This is to certify that the

dissertation entitled

THE IMPORTANCE AND MEASURABILITY OF SELECTED NATA EDUCATIONAL COMPETENCIES AS PERCEIVED BY CERTIFIED ATHLETIC TRAINERS AND TEAM PHYSICIANS

presented by

Sally Eaves Nogle

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Kinesiology

Gail M. Dummer
Major professor

Date 8/13/01

THE IMPORTANCE AND MEASURABILITY OF SELECTED NATA EDUCATIONAL COMPETENCIES AS PERCEIVED BY CERTIFIED ATHLETIC TRAINERS AND TEAM PHYSICIANS

By

Sally Eaves Nogle

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Kinesiology

2001

ABSTRACT

THE IMPORTANCE AND MEASURABILITY OF SELECTED NATA EDUCATIONAL COMPETENCIES AS PERCEIVED BY CERTIFIED ATHLETIC TRAINERS AND TEAM PHYSICIANS

By

Sally Eaves Nogle

The purpose of this study was to describe the measurability and importance of the competencies in the general medical conditions and disabilities content area of the National Athletic Trainers' Association educational competencies as perceived by athletic trainers and team physicians. This content area is only one of twelve content areas that define the competencies necessary for the entry-level athletic trainer.

Four research questions guided this study: (a) the extent to which stakeholders perceive that the educational competency statements in the general medical conditions and disabilities content area are measurable; (b) the extent to which the stakeholder groups differ on the perceived measurability of each of these competencies; (c) the extent to which stakeholders perceive these competencies as important; and (d) the extent to which the stakeholder groups differ on the perceived importance of the competency statements.

The instrument included the competencies, paired with 4-point Likert-type scales for rating both importance and measurability. The stakeholder groups included 420 certified athletic trainers (ATC) from college and university settings; 384 "professional" ATCs from high school, clinic, industrial, and professional sports settings; and 122 team physicians who were members of the American Society of Sports Medicine or the American Orthopedic Society of Sports Medicine.

The results of the study revealed that participants had a wide range of perceptions about the measurability and importance of these competencies; however, there were no statistical differences in perceived measurability or importance across stakeholder groups. Overall, the measurability of the competencies was perceived to range from "somewhat measurable" to "measurable." The competency perceived to be the easiest to measure was "assessing vital signs," and the least measurable was "supporting the moral and ethical behavior of athletic trainers in dealing with diseases for the persons who are physically active". Measurability issues occur because a competency is not easily observed, it involves uncommon conditions or situations, it is difficult to simulate, and/or the competency statement is unclear.

The ratings for importance demonstrated that overall, the affective domain and psychomotor assessment competencies were perceived as the most essential. The competency perceived to be the most important was "recognizing postconcussional syndrome," while the least important was "describing common conditions of the breast". Some of the less important competencies may be beyond the scope of duty for the entry-level ATC.

Overall, 37% of the 57 competencies were rated low in both measurability and importance. Further breakdown of these competencies revealed that 49% of the cognitive, 25% of the psychomotor assessment, 11% of the psychomotor treatment, and none of the affective competencies were in the "low-low" category. The results of this study demonstrate a need to further evaluate the NATA educational competencies since they are the basis for the accreditation of athletic training programs and the certification of athletic trainers.

ACKNOWLEDGEMENTS

There are many people who contributed to my completion of graduate school and this dissertation. I would like to thank them for their support.

The members of my dissertation committee are appreciated for all their time and efforts. I thank Dr. John Haubenstricker, Dr. Paul Vogel, and Dr. Stephen Yelon for sticking with me through these many years as an integral part of my graduate experience. A thank you to Dr. Edward Wolfe, the statistical whiz, without whom I would still be making calculations. A special thank you to my advisor, Dr. Gail Dummer, who spent countless hours advising me on my dissertation and who went above and beyond the call of duty with her expediency and support.

I thank my coworkers and many friends who have been willing to listen to me and provide me with their wisdom and assistance throughout graduate school. A special thank you to Dave Carrier, George Glazer, Jo Ann Janes, Holly and Dr. Michael Kasavana, Tom Mackowiak, Carrie Murphy, and Gale and Dr. Larry Schiamberg who have always been there for me and constantly encouraged me with their unending support. Also, a special thank you to Jeff Monroe, who allowed me to pursue this dream and supported me throughout the entire process.

To my parents, Jackson and Pat Eaves, I thank you from the bottom of my heart for the love and encouragement that has always been there for me.

Finally, but most importantly, thank you to my husband, Carlton, and children Bryce and Tracy, who have sacrificed often to allow me time to complete my work. I appreciate your patience and I love you.

All of you have made this dream a possibility and I cannot thank you enough.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The educational competencies of the National Athletic Trainers' Association (NATA) represent the key knowledge and skills needed by entry-level certified athletic trainers. The educational competencies have been revised and expanded numerous times since the 1980's; however, they have not undergone rigorous evaluation to determine if the outcomes are measurable and essential. This evaluation is crucial because these competencies are receiving increased attention as the basis for the accreditation of athletic training education programs and the associated revisions of athletic training curricula nationwide. In addition, the educational competencies are the foundation for the national athletic training certification examination. Accordingly, the evaluation and refinement of these competencies would provide a means to assure a level of quality critical to the profession.

The first edition of the NATA competencies was developed in the 1980's after the completion of a professional role delineation study (Grace, 1999). Subsequent editions were written as repeated role delineation studies were completed with the results documented as revised competencies. In 1999, the NATA competencies were increased from 191 to 542 with the addition of 696 clinical proficiencies (NATA, 1996; NATA, 1999). The 542 competencies that appear on the revised list represent a huge amount of content to be covered in an athletic training educational program.

Furthermore, the National Athletic Trainers' Association Board of Certification (NATABOC) recently mandated that beginning in 2004 to be eligible to qualify for the National Athletic Trainers' Association (NATA) certification exam, a student must have

graduated from an accredited program (Hunt, 1998; McMullan, 1997; NATA Education Task Force, 1997). This mandate effectively eliminates the former internship route to certification, thereby altering the educational methodology currently used to educate athletic trainers at most universities. Instead of working as mentors to student athletic trainers in an internship arrangement where a minimum of 1500 hours of apprenticeship were required, athletic training educators must focus more on formal coursework under the new requirements. Many collegiate athletic training educators will restructure the educational programs at their institutions to conform to accreditation guidelines as specified by Commission on Accreditation of Allied Health Education Programs (CAAHEP) of the American Medical Association (AMA). In most cases, this will lead to an escalation of the number of athletic training courses taught at participant institutions. As athletic training programs are restructured, their curricula must include the NATA educational competencies (NATA, 1999).

Athletic training educators face challenges when attempting to implement the NATA competencies into the university curriculum. There are concerns about the number of competencies required. This was illustrated by comments posted on the athletic training education listserv that discussed the concerns about how to teach and develop competence in all these areas. Some thought that the competencies have gone beyond "entry-level." One person referred to this problem as "competency overflow." Another commented "... I look at the competencies which have been put forth and wonder how it can be done in 4-5 years of school. I think that many of the proponents of these new competencies, most with 10-20 years of experience, didn't learn all of the stuff they say kids should learn, in school...." A student listserv respondent even discussed his

frustration when presenting information on one specific competency for a class project and found the amount of instructional time necessary to teach the implied competency overwhelming. He had presented, but not developed competence in only half of one of the general medical conditions and disabilities competencies in 1.5 hours. His concern was that the time it would take to truly develop competency in only half of that competency would preclude the students from learning some other competencies that he felt were more important. These comments illustrate common concern over both the number and the importance of the NATA competencies.

There are a limited number of credits and curricular opportunities in every educational program. It is imperative that the importance of the competencies is identified so that high priority content will be emphasized in the curriculum. Therefore, a critical issue of the study is to determine the importance of competencies proposed for inclusion in a program. The NATA has done a good job of delineating competencies, but with the concerns voiced, it is time to take a realistic look to determine if all of the current competencies are truly essential for the entry-level certified athletic trainer.

In addition to the number of competencies, there is concern about the potential variability of interpretation of each competency by athletic trainers. A competency must be clearly written to achieve interpretability and measurability. When competencies can be accurately measured, a standardized understanding of the most important knowledge and skills necessary for becoming a successful athletic trainer can be established. This, in turn, contributes to the educational process because programs can be designed to achieve intended curricular outcomes. Conversely, if a competency's standards of achievement are variable across athletic trainers or sports medicine physicians, the competency

statement must be revised to provide its intended curricular guidance function. Hence, curriculum development and evaluation standards will be stronger and more purposeful with measurable competencies.

An example of a problem in this area occurred when the investigator tried to develop a rubric for the affective domain competency concerning "supporting the moral and ethical behavior of athletic trainers when dealing with diseases of athletics and physical activity." In attempting to help standardize student evaluation within the staff members at her institution, it was found that there was a lack of consensus on the meaning of the competency statement. Therefore, it was not possible to develop a rubric because everyone wanted to measure something different. A lack of measurability may be due to the vagueness of a statement or, the difficulty in measuring some competency areas. Both difficulties are aided, however, by addressing the measurability of each competency statement.

The NATA's revised educational competencies specify the outcomes that students should possess upon completion of an accredited athletic training educational program. Competencies are grouped into twelve content areas: (a) risk management and injury prevention; (b) pathology of injuries and illnesses; (c) assessment and evaluation; (d) acute care of injury and illness; (e) pharmacology; (f) therapeutic modalities; (g) therapeutic exercise; (h) general medical conditions and disabilities; (i) nutritional aspects of injury and illness; (j) psychological intervention and referral; (k) health care administration; and (l) professional development and responsibilities. Within each content area the competencies are distributed among three domains: cognitive,

psychomotor, and affective. One content area, general medical conditions and disabilities, is the focus of this study.

