the item correctly than low scoring individuals, with +1 as the ideal. The item pool’s discrimination values ranged from -0.03125 to 0.3125. The elimination threshold was set at 0.1. Due to unacceptable discrimination, 55 items were removed from the blueprint.

**Item Difficulty**

Item difficulty is a statistical description of how challenging an item is. Item difficulty describes the proportion of individuals who chose the correct response. Since item difficulty shows the proportion of individuals who answered an item correctly, items with values closer to 0 are considered more difficult whereas items closer to 1 are easier. Difficulty values of all items ranged from 0 to 1. Difficulty between 0.32 and 0.92 was deemed acceptable. Ten items were discarded as too difficult; 16 items were discarded for being too easy.

**Item Pool**

In order to be retained, an item had to meet the acceptable criteria for both difficulty and discrimination. Figure 2 presents the discrimination and difficulty for each item.
Figure 2. Display of discrimination and difficulty by item. Blue lines demarcate acceptable region for difficulty. The yellow line is the cut point for acceptable discrimination. The shaded area represents the items that met both criteria.

Items that met criteria for both discrimination and difficulty, as represented by the shaded area, were retained. The difficulty, discrimination, and number of participants who responded to these items is contained in Table 3.
Table 3. Retained Test Items

<table>
<thead>
<tr>
<th>Items by Content Area</th>
<th># Participants</th>
<th>Difficulty</th>
<th>Discrimination</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evidence-Based Practice</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBP02</td>
<td>26</td>
<td>0.92</td>
<td>0.22</td>
</tr>
<tr>
<td>EBP06</td>
<td>28</td>
<td>0.46</td>
<td>0.16</td>
</tr>
<tr>
<td>EBP07</td>
<td>28</td>
<td>0.71</td>
<td>0.16</td>
</tr>
<tr>
<td><strong>Prevention and Health Promotion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHP04</td>
<td>28</td>
<td>0.59</td>
<td>0.16</td>
</tr>
<tr>
<td>PHP06</td>
<td>29</td>
<td>0.57</td>
<td>0.13</td>
</tr>
<tr>
<td>PHP12</td>
<td>29</td>
<td>0.90</td>
<td>0.22</td>
</tr>
<tr>
<td>PHP13</td>
<td>28</td>
<td>0.71</td>
<td>0.25</td>
</tr>
<tr>
<td>PHP17</td>
<td>29</td>
<td>0.61</td>
<td>0.16</td>
</tr>
<tr>
<td>PHP18</td>
<td>27</td>
<td>0.62</td>
<td>0.13</td>
</tr>
<tr>
<td>PHP19</td>
<td>27</td>
<td>0.35</td>
<td>0.16</td>
</tr>
<tr>
<td>PHP22</td>
<td>29</td>
<td>0.71</td>
<td>0.31</td>
</tr>
<tr>
<td>PHP25</td>
<td>29</td>
<td>0.68</td>
<td>0.13</td>
</tr>
<tr>
<td><strong>Clinical Examination and Diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE01</td>
<td>28</td>
<td>0.61</td>
<td>0.13</td>
</tr>
<tr>
<td>CE13</td>
<td>29</td>
<td>0.64</td>
<td>0.13</td>
</tr>
<tr>
<td>CE16</td>
<td>27</td>
<td>0.69</td>
<td>0.25</td>
</tr>
<tr>
<td>CE18</td>
<td>28</td>
<td>0.75</td>
<td>0.31</td>
</tr>
<tr>
<td>CE23</td>
<td>27</td>
<td>0.69</td>
<td>0.16</td>
</tr>
<tr>
<td>Items by Content Area</td>
<td># Participants</td>
<td>Difficulty</td>
<td>Discrimination</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------</td>
<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Acute Care of Injuries and Illnesses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC04</td>
<td>30</td>
<td>0.69</td>
<td>0.19</td>
</tr>
<tr>
<td>AC08</td>
<td>30</td>
<td>0.86</td>
<td>0.13</td>
</tr>
<tr>
<td>AC13</td>
<td>30</td>
<td>0.90</td>
<td>0.13</td>
</tr>
<tr>
<td>AC16</td>
<td>126*</td>
<td>0.83</td>
<td>0.13</td>
</tr>
<tr>
<td>Therapeutic Interventions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TI05</td>
<td>30</td>
<td>0.59</td>
<td>0.22</td>
</tr>
<tr>
<td>TI06</td>
<td>30</td>
<td>0.83</td>
<td>0.13</td>
</tr>
<tr>
<td>TI10</td>
<td>28</td>
<td>0.89</td>
<td>0.19</td>
</tr>
<tr>
<td>TI12</td>
<td>28</td>
<td>0.46</td>
<td>0.13</td>
</tr>
<tr>
<td>TI14</td>
<td>29</td>
<td>0.76</td>
<td>0.13</td>
</tr>
<tr>
<td>TI19</td>
<td>31</td>
<td>0.77</td>
<td>0.19</td>
</tr>
<tr>
<td>Psychosocial Strategies and Referral</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS03</td>
<td>28</td>
<td>0.67</td>
<td>0.13</td>
</tr>
<tr>
<td>PS05</td>
<td>26</td>
<td>0.72</td>
<td>0.25</td>
</tr>
<tr>
<td>PS07</td>
<td>29</td>
<td>0.76</td>
<td>0.19</td>
</tr>
<tr>
<td>PS09</td>
<td>28</td>
<td>0.89</td>
<td>0.16</td>
</tr>
</tbody>
</table>
Table 3. Retained Test Items (continued)