The general medical conditions and disabilities area was chosen because it includes a wide range of competencies in which both athletic trainers and sports medicine physicians have been educated. In addition, several concerns have been expressed about this area on the athletic training educators listserv. Some athletic trainers feel the competencies in this content area are outside the scope of athletic training, and that they are better left for the team physician. Also, there is concern that some competencies require a great deal of time to develop proficiency and that they are of low importance. Such competencies may need to be deleted to prevent detracting from some of the competencies perceived as more important. Where educational resources are insufficient to address all the competencies currently contained in the NATA document.

These issues demonstrate the need to identify the importance of these competencies for the entry-level athletic trainer. Research can also help to identify poorly defined competency statements, thus facilitating their future revisions.

Statement of Purpose

The purpose of this study is to describe the measurability and importance of the competencies in the general medical conditions and disabilities section of the NATA educational competencies as perceived by athletic trainers and sports medicine physicians.

Significance of the Study

The identification of the most important competencies, and subsequently developing methods of teaching and evaluating that content, is critical to the health and

well-being of athletes, patients, and clients that athletic trainers will serve in their professional lives. Conversely, a lack of knowledge and skills may actually exacerbate the severity of injuries, illnesses, or medical conditions of clients. Both can be detrimental to the credibility of the athletic training profession. Additionally, the consequences of insufficient knowledge or skills enable additional liability risk because of possible harm to the patient.

The fact that NATA educational competencies are used by thousands of athletic trainers representing over 200 college and university athletic training programs across the country contributes to the significance of this problem. Athletic training educators at every one of these programs are faced with the challenge of implementing the competencies and clinical proficiencies in a coursework emphasis program. This problem is exacerbated when considering the limited instructional time available to athletic training programs. For example, most programs require approximately 30 semester credit hours in the major area of study. This converts to 450 hours of classroom time to teach, develop, and evaluate 542 educational competencies, an average of only 50 minutes per competency. These values do not include the time needed for student attainment of the 696 clinical proficiencies that are to be developed in the clinical education program. Accordingly, much work is needed to establish measurability and importance of the competencies to aid in managing this merger between content and instructional resources.

This study will identify the importance of each of the general medical conditions and disabilities educational competencies as rated by certified athletic trainers and sports medicine physicians. The results will help determine which competencies are essential

for the entry-level ATC and provide a foundation for further research of the other 11 content areas.

Competencies that are clearly stated and those that are not directly measurable will also be identified. This study was designed to identify competencies that need modification and/or clarification. Such information will help educators in athletic training programs to focus their curricula on high priority, clearly stated, measurable competencies. Educators may waste time trying to define the competency and even worse, they may teach unnecessary content, wasting time for both the students and instructors. The identification of competency measurability may also give rise to the establishment of better tools for student evaluation.

These issues need to be addressed expediently because in 2002 CAAHEP is requesting a competency matrix from each institution that will display when students are taught a competency, when they are evaluated, and how often they are evaluated as part of the accreditation process. Additionally, by 2004, all athletic training programs are to be accredited based on the degree to which they are in alignment with the competencies.

Research Questions

This study focused on the general medical conditions and disabilities content area of the NATA Athletic Training Educational Competencies (NATA, 1999). The following research questions guided this study:

1. To what extent do stakeholders perceive that the educational competency statements in the general medical conditions and disabilities content area are measurable?

2. To what extent do college/university athletic trainers, professional athletic trainers, and sports medicine physicians differ on the perceived measurability of the general medical conditions and disabilities educational competency statements?

3. What importance do stakeholders assign to each of the competencies in the general medical conditions and disabilities area?

4. To what extent do college/university athletic trainers, professional athletic trainers, and sports medicine physicians differ on the perceived importance of the competency statements in the general medical conditions and disabilities area?

In addition to these research questions, the influence of demographic variables such as gender, employment status, and teaching responsibilities will be explored.

Assumptions

The assumption was made that the participants had sufficient knowledge and experience in the athletic training field to rate each competencies measurability and importance. Additionally, it was assumed that the participants gave a good faith effort when rating each competency. Another assumption was that when a stakeholder rated a competency, he/she was interpreting it as intended.

Limitations

Any misunderstanding of the content of a specific competency could influence the stakeholder's perception of its measurability, creating a limitation in the ratings for both importance and measurability. In addition, if the results show that the competency is not easily measured, the importance ratings for that competency will be suspect. For example, one participant noted that for competency # 57, accepts the roles of medical and allied health personnel in the referral of those physically active people suffering from

medical conditions, that if the interpretation is "accepts the roles of other medical personnel" he would rate it as a "1, nonessential"; however, if the interpretation is "accepts referral to other medical personnel" then the rating would be a "4, very essential." Therefore, the stakeholder's interpretation and perception of the intent of the competency, even if erroneous, affects his/her rating.

Another limitation is that the sample may not be representative of all athletic trainers, because it may be postulated that the athletic trainers who returned the questionnaires are atypical. Those who volunteered to complete and return the surveys may be different from those who did not participate in this research, creating a self-selection bias.

Only one content area of the educational competencies was evaluated. Each content area covers different competencies of the athletic training profession and is dissimilar from the other content areas. Therefore, the results from the general medical conditions and disabilities section may not be an appropriate representation of the other content areas. For instance, this content area may have clearly written and thus easily measured competencies, which would give the impression that, in general, all the competencies are measurable. Conversely, the general medical conditions and disability content area may have many ambiguous and unmeasurable competencies that would give the impression of major problems. Therefore, it is important that these results not be generalized to the other content areas.

Definition of Terms

1. Athletic training. An allied health profession that applies the art and science of sports medicine for the prevention and management of injuries for those who are physically active.

2. CAAHEP. The Commission on Accreditation of Allied Health Education Programs, the accrediting body for the American Medical Association (AMA) of athletic training educational programs.

3. Certified Athletic Trainer (ATC). A Certified Athletic Trainer. He/she has passed the National Athletic Trainers' Association Board of Certification exam.

4. Competencies. The knowledge, skills and attitudes that a person must demonstrate to be competent in a given area.

5. Entry-level certified athletic trainer. An athletic training program graduate who has recently passed the NATABOC exam.

6. Internship. An educational experience where students learn the skills necessary for the profession by working with certified athletic trainers in a clinical setting.

7. JRC-AT. The Joint Review Committee-Athletic Training is the committee that validates whether or not a program is in compliance with the required educational standards required for accreditation by CAAHEP.

8. NATA. National Athletic Trainers' Association, the national governing body for athletic trainers, founded in 1950.

9. NATABOC. National Athletic Trainers' Association Board of Certification, the organization that establishes the requirements for eligibility for the certification exam and certifies athletic trainers.

10. Program or curriculum director. The person responsible for the day-to-day operation, implementation, management, and evaluation of a CAAHEP accredited athletic training educational curriculum.

11. Role-delineation study. Role delineation studies focus on the tasks that are performed on the job, the importance of the tasks, the frequency of the tasks, and how critical the tasks are for the entry-level athletic trainer (NATA Education Council, 1999b; Grace & Ledderman, 1982).

12. Sports medicine physician. A doctor who is working with athletic trainers and athletic teams and is listed as a member in either the American Medical Society for Sports Medicine or the American Orthopedic Society for Sports Medicine.

13. Stakeholders. Individuals who are involved in the athletic training profession as certified athletic trainers or team physicians. For this study they include a) sports medicine physicians, b) ATC's working at the collegiate level, and c) ATC's employed at high schools, clinics, industrial, or other settings.

CHAPTER 2

REVIEW OF RELATED LITERATURE

The purpose of this study was to establish the perceived measurability and importance of the general medical conditions and disabilities content area of the NATA educational competencies. The following topics will be reviewed in this chapter: (a) accreditation of programs in athletic training, allied health and medical fields (b) accreditation of athletic training education programs; (c) educational models in allied health and medical education; (d) competency-based education, especially in relation to allied health and medical fields; (e) competencies; and (f) athletic training competencies.

Accreditation of Educational Programs

The education of athletic trainers has evolved into accreditation of the programs that are responsible for producing students who are competent and qualified to become certified athletic trainers. In exploring accreditation in athletic training, it is important to understand general philosophies and practices related to accreditation. General accreditation once was perceived as a threat to the freedom of colleges and universities, but has now become widely accepted by those institutions (Selden, 1960). The once held belief that accrediting organizations should not interfere with higher education has changed to the point where accreditation has become the accepted standard. The purpose of accreditation in higher education is to inform the public through certification that an institution is of acceptable quality, and to support institutions in improving their educational programs (Commission on Institutions of Higher Education, 1984-1985).

According to Selden (1960), accreditation is the process by which an organization or agency grants a college, university, or program of study as having met specific standards. The accreditation process focuses on two concerns: (a) educational quality, defined and interpreted through a comparison of the institution's own statements of scope and purpose with those of similar institutions; and (b) institutional integrity, that the institution or program is accurate in describing its goals and abilities as well as the capability to complete set tasks (Young, Chambers, Kells, & Associates, 1983). Accreditation can improve the institution or program by forcing it to focus on internal issues.

Program Accreditation

Apart from the accreditation of the general university, many programs within the institution participate in separate, individual program accreditation. Program accreditation, also identified as specialized accreditation or professional accreditation, is primarily relevant to the approval of programs, entry-level curricula, disciplines, or units within institutions of postsecondary education (Commission on Institutions of Higher Education, 1984-1985; Harcleroad, 1980; Stull, 1989). Program accreditation examines the curricula and the specified student outcomes within the specialized program in an institutional setting. The American Physical Therapy Association (APTA, 2001) defines specialized accreditation as "a system for recognizing professional education programs for a level of performance, integrity, and quality that entitles them to the confidence of the educational community and the public they serve. Accreditation status signifies that the program meets established and nationally accepted standards of scope, quality and relevance."

The charge of accreditation is to assure quality education through the official accreditation process (Fauser, 1992; Shirer, 1987). The accreditation process requires the following essential elements: (a) clearly stated educational intentions by the program; (b) performance of a self study focused on the achievement of these intentions; (c) an on-site evaluation by a selected group of peers; and (d) a decision by an independent accrediting commission that, in light of its standards, the institution or specialized unit is worthy of accreditation (Young et al., 1983). Therefore, an outside group visits the institution to perform an evaluation and arrive at an independent judgment verifying or denying that the program is substantially accomplishing its objectives and that the quality of education meets the acceptable standards. Conditions that are believed to be necessary and desirable to produce educational quality (input, resources, and process) are encouraged and evaluated by assessing evidence that the program does indeed achieve educational quality, as stated in the purpose and goals.

In order to evaluate itself objectively, the institution uses a self-study process. This process will identify the strengths and weaknesses of the program (Dummer, Reuschlein, Haubenstricker, Vogel, & Cavanaugh, 1993). The information provided from the institution's self-study is presented to the accrediting body for validation. The self-study must have measurable verification that the students who have completed the program have achieved the outcomes described. This process is rigorous, but necessary for the specialized program within the institution to attain accreditation. Gelmon (1996) notes that the primary purpose of the self-study should not, however, just be accreditation; each institution should use the results to improve the educational quality of the program.

Importance of Accreditation in Health Fields

Program accreditation was first developed by the professions of medicine and law as a means of raising educational standards in their respective fields of study (Harcleroad, 1980; Selden, 1960). The need for specialized accreditation for medical schools was generated from the concern over the abilities of the graduating practitioners. The variance of programs and inconsistency in knowledge and skills of graduates created the need to improve the quality of their educational programs, which accreditation could help accomplish (Selden, 1960). The institutions, along with the profession, did not want graduates regarded as incompetent. In addition, the public should have the assurance that a person who graduates with a medical or allied health degree will be competent in his/her field (Gelmon, 1996; Young et al., 1983). Young et al. postulated that there is no need to argue about society's need for quality assurance in the education of practitioners in health related fields; it is an obvious necessity.

Although seemingly necessary for quality assurance and endorsed by the individual allied health professions, program accreditation has not been embraced by all institutional leaders (Selden, 1960). Some felt the institutional accreditation for the university already was achieved and should be satisfactory. Accreditation also has been viewed as an expensive, time consuming, bureaucratic activity with possible disciplinary repercussions (Gelmon, 1996; Kniffel, 1999). Mangan (1999) researched accreditation for health programs and found unfavorable results. She reported that a university's Center for Health Professions Committee found site visitors from accrediting bodies to be rigid with poor inter-rater reliability. The committee also found that the process was time consuming and expensive. In addition, Bruhn (1993), writing about the need to abolish

individual allied health program accreditation, noted that the accreditation process still focuses on monitoring details and instilling standardization and conformity. He suggested that accrediting agencies often are more concerned with the way things are done in the program rather than with the outcomes, creating a prescriptive educational program with little room for program variation or innovation. These are important concerns because the whole accreditation process places large time demands on program personnel to gather the information for the self-study. Therefore, if the accreditation process is not founded on the outcomes necessary for the students, it may be a waste of everyone's time and energy. The profession, and ultimately the public, should have assurance that the graduates of an accredited allied health care program are qualified entry-level workers. One of the chief causes of tension between institutional leaders and the specialized accreditation advocates is the question of who is being served by the accreditation process, the institution or the profession (Knight, 1991). The best result is to identify a balance between the two. Appropriate professional standards must be upheld, not only in the interest of the profession, but also for the good of society. In general, specialized accreditation acknowledges that mission as its primary function. Currently the belief is that all accreditations, institutional or specialized, should have educational outcomes as their primary focus.

Contrary to those who believe accreditation is an expensive, time consuming, bureaucratic activity, Young et al. (1983) expressed optimism that specialized accrediting bodies have been attempting to further improve their operations, with several agencies making enormous efforts to study and validate their standards. The key is the establishment of these standards and expected outcomes so that the accreditation process

is not a random event depending on who is evaluating the program. In allied health fields, the Committee on Allied Health Education and Accreditation (CAHEA) is trying to help improve the accreditation process by supporting succinct, cost effective reports as long as the professional requisites are maintained (Fauser, 1990). In addition, Healy (1999) recently pointed out that the United States Education Department is proposing rules to provide more flexibility to institutions of higher education by decreasing the demands on branch campuses, as well as improving their review of an institution's standards. Also, the Higher Education Amendments of 1998 and the proposed regulations described accreditors as retreating towards their traditional function as assessors of educational quality and agencies trying to help institutions improve their programs (Healy, 1999).

Program accreditation lends credibility to the institution's educational program and to the profession. Therefore, many institutions and programs participate in voluntary accreditation because of the credibility and prestige it provides. If a program achieves accreditation, the public thinks of a certified program as "good" (Shirer, 1987). Young et al. (1983) asserted that the enhancement of a profession must be through the structure for accrediting educational programs. A member of the NATA Board of Directors supported that assertion when he stated that athletic trainer educational reform and proposed program accreditation "will further enhance our credibility, help us keep abreast of current techniques and better qualify our members to perform their functions of caring for the physically active" (McMullan, 1997, p. 4). As for the many professions that struggle for recognition, accreditation can supply it instantly.

Accreditation is mandatory for several programs in order for the graduating students to be eligible for a professional certification or licensure exam (Fauser, 1992;

Harcleroad, 1980; Roberts, Cordova & Saxe, 1978). Young et al. (1983) stated that for a few professions, graduation from an accredited program is the only accepted route toward licensure. This has recently become the case for the athletic training profession. Therefore, there are numerous quality reasons why institutions voluntarily seek accreditation. The accreditation process has become widely accepted by many professions and the public. Despite some of the concerns about program accreditation by institutional administrators, it has garnered a strong foothold in numerous allied health care fields, including athletic training.

Accreditation of Athletic Training Education Programs

"Specialized accreditation was born out of the concern of a profession about the quality of educational programs that were preparing its practitioners" (Young et al., 1983; p. 187). This statement summarizes the need for program accreditation and resonates for the profession of athletic training because of the need to ensure educational quality. The athletic training profession has grown and progressed towards accreditation for its educational programs because of the need for standardized quality educational programs, and to generate professional credibility (McMullan, 1996; Peer & Rakich, 2000). Credibility is created when the public has confidence in the educational programs and certification process. This credibility improves the patient's trust of the ATC with the assurance that every ATC has the knowledge and skills to treat their conditions.

It has taken approximately 50 years for the profession to reach its current status of mandatory program accreditation for students to be eligible for the National Athletic Trainers' Association Board of Certification (NATABOC) exam. Athletic trainers took the first step toward professionalism by forming the National Athletic Trainers'

Association (NATA) in 1950 (Ebel, 1999). The NATA was created by a group of men who worked with a variety of institutions providing health care for their athletes while labeling themselves athletic trainers. Essentially, this group founded the profession since there was no recognized formal education in the field and no set curriculum for students interested in athletic training as a profession. At this time, students interested in an athletic training career would pursue a college degree in any discipline and obtain experience through internship training with an athletic team or an apprenticeship with an athletic trainer.

The founders of the NATA realized the need for a strong educational foundation in order for the profession to become a legitimate allied health care field, and therefore formed a committee to establish a professional preparation program for students (Delforge & Behnke, 1999; Hunt, 1998; Rawlinson, 1961, as cited in Zylks, 1988). In 1969, the Professional Education Committee of the NATA established the curriculum requirements necessary to have a NATA-approved undergraduate athletic training education program (Delforge & Behnke, 1999; Zylks, 1988). In addition to a curriculum, they agreed to institute a certification process, the first stages of accreditation (McLean, 1999).

The previously established internship route to certification was allowed to continue in tandem with the NATA-approved curriculums specifying the number of internship hours as the key requirement. Eventually seven core courses (human anatomy, physiology of exercise, human physiology, kinesiology/biomechanics, health, basic athletic training, and advanced athletic training) were identified as essential preparation for students, along with the required clinical hours. Therefore, under the current

certification eligibility requirements, a student can graduate from an approved curriculum along with 800 clinical hours, or follow the internship route of seven core courses and 1500 clinical hours, to be eligible for the NATA certification exam. To balance the lack of standards for the internship route to certification, a larger number of internship hours are required. The view was that with more internship hours, the student would have a better chance of gaining the knowledge and skills required for the certification exam and ultimately for an entry-level job.

The problem with the internship route is the lack of standardization of educational outcomes (McMullan, 1996; Peer & Rakich, 2000). The student who graduated via the internship route was dependent on the certified athletic trainers who were responsible for the instruction, including clinical instruction, in the athletic training program. These educators could decide what to teach based on their own preferences instead of what the profession deemed important or necessary to know. They were not required to teach any specific competencies or proficiencies. Some ATCs did not take the time to teach in the clinical setting, but instead used the students to perform menial tasks. In fact, Turocy, Comfort, Perrin and Gieck (2000) illustrated this when they examined the clinical experience hours performed by students and compared them to the passing rate on the NATABOC exam. The results demonstrated that the amount of clinical hours had no relationship to passing rates. Thus, more internship hours for the students did not translate into more knowledge or skills, and ultimately certification. It would seem logical that if learning were occurring in the athletic training room, then more hours would result in higher passing rates.