<table>
<thead>
<tr>
<th>Items by Content Area</th>
<th># Participants</th>
<th>Difficulty</th>
<th>Discrimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare Administration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA01</td>
<td>26</td>
<td>0.32</td>
<td>0.19</td>
</tr>
<tr>
<td>HA02</td>
<td>29</td>
<td>0.50</td>
<td>0.22</td>
</tr>
<tr>
<td>HA03</td>
<td>30</td>
<td>0.63</td>
<td>0.28</td>
</tr>
<tr>
<td>HA06</td>
<td>29</td>
<td>0.54</td>
<td>0.16</td>
</tr>
<tr>
<td>Professional Development and Responsibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PD02</td>
<td>31</td>
<td>0.67</td>
<td>0.19</td>
</tr>
</tbody>
</table>

*This value was much larger as this item was one of the initial two items that appeared on every assessment.

Based on these results, the item pool was 36. Table 4 displays the breakdown of test items by content area prior to analysis and those meeting discrimination and difficulty criteria. Figure 3 shows the percentage breakdown of the revised item pool.

Reliability

Reliability is a measure of internal consistency. Due to the randomized administration of the test items, internal consistency cannot be measured.
**Table 4.** Test Items by Content Area

<table>
<thead>
<tr>
<th>Content Area*</th>
<th>Items Administered to Participants</th>
<th>Number of Items Meeting Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence-Based Practice</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Prevention and Health Promotion</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>Clinical Examination and Diagnosis</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Acute Care of Injuries and Illnesses</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Therapeutic Interventions</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Psychosocial Strategies and Referral</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Healthcare Administration</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Professional Development and Responsibility</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>98</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

*Content areas as determined by the Competencies.*
Percentage Breakdown of Items Meeting Discrimination & Difficulty Criteria

Figure 3. Post-analysis distribution of test items by content area.

Participant Scores

Participant scores ranged from 8% to 92% with a mean score of 62.23%. Results are displayed in Figure 4. Participant results in relation to terms of athletic training education completed can be found in Table 5. Average scores were 63.35% for men and 61.78% for women. Participants from baccalaureate programs scored an average of 62.42% whereas participants from post-baccalaureate programs had an average score of 54.66%. It is important to note
that only 3 participants who completed the assessment were enrolled in post-baccalaureate programs.