An important aspect of the athletic training education evolution occurred when the American Medical Association (AMA) agreed to oversee the educational programs for athletic trainers (Delforge & Behnke, 1999). Originally, the Committee on Allied Health Education Accreditation (CAHEA) (currently, the Commission on Accreditation of Allied Health Education Programs or CAAHEP) was the accrediting body of athletic training education (Delforge & Behnke, 1999; Hunt, 1998; Mathies, Denegar, & Arnhold, 1995; Weithaus & Fauser, 1991). Formed in 1976, CAHEA was one of the early specialized accreditation units under the umbrella of the AMA. In fact, the AMA was one of the first professional organizations to develop an umbrella approach to accreditation (Harcleroad, 1980). CAHEA addressed the need for coordination and cooperation in the accreditation of health-related educational programs, taking over a function previously performed by the AMA (Fauser, 1992; Gupta & Hendrick, 1990). CAAHEP currently recognizes 18 professions, including athletic training (CAAHEP, 2001; JRC-AT, 2001).

The Joint Review Committee–Athletic Training (JRC-AT) is the athletic training arm of CAAHEP that helps validate institutional compliance with JRC-AT educational standards. Its role is "to promote and ensure quality of the institutional programs" (NATA Education Council, 1999a, p. 2). To achieve this quality, a single route to certification for all students was developed to ensure the standardization of athletic training education (McMullan, 1996).

A mandate was issued by the NATABOC that beginning in 2004 a student must have graduated from a CAAHEP-accredited program in order to be eligible for the NATABOC exam (Hunt, 1998; McMullan, 1997; NATA Education Task Force, 1997).

Therefore, the previous internship route to certification was eliminated, thereby requiring all students to graduate from an accredited athletic training program in order to be eligible for the NATABOC exam. In accredited athletic training programs, the educators must demonstrate the educational process, content, and outcomes. The termination of the internship route was initiated to eliminate the variance among athletic training programs and to standardize athletic training education.

The CAAHEP accreditation preamble in the CAAHEP standards and guidelines describes the joint efforts of the American Academy of Family Physicians, the American Academy of Pediatrics, the American Orthopaedic Society for Sports Medicine, CAAHEP, and the NATA to "establish, maintain, and promote appropriate standards of quality for educational programs in athletic training and to provide recognition for educational programs that meet or exceed the minimum standards outlined in these standards" (CAAHEP, 2001). These standards include the educational competencies that are the heart of an athletic training program and ultimately of certification. Thus, it was imperative for the NATA and NATABOC to establish updated competencies so that students will know what is expected of them during their studies in an athletic training educational program, as they prepare for the certification exam, and as they enter the field of athletic training.

The NATA educational competencies drive the educational program at each institution and are tested on the NATABOC exam. The newly revised competencies are the standards by which accreditation will be granted starting in 2002 (NATA Education Council, 1999c; NATA, 2000, 2001b). The accreditation process requires the curriculum director to document and demonstrate proof regarding where in the program these

competencies are taught and when the students are demonstrating competence (NATABOC, 2000b). Therefore, the competencies, along with the accreditation process, are currently driving the curriculum in every athletic training program. These competencies are the key to the educational program for the student athletic trainer, and they demonstrate the knowledge and skills needed to be a competent entry level certified athletic trainer.

Educational Models in Allied Health and Medical Education

A variety of educational models have been used in the allied health and medical fields to educate students. An educational model may be chosen due to the accreditation process that drives the curriculum for many allied health fields. With the majority of medical and allied health fields involved in some type of accreditation, the influence of accreditation on curricula is profound. This influence was evident when Bruhn (1993) discussed how often a set of specific courses must be offered within a program in order to achieve accreditation. He asserted that the programs seeking accreditation necessitate curricula that are carefully sequenced with required courses. However, there are a variety of models that can be used to educate allied health professionals. When seeking accreditation in medical or allied health fields, most curriculum programs follow the traditional model of education, the medical model, problem-based learning, or competency-based education (Conger, Baldwin, Abegglen, & Callister, 1999; Hart, 1976; Heestand, Templeton, & Adams, 1989; Posey, 1983).

Traditional Model

The traditional model of higher education requires students to follow the required courses in general education, the required courses within the major, possibly some

electives, and clinical experiences (Hart, 1976; Young & Van Mondfrans, 1972). The courses are usually teacher driven with the information given to all students at the same pace regardless of student comprehension. Yet the goals and areas stressed are those valued by individual teachers

Medical Model

The medical model, which stresses the basic medical sciences, demands that graduates complete an undergraduate program, two to three years of post-graduate work, clinical rotations, and a residency program (Ebert & Ginzberg, 1988; Ende & Davidoff, 1992; Hunt, 1991; McGaghie, Miller, Sajid, & Telder, 1978; Moore-West, Regan-Smith, Dietrich, & Kollisch, 1990; Posey, 1983). Some graduates may want to further their expertise and complete fellowship training in their specialized area. The assumption of the traditional and medical models is that if the student completes and passes the specified courses and experiences, he/she is ready to sit for the certification/licensure or national exam and is ready to practice his/her profession (Hart, 1976; Posey, 1983). This assumption was the same one used for the internship route of the athletic training educational model. Students took specific courses then gained experience through clinical rotations prior to being eligible for the NATABOC exam.

Problem-Based Learning Model

The problem-based learning (PBL) model was first introduced into the medical school curriculum in the mid 1960's (Caplow, Donaldson, Kardash & Hosokawa, 1997; Heestand, et al., 1989; Moore-West, et al., 1990). Albanese and Mitchell (1993) have defined PBL as a method for students to learn problem-solving skills and acquire knowledge about the basic clinical sciences through the use of patient problems. In PBL

the problem is presented prior to the student's acquisition of the necessary science or clinical knowledge to solve the problem. The educational goals of PBL are: (a) the structure of clinical contents and acquisition of knowledge; (b) the development of critical thinking and problem solving; (c) the improvement of individual learning abilities; and (d) the improvement of personal motivation (Barrows, 1986; Caplow et al., 1997; Moore-West et al., 1990). The methodology used to achieve these goals mainly incorporates small group work. The groups are given a problem that they discuss as a group, research individually, and then further discuss as a group. Therefore, the analysis of patient cases through group discussion and independent research educates the students in the knowledge and skills they need. This model could be incorporated into some of the other models as a pedagogical method.

Competency-Based Education

In contrast to the previous models, the field of athletic training has chosen to use competencies as the basis for the educational process. In fact, the JRC-AT asserted that no courses are required; however, a demonstration of student competence in the NATA educational competencies is required (JRC-AT, 2001). The JRC-AT affirmed this assertion by declaring, "this is a competency-based program where an institution has the academic freedom to determine where and how it presents the 'competencies' in its own unique setting. Although there are no 'required' courses, each of the competencies must be formally instructed, meaning taught in a classroom setting" (JRC-AT, 2001). This may still create a sequenced, high credit course load curriculum for athletic training students, but the teaching is based on the NATA educational competencies.

Other medical and allied health fields have started using competencies as a means to ensure that their students possess the requisites for entry-level professional performance (Bensley, 1990; Roberts et al., 1978). Therefore, even though the medical model or PBL is used in many of the medical and allied health fields, there is also a trend toward the development of competencies to help define and guarantee that graduates in a specific field will possess specific knowledge and skills. Once the competencies are developed, a profession may choose to use the competency-based education (CBE) model in the education of their students. Competency-based education has been found to be a viable model in the health care fields to prepare individuals for their profession. (Barris, 1978; Broski et al., 1977; Chidley & Kisner, 1979; del Bueno, Barker, & Christmyer, 1980; DeWald & McCann, 1999; Hinojosa, 1985; Menne, 1975; Moncur, 1985; Roberts, et al., 1978; Russell & Weinstein, 1978).

Competency-Based Education

CBE, sometimes known as outcome-based education, performance-based education, and mastery learning, originated in the 1930s and slowly evolved during the 1960s as a method for teacher education (Bell, Kozakowski, & Winter, 1997; Block, 1971; Houston & Warner, 1977; Jarrett, 1977; Lane & Ross, 1994a; Scott, 1982). In teacher education, CBE was a term created by promoters of a movement that sought to base teacher education on behaviorally stated objectives related to teacher effectiveness (Houston & Warner, 1977). The objectives would be known, specific, and completely connected to their roles as teachers. These objectives would drive the instructional activities and the evaluation criteria would relate directly to the stated objectives. These CBE features for teacher education are almost synonymous to those described for mastery

learning. For instance, Bell et al. (1997) defined the primary features of mastery learning as unambiguous definitions of the competencies that must be mastered for successful completion of a curriculum, use of formative evaluation instruments that facilitate the assessment of students and teachers throughout the program, variable time frame to accommodate all learners, and a variety of teaching strategies. CBE, mastery learning, and outcome-based education have their roots in teacher education, but have expanded to other disciplines.

Critical Elements of CBE

Certain critical elements must be included for an educational program to be defined as CBE. These elements include explicit learning outcomes or statements of behavior, flexible time parameters, a variety of instructional approaches with learning opportunities, and criterion-referenced evaluation (Alspach, 1984; Bell, 1976; Burns & Klingstedt, 1972; Fearon, 1998; Moncur, 1985; Schuldenfrei, 1993; Spady, 1977).

Explicit learning outcomes. Explicit learning outcomes imply that the instructor and student both understand what the student needs to know or be able to do at the end of the lesson, course, and/or program. Jarrett (1977), discussing the use of CBE in the liberal arts, stated that CBE focuses on outcomes in the educational process, hence the name outcome-based education.

In the nursing education field, Beare (1985) claimed that CBE specifically defines the process of education and the outcomes of the learning process. Scott (1982) also discussed the use of CBE for nursing curriculums because she feels it provides the programs with explicit goals and standards within a systematic framework. Therefore, the focus of CBE shifts from the teacher and teaching process to the learner and learning

process, with the emphasis placed on the needs and accomplishments of the student (Beare, 1985; Elam, 1971; Hart, 1976; Schmaus, 1987; Young et al., 1983; Young & Van Mondfrans, 1972). This shift is defined by Barris (1978) as an emphasis on exit requirements. Entrance requirements are not as important since the goals are focusing on what the student will be able to do at the end of the program. Mager (1962) also stressed the necessity to be explicit about educational objectives and defining the exit behaviors. He discussed the importance of educators knowing the direction they are going with instruction or else they may end up somewhere unexpected. Defining the exit behaviors provides goals for the instructors and learners. The exit or outcome requirements are presented as competencies.

In CBE the most valued outcomes or content are represented in the competency statements. Therefore, a key to competency-based education is the establishment of the essential competencies required for the specified profession. These competency statements must be explicit and inform the learner which behaviors are necessary for each domain (cognitive, psychomotor and affective) in order to complete the program successfully (Beare, 1985; Bell, 1976; Burns, 1972; Fearon, 1998; Roberts et al., 1978).

The establishment of the competencies must be through a rigorous process. Fearon (1998) discussed how the content to be included in a competency should be developed through research of the best practice and clinical experience available along with the interpersonal skills needed to perform the activity to an agreed standard. Others have used role delineation studies to determine content of the competencies (Bruess, Hedricks, Poehler, & Redford, 1987; Ebel, 1999; Golaszewski, Couzelis, Corry, Baun, &

Eickhoff-Shemek, 1994; Grace, 1999; Grace & Ledderman, 1982; Henderson, McIntosh & Schaller, 1981; Schmidt & Beall, 1988).

Once the content of the competencies is decided, the next step is to compose well-written and easily interpreted competency statements. According to Bell (1976) a competency statement must include the behavior the student is to acquire, specifically what the student will be capable of doing upon completion of the learning period or course. Besides the behavior, the statement should also include the area of life or context in which behavior will be conducted. This is important because these statements will guide all learning experiences and establish the foundation for evaluating student achievement (Lutrell, Lenburg, Scherubel, Jacob, & Koch, 1999). Outcomes have often been written in vague terms, so proponents of CBE have stressed the need for more specific, behavioral type objectives (Klingstedt, 1972). Some of the essential characteristics of a competency statement as described by Alspach (1984) are: (a) describes a general category of behavior; (b) learner oriented; (c) behavioral and measurable; and (d) expert validated. Luttrell et al. (1999) pointed out that when writing a competency statement, "to be effective they must be worded deliberately in realistic, practice-based and measurable terms" (p. 136). Easily interpreted or clearly written competencies allow the educator and learner to understand the outcome they are striving toward.

Flexible time parameters and varied instructional approaches. Other requirements of competency-based education are flexible time parameters and varied instructional approaches. The students must have multiple opportunities for achieving and demonstrating competence (Spady, 1977).

Beare (1985) discussed that when using CBE in nursing education, the focus is on creating alternative teaching strategies to achieve learning goals. These alternative strategies are necessary because in a true competency-based program, students move on to the next area of study if they have developed competence in the current content area. Conversely, if a student does not achieve competence quickly, he/she needs to be given additional time to attain mastery (Bell, 1976; Bell et al., 1997). Therefore, students will move through the curriculum at various rates. The flexible time parameter creates a classroom of students who may all be studying different areas at a given time. Thus, the instructor must learn how to facilitate the learning experience instead of preparing lectures to give to the whole class. The diversity of instructional strategies to teach the different competencies is important since there is variability in the competencies. Competencies come from a variety of domains, which make them prone to different instructional methods.

In addition, a variety of teaching strategies for those who require additional instruction must be available so that strategies can be matched to learner styles (Bell, 1976; Bell et al., 1997). The instructor's ability to implement a variety of methodologies is important, however, the instructor may not have control over the time frame in which to use these methods.

In theory, a variable time frame may be a good concept, but in practice this may be a problem because most curricula are developed by the time frame of the university. Courses traditionally start at the beginning of the semester and finish at the end. Colleges and universities do not allow for students to change to a different course midway through the semester. A true competency-based program at the higher education level will require

that some changes be made to the current system. The traditional time frame may have to be adjusted, and instructors must also be educated in how to teach when students are working on different competencies at the same time. Within this flexible time parameter is the underlying assumption that every student has the potential to become competent. This assumption may be true if the program admission requirements are stringent and ensure only the entry of students who are capable of developing competence. This belief is seen in physical therapy, nursing, and medical schools where the prerequisites for admittance into the program are stringent enough to only accept students who all have the capability of learning the competencies required (McGaghie et al., 1978).

Athletic training programs are in the process of incorporating the flexible time parameter into athletic training clinical experiences. The historically mandated 800-hour requirement for students who graduate from an accredited program was discontinued in favor of the development of clinical proficiencies. Therefore, the time necessary to develop and demonstrate proficiency will vary for each individual student as long as he/she has developed the skills over a minimum of two years (NATA, 2001b). The issue remains that the competencies must be taught in courses, but they are usually restricted in time to the semester or quarter framework of the institution.

Criterion-referenced evaluation. Another requirement of competency-based education is the use of criterion-referenced measurement. The students are not compared to each other, but are evaluated according to a pre-set standard of knowledge or performance (Schuldenfrei, 1993; Shanklin & Beach, 1980). Criterion-referenced measurement is an excellent evaluation method when the goal is to assess student competence and not student ranking (Turnbull, 1989). Criterion-referenced measurement

is supported in the use of competency assessment in medical and allied health education (del Bueno & Altano, 1984; Shanklin & Beach, 1980; Turnbull, 1989). The goal of medical and allied health education is to produce qualified professionals; therefore, it is imperative that the assessment of knowledge, skills, and attitude determines competence. CBE emphasizes the specific knowledge or skills required by the student within clearly articulated performance standards. This was declared by McGaghie (1991) in terms of fitness for practice. If there is not an explicit understanding about what is professional competence, then determining who is ready to practice is impossible. Thus competency in the context of higher education has been defined by Bell (1976) as the minimum knowledge, skills, and/or affective behavior that an individual needs to possess at a set level of expectations. The key to the objectives or competency statements is the addition of a standard (Burns, 1972). This pre-set standard is one that every student must meet in order to be deemed competent.

These standards may require the student to demonstrate competence in simulated or real life situations. Many feel the competencies should relate to real life situations so that the students will be able to function independently in their first job (Beare, 1985; Chambers, 1995; Chambers, Gilmore, Maillet, & Mitchell, 1996; Lutrell et al., 1999; Mitchell, 1990; Spady, 1977; Spady & Mitchell, 1977). The need for entry level practitioners to be able to function adeptly in real life situations is seen when McGaghie (1991) stated, "competence evaluations are defined as measurements and subsequent interpretation of data derived from measurements that result in a judgment that an individual is fit to practice a profession autonomously"(p. 3). Senior (1976) discussed the issues of determining whether or not a physician is competent. He noted that a key to

being deemed competent is when an evaluator judges the physician as demonstrating the knowledge and skills necessary for a good performance in his/her future practice. Therefore, the judgment against a standard for each specific competency to determine competence is crucial in CBE. However, the evaluation of competencies is a struggle in CBE programs due to the difficulty in delineating clearly understood competencies and defining the appropriate minimum level of competence.

One way to deal with the interpretation of a competency is to divide broad competencies into smaller closed competencies that are easily defined and measured. Spady (1977) stated that as CBE programs strive for high quality evidence as a basis for certification of competency, the more the objectives will have to be narrowed and simplified so as to correspond to existing test technology. These competencies must be clearly demonstrable and the criteria for demonstration explicitly stated in order for valid and reliable testing of competence to take place. The establishment of measurable competencies is a difficult task.

The definition of the standard and thus the testing to determine competence has been lacking in some fields (Scott, 1982). For instance, this problem of measurement has received an enormous amount of consideration in the literature for the nursing field (Scott, 1982). In addition, Reilly, Barclay and Culbertson (1977) have referred to the measurement of competence in CBE programs as the "Achilles heel." This view was supported by others and is attributed mainly to the inadequacy, weak validity, and questionable reliability of the measurement tools (Barr, 1977; DeWald & McCann, 1999; Elam, 1971; Hanken, 1979; Houston & Warner, 1977, Lane & Ross, 1994b; Lane & Ross, 1998; Lane, Ross, Parkinson, & Chen, 1995). Competencies within the affective

domain have been observed to be very difficult to measure (Harbeck, 1972). Therefore, the concern is that the assessment approaches have not evolved along with the teaching and learning philosophies of CBE (Spady, 1977).

The lack of reliability and validity of a competency statement, along with a lack of consensus on a standard for competence, creates the need to establish measurable competencies. The issue of explicit outcomes and minimal standards for criterion-referenced evaluation needs to be addressed. The developers of the competencies need to ensure that every instructor and learner interprets the competency as it was intended or else there will not be any standardization of educational outcomes.

The field of preventive medicine has acknowledged this lack of reliability and validity (Lane & Ross, 1998; Lane, Ross, Parkinson, & Chen, 1995). Extensive work has been done to alleviate this problem in the CBE programs for preventive medicine physicians. To evaluate the competencies, they have identified performance indicators for each competency. These indicators are then used to develop measures to assess competency achievement. They also have stressed the need to assess the performance by direct observation if possible; otherwise, they suggest simulations.