**Participant Performance in Relation to Terms Completed**

**Figure 4.** Percentage scores of participants in relation to number of terms of athletic training education completed.
**Table 5. Average Scores Based on Terms Completed**

<table>
<thead>
<tr>
<th>Terms Completed</th>
<th>Number of Participants</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>50.40</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>63.27</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
<td>62.57</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>57.33</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>63.75</td>
</tr>
<tr>
<td>6</td>
<td>37</td>
<td>63.46</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>81.33</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>60.57</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>77.33</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>92.00</td>
</tr>
</tbody>
</table>
Chapter 5: Discussion

Introduction

This section provides an interpretation of the results from the item analysis. The impact of demographic information on results, final item pool quality, and the need for a standardized tool are discussed. The limitations of the research due to test item quality, participants, and test scope are also addressed. The conclusion focuses on the applicability of these findings and opportunities for further research.

Demographics

Participants’ experience with the material contained in the Competencies is unknown. While the demographic data included number of terms of athletic training education completed, variance in programmatic structure makes it difficult to determine participants’ actual familiarity with the material. Participants acknowledged whether the terms of their institution’s academic calendar were semesters, trimesters, or quarters, with 97% of participants choosing semesters. The average of approximately 4.5 terms completed on a semester system would equate to over 2 years of athletic training education. Since length of official enrollment in the athletic training program also varies by institution, individuals with 4 terms as an athletic training student could range from sophomore to senior status depending on when their program began. Performance on the assessment did not seem to be correlated to number of terms of athletic training completed (see Figure 4).
The representativeness of this sample is questionable. While participants were affiliated with over 50 athletic training programs, approximately 8% were from the same institution. The involvement of program directors forwarding the link to the assessment tool had an effect on demographic distribution; if program directors chose not to forward the tool, their students did not have the opportunity to participate. In addition, some program directors were unable to provide students with the link due to individual institutional review board policies.

**Revised Item Pool**

While over 100 items existed in the original pool, items were discarded due to misalignment as judged by the expert panel, failure to meet a discrimination threshold of 0.1, or a difficulty value outside the acceptable range of 0.32 to 0.92. The total item pool had discrimination index values ranging from -0.0625 to 0.3125 and difficulty ranging from 0 to 1. A tool based on earlier editions of the Competencies showed similar difficulty and discrimination values for its item pool, but its descriptive nature precluded acceptability thresholds from being established.⁸

Items in the revised pool have difficulty values ranging from 0.32 to 0.92 and discrimination values greater than 0.1. Based on these findings, the final item pool has 36 items which represents approximately 31% of the original items. To mirror the test blueprint as closely as possible, more items would need to be developed to establish a representative standardized tool.
Standardized Tool

The purpose of this research was to develop an assessment tool based on the Competencies. Currently no standardized assessment is available to programs to measure student learning based on the fifth edition Competencies. While programs are given some autonomy in evaluation, establishing a standardized tool would present programs with an additional resource for assessing outcomes. Due to a lack of items and absence of a reliability measure, this tool is not sufficient in its current state.

Limitations

Test Items. Ideally, item writers collaborate to develop test items. In this study, the primary researcher was responsible for writing the items. In addition to subjecting all items to the same bias, having one item writer resulted in a small initial item pool. Upon review from an expert panel, the pool of items shrank due to lack of agreement regarding alignment. Retaining only items meeting established discrimination and difficulty criteria caused a further reduction in the item pool.

Participation. Results may have been influenced by the voluntary nature of participation. Participants received no compensation or benefits for participating; participants also experienced no consequences or loss of benefits based on poor performance. Lack of perceived importance or buy-in on the behalf of the participants classifies this research as a low-stakes assessment. The applicability of these results to high-stakes tests may be limited.
Further Research

Additional research is needed to develop an assessment that accurately represents the material found in the Competencies. In its current state, this item pool is insufficient, because it does not contain enough items nor does it have a reliability value. The revised item pool is relatively small; further research could involve creating more test items. Assuming a tool containing 50 items is the goal, Table 5 shows the number of items that would need to be created by content area. Following the creation of these items, administration of the entirety of the revised item pool to a sample would provide a measurement of reliability.
**Table 6. Items Needed for Blueprint**