In athletic training there should be a common understanding of what the entry-level athletic trainer should know and be able to do. The knowledge, skills, and attitudes necessary to be an entry-level athletic trainer have been determined, but there may be disagreement as to the interpretation of what each competency statement intends and what defines competence. To help resolve this problem, the NATA competency statements need to be written so they are easily interpreted. Educators need to know what to teach while students need to recognize when they have achieved competence. Also, to decrease

ambiguity among students, teachers, and programs, there is a need to develop standards, criteria, or what constitutes "competent." These are important aspects of a CBE program.

Theoretical Bases of CBE

The origin of CBE has been attributed to several theoretical bases. The components of CBE (explicit outcomes, flexible time parameters, variable teaching strategies, and criterion-referenced evaluation) within an educational program are similar to other educational models, which may be the foundation of CBE. Three of these theoretical bases are: (a) experimentalism (Burns & Klingstedt, 1972; Klingstedt, 1972; Moncur, 1985); (b) novice to expert theory (Chambers et al., 1996); and (c) adult learner education (Schmaus, 1987).

Experimentalism. The underpinnings of experimentalism focus on the scientific study of human behavior. The belief is that learning is defined as a change in behavior. Some of the fundamental ideas associated with experimentalism are that the world is in constant change, that learning takes place when one experiences, observes, and reflects on the outcomes or consequences of his/her behavior (Hallet, 1997; Regan-Smith, 1998; Schmaus, 1987). John Dewey, the founder of experimentalism, maintained that children learned best from experimenting, followed by observing the outcome of their actions. The opinion that CBE grew out of experimentalism is because of the emphasis on change in the learner and his or her behavior or performance. Dewey also stressed the importance of a clearly defined purpose that will guide the educational process and help promote growth (Hallet, 1997; Schmaus, 1987). The relationship to competency-based education is seen in the similarities of clearly defined purposes in the intended competencies, and

growth of the learner occurs as he or she develops competence. One of the benefits of CBE is the proof that a student has developed competence in the stated areas.

In addition, experimentalists discuss the need to use new alternatives when educating, to use a variety of teaching strategies, and to be flexible in their routine. Hallet (1997) noted how learning from experience is better than sitting in a classroom and learning only from didactic techniques. CBE follows this prescription by providing alternative methods to in order to accommodate all learning styles. A variety of teaching strategies is also necessary because students would be able to concurrently work on a variety of competencies.

Novice to expert theory. Novice to expert literature is attributed by some to be the theory behind the development of CBE (Chambers et al., 1996). Chambers et al. defined competency as the midpoint on a scale of professional growth that typically extends over 10 to 12 years. There are five stages a person must progress through to advance from novice to expert. The stages that range from 1 to 5 are novice, beginner, competence, proficiency, and expertise or mastery (Bruer, 1993; Chambers et al., 1996). The years of learning in the formal school setting take the student from novice to competence. The proficiency and expertise/mastery stage occur sometime during the person's professional career. Chambers (1995) defined competency as the stage where a learner has achieved enough understanding, skill, and appropriate values to continue professional growth independently.

Both the novice to expert model and CBE has been used in physical therapy and nursing practice (Benner, 1984; Farrell, 1996; Jensen, Shepherd, & Hack, 1990; Minghella & Benson, 1995; Nuccio et al., 1996). Benner (1984) originally developed the

novice to expert domains for the stages of nursing development from interviews and observations of clinical nursing practice. Other studies have supported her definitions of each stage of nursing practice (Minghella & Benson, 1995; Nuccio et al., 1996).

In the profession of physical therapy, Jensen et al. (1990) studied novice and expert physical therapists and found that experts learned to manage their patient care time better, thus more time was actually spent working closely with the patient. They also found that expert therapists were better able to respond to their patient's thoughts and concerns while the novice worked in a more mechanical and procedural manner. These studies demonstrated that competence occurs in the middle or at stage 3 of the novice to expert model. At that time they are ready to practice their profession without much guidance. The relationship of the novice to expert theory to CBE is noted through the focus on competence. In CBE, a student must have exhibited an acceptable level of competence in the stated competencies in order to ultimately graduate and/or become certified. As the certified athletic trainers enter the work force as entry-level practitioners they will continue to learn and grow as they practice, develop their skills, and continue to attain more knowledge. Thus, this component of CBE is a parallel to the novice to expert model.

Adult learner theory. The final theory claimed by some to be the basis for CBE is adult learner theory (Price, Swartz & Thurn, 1983; Schmaus, 1987). Adult learner theory, often called andragogy, has been described extensively by Knowles (1980, 1984). Some of the primary assumptions regarding adult learners are: (a) adult learners perceive themselves as responsible for their learning and are self-directed; (b) adults use the immense quantity of knowledge they have amassed as a learning resource; (c) adults are

motivated to learn when they recognize that the knowledge or skill will help them with real-life tasks or problems; and (d) adult learners consider education as a lifelong process that will help them realize their full potential (Knowles, 1980, 1984; Schmaus, 1987). CBE may be derived from adult learner theory because it has similar assumptions within its structure. One similarity is that adult learners are said to be self-directed learners. CBE is described as self-directed instead of instructor-centered in view of the fact that when the learner has attained the knowledge or skills for a specific competency he/she continue on to another competency.

Another likeness is seen when Beare (1985) discussed CBE in nursing education and noted that the trend is to focus on methods to develop self-motivated life long learners. This goal matches up to the belief that adult learners consider learning a life long process. Lastly, adult learners are motivated when they realize the knowledge or skill they are learning is related to real life tasks (Regan-Smith, 1998; Knowles, 1980, 1984). Regan-Smith described a workshop for primary care practitioner educators where the importance of adult learning theory was evident. She felt the most compelling aspect relating to adult learning was the learner's intrinsic need to know. This motivation was necessary for learning to take place. One aspect of motivation is the realization that learning will be needed in the future, that the knowledge and/or skill relate to real life. This real life aspect is found in CBE, since role delineation studies often become the basis for competency development. Thus, CBE competencies are directly relevant to job performance. CBE is designed to have competencies that are related to real life tasks.

Each of these theories may have contributed to the development of CBE. The ultimate outcome is the assistance CBE provides educators in all fields of study by

providing accountability through the measurement of outcomes in a systematic and objective manner (Beare, 1985). Thus, the outcomes or competencies on which CBE are based are very important for each profession because they will be used in all the educational programs, in the accreditation process, and will define to society what knowledge and skills students have attained. Importance is also realized because the competencies are actually needed by professionals in the field to perform their job, and their patients value these competencies.

Competencies

Curriculum development, often driven by accreditation, is concerned with the central issue of determining which content is of most value (Allen, 1998; Ende & Davidoff, 1992; Walker, 1990). This holds true for all curricula, including those in the allied health fields. When determining the content of curricula for allied health professions, there are some general professional competencies advocated for all health education settings (Doyle, Woods, & Deming, 1995; Luebke & Bohnenblust, 1994). In addition, in preparing for the future, the Pew Health Professions Commission (1995) has established competencies and strategies for all allied health care practitioners starting in 2005 (Buck, Tilson, & Andersen, 1999; Fauser, 1992; Gelmon, 1997; Starkey, 1997). These competencies are related to promoting a healthy America and include such areas as improving primary care, promoting healthy lifestyles, and coordinating health services. The Pew Health Professions Commission feels that the task at hand is the development of outcome measures for each allied health field in order to assess how members will attain these competencies.

Competencies in Health and Medical Education

In addition to these general guidelines, each health profession must develop competencies that define to society and the profession what knowledge and skills a graduate of an accredited program and certified member of the profession will possess. Many medical and allied health fields have realized the need for the development of competency statements (Ali, Hogan, & Blanchard, 1992; Chidley & Kisner, 1979; Deming, Doyle, & Woods, 1993; DeWald & McCann, 1999; Edwards & Keeley, 1998; Hinojosa, 1985; Holmes, 1982; Weinstein & Russell, 1976; Young, Weser, McBride, Page, & Littlefield, 1983). Some of the specific professions include family practice, preventive medicine, dietetics, nursing, and athletic training (Barris, 1978; Bell et al., 1997; Dunn, Hamilton, & Harden, 1985; Grace, 1999; Luebke & Bohnenblust, 1994; Pololi et al., 1994; Scott, 1982; Stephens, 1999). Some of these professions are farther along than others since they have already identified their essential competencies, while other professions are still grappling with this issue.

Nursing is one field that has developed competencies and has used them in CBE and novice to expert education models (Beare, 1985; del Bueno & Altano, 1984; Rice & Rapson, 1999; Stephens, 1999). The need for clarity and accountability along with increasing costs created the interest in CBE for the nursing profession (Rossel & Kakta, 1990). Although competencies were developed for nursing, everyone did not support them. Stephens (1999) discussed the tensions in the development of nursing competencies when he pointed out that some members objected to the apparent reduction of nursing to a series of tasks while others thought that delineation of tasks would help clarify and identify skills that must be included in educational programs.

DeWald and McCann (1999) discussed the three-step process used to develop a CBE curriculum for a dental hygiene program at the Caruth School of Dental Hygiene. Determining the program competencies was the first step. Experts in that department initially developed the ideal curriculum, and then adjusted it to a realistic curriculum in terms of the essentials for an entry-level hygienist and the available time frame. The next steps were the establishment of the teaching and measurement techniques for these competencies.

Preventive medicine specialists realized the need for competency development when there was confusion by colleagues, program applicants, and employers about their roles (Lane & Ross, 1994a). There was also a great amount of variance among programs that needed to be diminished (Lane & Ross, 1994a). In addition to competencies that define the field of preventive medicine to others, competencies for the preventive medicine curriculum for all medical schools in teaching have been discussed (Pololi et al., 1994; Seagall et al., 1981). These competencies were developed to increase effective use of limited curriculum time and resources by reducing the arbitrary component of teaching programs in preventive medicine.

In the 1980's the charge was given to dietetic programs to identify competencies that relate to the philosophy and goals of their institutions, as well as the general needs for all competent practitioners (Shanklin & Beach, 1980). Studies were performed to determine the general competencies for an entry-level generalist dietitian (Holmes, 1982; Loyd & Vaden, 1977). Holmes (1982) advanced the competencies in the dietetics field with her research on competency ratings by dietetic educators. As the essential competencies were identified, the need to continually update the competencies to meet

the current needs of society was realized. Thus, the profession of dietetics has developed and continually revises competencies for CBE programs within the field.

While the professions of nursing and dietetics have already established competencies, the field of family practice also has identified the need to do so, but does not have unanimous support from its practitioners. Bell et al. (1997) stated that there are no standardized definitions of what is a competent family practice physician. He called for the need to establish these competencies for family practice despite the resistance of some who feel the "art of family practice" is impossible to define.

The development of competencies varies for the many health care fields. There is a mixture of stages of competency development with some professions very advanced and using them extensively while others are in their infancy of the development process.

Competencies in Athletic Training

The profession of athletic training grappled with competency development many years ago and has evaluated and revised its competencies several times. The NATA educational committees and the NATABOC made the determination of what was important through role delineation studies (Grace, 1999; Grace & Ledderman, 1982; NATA, 1996).

Role delineation studies focus on the tasks that are performed on the job, the importance of the tasks, the frequency of the tasks, and how critical the tasks are for the entry-level athletic trainer (NATA Education Council, 1999b; Grace & Ledderman, 1982). Role delineation studies also have been used to help define other allied health fields including health education and worksite wellness programs (Bruess, et al., 1987;

Golaszewski et al., 1994; Henderson et al., 1981; McMahon, Bruess, & Lohrman, 1987; Schmidt & Beall, 1988).

Henderson et al. (1981) discussed the role delineation process undertaken for entry-level health educators. A role delineation study was performed to help establish the definition and competencies for entry-level health educators, which in turn would establish standardized curricula. The goal was to develop core competencies needed by all entry-level health educators regardless of their employment settings. They were able to determine seven areas of responsibilities.

The profession of athletic training conducted its first role delineation study in 1982 to assess the profession and determine the validity of the content of the National Athletic Trainers' Association Certification Exam (Ebel, 1999; Grace, 1999; Grace & Ledderman, 1982). The exam content was validated through this study by determining the tasks performed by entry-level athletic trainers and comparing them to the certification exam content (NATABOC, 2000a; Grace, 1999). The role delineation studies have been repeated approximately every five years with the latest study completed in 1999 (NATA Education Council, 1999b; NATABOC, 1999). It is important to repeat and update the role delineation studies because of the continuing changes in the field and practice settings of athletic training (NATABOC, 2000a). Some of the progress has been made in the technological and surgical areas that affect the knowledge and skills required for athletic trainers. In addition, athletic trainers have gone from working only with athletic teams in the "traditional" settings of colleges/universities, professional sports, and high schools to practicing in clinics, hospitals, and industrial settings. Also, the increase in participation by women, persons with disability, children, and older adults in

competitive sports has changed the role of the ATC. The role delineation studies are critical to the athletic training profession because they provide the framework for the academic program for entry-level preparation (McMullan, 1996).

The latest role delineation study commenced with a panel of athletic training experts from diverse backgrounds (NATABOC, 1999). They developed the major performance domains and the tasks associated within each domain. After a pilot study, the questionnaire was distributed to a national sample of 2000 certified athletic trainers. The results, based on a 36% return rate, were published as the current role delineation study (NATABOC, 1999).

Role delineation studies provided an analysis of the tasks that are utilized by certified athletic trainers. The NATA Education Council used the results of the role delineation study to delineate competency statements (Grace, 1999; NATA, 1999). The Education Council has stated that the competencies are slightly broader and more specific than the content found in the role delineation study to help ensure growth of the profession (NATA, 1999). These competencies then became the foundation for curriculum development. It should be noted that the NATA educational and certification committees were wise to realize the need to establish competencies that would be the basis for both educational programs and the certification exam. They recognized that athletic training educational programs and the certification exam should be founded on one set of competencies. As the foundation for the profession, the NATA educational competencies need to be developed and stated in full alignment with the literature delineating high quality competency statements.

The NATA educational competencies have emerged as the field of athletic training has advanced into a profession over the past thirty years. The field of athletic training is similar to its original profession, yet advanced due to research and progress in such areas as the prevention, evaluation, treatment and rehabilitation of injuries. Role delineation studies have been performed to determine the NATA competencies necessary for an athletic training curriculum. Koehneke (1999) emphasized this when he stated, "JRC-AT/CAAHEP Standards and Guidelines and the NATA Athletic Training Educational Competencies must be the basis of a curriculum" (p. 16). As the foundation of the curriculum, the future requirement for accreditation is to use a competency matrix to document where each competency is taught, how it is evaluated, and when the student will be evaluated (NATA Education Council, 1999a; 1999c).

Interestingly, the investigator found only one other study that evaluated the importance of the athletic training competencies (Zylks, 1988). In that study 300 certified athletic trainers were asked to rate the importance of the NATA competencies that were in existence in 1988. At that time, there were 175 competencies in 7 content areas. The sample was divided into three groups, including program directors of NATA-approved educational programs, clinical instructors, and ATCs from the general membership. The participants rated the competencies on importance with a 5-point Likert scale. Zylks identified the competencies that received a "5 - "very important" or a "4 - important" ratings only. Only a few of the competencies received average ratings of "4" of "5" from instructors and program directors. The general membership (N = 179) did not rate any of the competencies with only "5's" and "4's." Therefore, there was variability in the perceived importance of the competencies by the participants.

In addition to examining competencies considered as important or very important, Zylks also noted competencies that 50% or more of the respondents rated as less than "important," a "3" or below rating. Five competencies had 50% or more of the ratings below "important." The content areas were two in education, one in counseling and guidance, and two in prevention of athletic injuries and illnesses. The competency statements in this study have since been revised two times.

The Education Council's Competencies Committee, using the previously published competencies and current role delineation studies as their guideline, developed the current competency statements. The 542 NATA Athletic Training Educational Competencies are organized into 12 content areas (NATA, 1999). There are three domains within each content area: cognitive, psychomotor, and affective. The 12 content areas and the distribution of the competencies by domain are presented in Table 1. A panel of experts and several NATA educational committees reviewed the first draft (Starkey, 1998). The draft of competencies was then placed on the Education Council web site for public review and comments. The resultant 542 NATA educational competencies (NATA, 1999), are a contrast in number to the previous edition of NATA competencies, which included only 191 competencies (NATA, 1996).

Some of this enormous increase in the number of competencies may be due to a better definition of the competencies. Rewriting the competencies into more discrete statements would help clarify the competencies, but would create a larger number of them. This method has been suggested by Spady (1977) as a way to help increase the measurability and understanding of each competency statement.

Table 1

Distribution of NATA Educational Competencies by Domain

Content Area	Domains			
	Cognitive	Psychomotor	Affective	Total
Risk Management and Injury Prevention	25	12	12	49
Pathology of Injuries and Illnesses	19	0	5	24
Assessment and Evaluation	27	17	7	51
Acute Care of Injury and Illness	46	21	16	83
Pharmacology	25	7	9	41
Therapeutic Modalities	22	10	5	37
Therapeutic Exercise	16	7	4	27
General Medical Conditions and Disabilities	37	17	3	57
Nutritional Aspects of Injuries and Illnesses	27	4	4	35
Psychosocial Intervention and Referral	25	6	10	41
Health Care Administration	46	8	12	66
Professional Development and Responsibilities	16	3	12	31
Total	331	112	99	542

Note. These values represent the number of competencies for each domain in every content area.

Another explanation for the increase may be the perceived competency needs of athletic trainers due to the changes in the profession. As the profession has advanced, the population served has expanded from athletes to other physically active persons, and the practice settings have increased in scope from the athletic training room to clinical and industrial settings. The diversity of the patient population including physically active men, women, persons with disability, children, and older adults, in addition to more practice settings over the years may have changed the duties of the athletic trainer. The population has grown from athletes in the high school, collegiate, and professional settings to any physically active person regardless of age and profession. Therefore, besides athletes in the training room setting, the population served by athletic trainers includes people who work on the assembly line, people who are physically active only on weekends, or people who are training for a marathon. Each of these people has different needs. This diversity helped shape the outcomes of the recent role delineation study, which ultimately affect the competency statements.

It must be noted, that in addition to the competencies, clinical proficiencies for each content area have been identified. These proficiencies are used concurrently with the competencies, but they are taught and demonstrated in the clinical portion of athletic training education. The proficiencies provide an outcome-based qualitative approach to the student's clinical education as compared to the previous hour or quantitative approach (NATA, 1999). The proficiencies are another area that can be examined, but they are beyond the scope of this study.

Although these competencies have been determined, the question arises concerning the practicality of a student accomplishing all these competencies in the

limited time of a typical undergraduate educational program. Realistically, there is a limited amount of time in each course or program, contrary to the CBE philosophy of flexible time parameters (Ali et al., 1992; Aston-McCrimmon, 1986). Therefore, it is imperative to identify which competencies are truly necessary for the entry-level athletic trainer. There may be some competencies that would be "nice to know" but are not essential for the entry-level athletic trainer to perform his/her first job.