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Current Items</th>
<th>% of Total Items</th>
<th>Total Items Needed*</th>
<th>Blueprint %</th>
<th>Still Need to be Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence-based practice</td>
<td>3</td>
<td>8.33</td>
<td>3</td>
<td>6.45</td>
<td>0</td>
</tr>
<tr>
<td>Prevention and Health Promotion</td>
<td>9</td>
<td>25.00</td>
<td>11</td>
<td>22.58</td>
<td>2</td>
</tr>
<tr>
<td>Clinical Examination and Diagnosis</td>
<td>5</td>
<td>13.89</td>
<td>6</td>
<td>10.59</td>
<td>1</td>
</tr>
<tr>
<td>Acute Care of Injuries and Illnesses</td>
<td>4</td>
<td>11.11</td>
<td>9</td>
<td>18.43</td>
<td>5</td>
</tr>
<tr>
<td>Therapeutic Interventions</td>
<td>6</td>
<td>16.67</td>
<td>7</td>
<td>14.28</td>
<td>1</td>
</tr>
<tr>
<td>Psychosocial Strategies and Referral</td>
<td>4</td>
<td>11.11</td>
<td>4</td>
<td>8.29</td>
<td>0</td>
</tr>
<tr>
<td>Healthcare Administration</td>
<td>4</td>
<td>11.11</td>
<td>7</td>
<td>13.82</td>
<td>3</td>
</tr>
<tr>
<td>Professional Development and Responsibility</td>
<td>1</td>
<td>2.78</td>
<td>3</td>
<td>5.5</td>
<td>2</td>
</tr>
</tbody>
</table>

*Based on a 50-item assessment.

Following the implementation of this tool, its correlation to BOC examination success and program grade point average could be determined. Depending on the results, the tool could be used as a predictive measure for students and programs.
Conclusion

Developing and validating a standardized tool for assessing knowledge included in the Competencies could be helpful for programmatic outcome measures. In order for this tool to be useful, a larger item pool would need to be developed as only 36 items from this study demonstrated appropriateness through expert panel review, acceptable discrimination, and difficulty within the established standards. While these 36 items provide a helpful starting point, more items are needed to accurately represent the material contained within the Competencies. Additionally, the item pool’s reliability would need to be established through an administration of all items to participants.
References


Appendix A: Phase I Recruitment Letter

Dear _____________,

Developing an athletic training outcome measure based on the fifth Educational Competencies is the focus of my Master’s thesis in Athletic Training at Ohio University. I am asking for your help in this endeavor. Your participation is necessary for my success as I strive to develop test items.

Attached you will find an informed consent form and a portion of my test blueprint which aligns test items with a specific competency as found in the fifth ed, Education Competencies. By choosing to participate, your consent is implied. I ask that you determine whether I have chosen the correct competency for each test item. If this is the case, please put your initials in the “Agree” column. If you believe the item is incorrectly aligned, please put your initials in the “Disagree” column and state your reasoning in the “Comments” column.

Sincerely,

Alyssa S. Anderson, AT
Graduate Assistant Athletic Trainer
Ohio University
aa043612@ohio.edu
773.972.9316
Appendix B: Phase I Consent Form

Ohio University Consent Form

Title of Research: Developing an Athletic Training Knowledge Assessment Tool: Phase I

Researchers: Alyssa Anderson, AT; Chad Starkey, PhD, AT

You are being asked to participate in a research study. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. This form describes the purpose, procedures, possible benefits, and risks. It also explains how your personal information will be used and protected. Once you have read this form and your questions about the study are answered, you will be asked to continue on to the next page of the online assessment. If you choose to continue, your consent will be implied.

Explanation of Study

This study is being done to assess professional athletic training students’ knowledge of the material in the fifth ed. Educational Competencies. To develop a quality assessment, the individual test items must be appropriate. If you agree to participate, you will be asked to determine whether test items align appropriately with assigned competencies.

Risks and Discomforts

There are no anticipated risks or discomforts above those associated with normal judgment of test questions.

Benefits

This study is important to the athletic training profession because it may help professional programs demonstrate student learning as part of the required outcomes assessment. You may not benefit personally by participating in this study.

Confidentiality and Records
No identifiers will be recorded.

Contact Information

If you have any questions regarding this study, please contact:

Alyssa S. Anderson, AT
Graduate Assistant Athletic Trainer
Ohio University
aa043612@ohio.edu
773.972.9316

Chad Starkey, PhD, AT, FNATA
Department of Athletic Training
School of Applied Health Sciences and Wellness
Athletic Training Program Division Coordinator
Grover Center E332
Athens, OH 45701-2979
starkeyc@ohio.edu
740.593.1217

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

By choosing to respond, you are agreeing that:
- you have read this consent form (or it has been read to you) and have been given the opportunity to ask questions and have them answered
- you have been informed of potential risks and they have been explained to your satisfaction.
- you understand Ohio University has no funds set aside for any injuries you might receive as a result of participating in this study
- you are 18 years of age or older
- your participation in this research is completely voluntary
- you may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you and you will not lose any benefits to which you are otherwise entitled.

Signature_____________________________________________ Date_____________

Printed Name__________________________________________

Version Date: [1/24/14]
Appendix C: Phase II Recruitment Letter

Dear [Institution] Athletic Training Program Director,

Developing an athletic training outcome measure based on the fifth Educational Competencies is the focus of my Master’s thesis in Athletic Training at Ohio University. Your cooperation is necessary for my success as I strive to validate this tool. If you are willing, please forward this email and attached link to all the students currently enrolled in your program and encourage them to participate. This portion of the online knowledge assessment includes ___25____questions and has a time limit of _25 minutes____.

Currently, documentation of educational outcomes is required, but there is no consensus on the definition, components and tools to measure and quantify it. The purpose of my research is to validate a tool that can be used as a component of assessing outcomes.

Thank you for the work you do for the education of future professionals. I hope you will encourage your students to participate in this assessment opportunity.

Sincerely,

Alyssa S. Anderson, AT
Graduate Assistant Athletic Trainer
Ohio University
aa043612@ohio.edu
773.972.9316
Appendix D: Phase II Informed Consent

Title of Research: Validating an Athletic Training Knowledge Assessment Tool (Phase II)

Researchers: Alyssa Anderson, AT; Dr. Chad Starkey, PhD, AT

You are being asked to participate in research. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. This form describes the purpose, procedures, possible benefits, and risks. It also explains how your personal information will be used and protected. Once you have read this form and your questions about the study are answered, you will be asked to continue on to the next page of the online assessment. If you choose to continue, your consent will be implied.

Explanation of Study

This study is being done to assess professional athletic training students' knowledge of the material in the fifth ed. educational competencies. To validate the knowledge assessment, it must be shown to measure what it is intended to measure. The knowledge assessment must also have consistent results or reliability. If you agree to participate, you will be asked to complete a knowledge assessment of 25 multiple choice questions to be completed in 25 minutes.

Risks and Discomforts

There are no anticipated risks or discomforts above those associated with a normal online assessment.

Benefits

This study is important to the athletic training profession because it may help professional programs demonstrate student learning as part of the required outcomes assessment. You may not benefit personally by participating in this study other than gaining experience in taking an athletic training specific assessment.

Confidentiality and Records

Your study information will be kept confidential by coding your results. The master sheet of personal information will be stored in a password protected file until data analysis has been completed.
Contact Information

If you have any questions regarding this study, please contact:

Alyssa S. Anderson, AT
Graduate Assistant Athletic Trainer
Ohio University
aa043612@ohio.edu
773.972.9316

Chad Starkey, PhD, AT, FNATA
Department of Athletic Training
School of Applied Health Sciences and Wellness
Athletic Training Program Division Coordinator
Grover Center E332
Athens, OH 45701-2979
starkeyc@ohio.edu
740.593.1217

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

By clicking next, you are agreeing that:

- you have read this consent form (or it has been read to you) and have been given the opportunity to ask questions and have them answered
- you have been informed of potential risks and they have been explained to your satisfaction.
- you understand Ohio University has no funds set aside for any injuries you might receive as a result of participating in this study
- you are 18 years of age or older
- your participation in this research is completely voluntary
- you may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you and you will not lose any benefits to which you are otherwise entitled.

Signature ___________________________ Date __________

Printed Name ___________________________  Version Date: [1/24/14]