Summary

Program accreditation, along with professional certification, strengthens a profession's credibility and defines to the public the knowledge and skills the professional will possess. The profession of athletic training has evolved to an accreditation of its educational programs after many years of allowing the existence of two routes to certification, curriculum and internship. The internship route was the original method of educating students; however, this route to certification will be eliminated by 2004. The switch to an accredited program based upon coursework that emphasizes the NATA competencies will facilitate the education of athletic training students to become standardized.

Athletic training educators across the country are striving for JRC-AT accreditation of their programs. As accreditation is sought, a self-study must be undertaken to evaluate the program. Required for the self-study, and a key component to the educational process, are the NATA educational competencies (NATA, 1999). Teaching these competencies creates an opportunity to use the CBE model to educate students.

CBE, with its elements of explicit learning outcomes, flexible time parameters, varied instructional approaches, and criterion referenced evaluations, has been used in other allied health fields. The elements of CBE can help strengthen the education of athletic training students, but attention must be given to the explicit learning outcomes and criterion-reference evaluations. The competencies that define the outcomes need to be clearly understood and evaluated in comparison to a pre-set standard. This can be summarized as measurability.

The measurable competencies are then incorporated into a CBE program. For athletic training, the competencies developed from the NATABOC role delineation studies were recently revised and increased in number from 191 to 542. The large increase has created a concern about the amount of time available to develop a student's competence in each competency. Currently, if calculated for the credit hours available in most programs, there is less than one hour of class time in which to teach each competency. In addition, the athletic training educators need to document the student's competence for each of these competency statements. If there are 30 students in a program, the educator must perform 16,260 competency evaluations during the time these students are in the program. This large amount of competency evaluations is to only document each student's competence one time for each competency statement. The evaluations will be done over the three years the students are in the program, so there will be approximately 5400 competency assessments a year. This does not include the fact that each competency should be evaluated more than once to demonstrate competence over time. Since these competencies are an integral part of athletic training educational

programs, it is time to examine the competencies in terms of importance and measurability to help produce competent, professional certified athletic trainers.

CHAPTER 3

METHODOLOGY

The measurability and importance of the general medical conditions and disabilities content area of the National Athletic Trainers' Association educational competencies (NATA, 1999) were the focus of this study. The content matter in the general medical conditions and disabilities competencies includes: (a) common illnesses; (b) cardiopulmonary conditions; (c) ear, nose, throat, and eye pathologies; and (d) skin disorders and organ infections. The general medical conditions and disabilities content area consists of 37 cognitive, 17 psychomotor, and 3 affective competency statements, for a total of 57 competencies. In this study, three stakeholder groups rated each of these competencies on two different dimensions, importance and measurability. The three stakeholder groups were the university/college athletic trainers, professional athletic trainers, and sports medicine physicians.

The general purpose of this study was twofold: (a) to identify stakeholder beliefs in the measurability of the general medical conditions and disabilities competencies of the NATA educational competencies (1999) and (b) to identify stakeholder perceptions of the importance of these same competency statements. The following research questions guided the study:

1. To what extent do stakeholders perceive that the educational competency statements in the general medical conditions and disabilities content area are measurable?

2. To what extent do college/university athletic trainers, professional athletic trainers, and sports medicine physicians differ on the perceived measurability of the general medical conditions and disabilities educational competency statements?

3. What importance do the stakeholders assign to each of the competencies in the general medical conditions and disabilities area?

4. To what extent do college/university athletic trainers, professional athletic trainers, and sports medicine physicians differ on the perceived importance of the competency statements in the general medical conditions and disabilities area?

Sample

Three stakeholder groups participated in this study. There were two groups of athletic trainers, all NATA certified, and one group of sports medicine physicians. The sample size and characteristics of the stakeholder groups will be discussed in the following section. The methods of sample selection and informed consent will be discussed under the "Data Collection Procedures" heading in this chapter.

Stakeholder Groups

- College/university athletic trainers. The participants in this group were certified athletic trainers (ATC) who worked at Division I, II, or III institutions or junior colleges as classified by the National Collegiate Athletic Association (NCAA) or the National Association of Intercollegiate Athletics (NAIA). These athletic trainers were working in an athletic training room setting with athletic teams at their respective institutions and/or were educators of athletic training students at these institutions.
- Professional athletic trainers. Certified athletic trainers in high school, clinical, industrial, or "other" settings were included in this group. The ATCs who work in high schools were one group of participants in this category. These athletic trainers were full time high school athletic trainers, teacher/athletic trainers, or

clinical/athletic trainers. The clinical or industrial athletic trainers were people who spent the majority of their time working in a clinical setting such as a sports medicine or physical therapy clinic, or those who work in an industrial setting. The "other" category includes athletic trainers who were working with professional sports, hospital settings, or any other setting that would not be included in any of the previously listed categories.

- Sports medicine physicians. The physicians are doctors who specialize in sports medicine and are listed in the directory of either the American Society of Sports Medicine or the American Orthopedic Society of Sports Medicine. These physicians usually work with athletes and athletic trainers. The physicians could specialize in family practice, orthopedics, sports medicine, or any other area, as long as they were listed in one of these sports medicine directories.

The rationale for the grouping of the athletic trainers based on employment is due to the task variance at each of the employment settings. For example, athletic trainers who work in the college or university setting usually have a specific team physician and often work with student athletic trainers. Working with the same physician each day, week, or year establishes a strong athletic trainer/physician relationship. The physician who knows the skills and knowledge of the athletic trainer may ask him/her to perform different or additional duties as compared to athletic trainers who do not have this close working relationship. In addition, athletic trainers in the collegiate setting are working with a relatively homogenous population of healthy 17-22 year old athletes, while ATCs at other settings usually have a more diverse population. Another difference is that the athletic trainers who work in the college settings often work with student athletic trainers

who are earning hours or developing clinical proficiencies towards NATA certification. These students may be involved in the athletic training curriculum at the university or they may be on rotation from the athletic training program at another school. This student involvement requires many athletic trainers at the collegiate setting to be involved in the education of the student athletic trainers by teaching athletic training classes and/or teaching in the clinical setting of the athletic training room.

In contrast, athletic trainers who work in high school, industrial, or clinical settings often work with a variety of physicians who may or may not have a sports medicine background. The community physicians who do not commonly work with athletes and athletic trainers may not understand the competencies of athletic trainers. High school athletic trainers are also dealing with different issues compared to college athletic trainers, since they are treating minors and must include the parents or guardians in any major decisions. High school athletic trainers were placed in the "professional" category because they often work in a clinical setting in the morning prior to going to the high school or when the schools are not in session.

The competencies necessary to work in the non-traditional clinical or industrial settings may be different from those needed in the traditional setting. The traditional setting for an athletic trainer is in a training room working with athletes who compete for the school or organization. The need and desire to return to work or play may be different for the assembly line worker, youth athlete, adult athlete, or recreational participant as compared to the college athlete. Also, many skills, such as the pre-participation exam, pre-game preparation, taping, and emergency management, are not used frequently in non-traditional settings. The clinical and industrial settings are businesses that need to

control costs and make money, which may influence the skills that are necessary in this setting. Also, many of the clinical and industrial athletic trainers do not work with students, but they understand the knowledge and skill needed for athletic trainers in their employment settings.

The "other" category may include athletic trainers who work for professional sports, hospitals, or other agencies not included in the previous categories. Even though athletic trainers who work in the professional setting may have a team physician, the demands of the professional athlete are different than those of the collegiate athlete. Since the professional athlete's livelihood depends upon his or her health, the team physician may be more involved than at the collegiate level. Additionally, the professional athlete has the means to seek second opinions, specialized rehabilitation, or alternative therapies outside the athletic training room. The professional athletic trainers may perceive different competencies as important to help them keep the athlete within their system. These athletic trainers also rarely work with student athletic trainers for an extended period of time. The athletic trainers who are also included in the "other" category may work in hospitals or other settings, but have moved out of the traditional setting. The work required of them may be similar to athletic trainers in other settings or it may require unique knowledge and skills. Therefore, the professional sport athletic trainer and those in unique settings have been placed into the "other" category. The "other" category, expected to have low participant numbers, was grouped with the high school, clinical, and industrial athletic trainers into the professional category because each of these groups has unique features that are distinctive from the college/university athletic trainers.

Data Collection Procedures

A list of ATCs was obtained by completing the NATA request for labels and returning it to the NATA District 4 secretary. A request for a list of all certified athletic trainers was then forwarded to the NATA headquarters. The NATA office provided the names, addresses, and employment status in a database format for each certified athletic trainer (ATC) in the United States. The employment was listed by the worksite codes: CL=clinical, CS= College Student, CO= Corporate, HS= High School, HC= High School/Clinic, HO= Hospital, IN= Industrial, JC= Junior College, PB= Pro Basketball, PF= Pro Football, PG= Pro Golf, PH= Pro Hockey, PS= Pro Soccer, PT= Pro Tennis, PX= Pro Baseball, OP= Other Professional, and UC= University and College. Certified student athletic trainers were included on the list, but these people were not included in the sample. The database was converted to a Microsoft Excel file to facilitate the selection of a random sample of 1200 college and university athletic trainers and 1200 other athletic trainers who were included in the professional group. The college and university group included any athletic trainer who was listed in the directory as college or university (UC) or junior college (JC). The professional group included clinical (CL), industrial (IN), high school (HS), high school/clinical (HC), or other (CO, HO, PB, PF, PG, PH, PS, PT, PX, OP) athletic trainers. The names of this stratified randomized sample were then printed in label form.

To help maintain confidentiality, a code was written only on the return envelope. When the questionnaire was returned, this code number was used to delete an individual's name from the master list, then the envelope was thrown away and the survey placed in a holding bin. This procedure permitted the master list to be updated so that follow-up

letters could be sent to non-responders. A cover letter and questionnaire were mailed to 1200 athletic trainers in each of the groups, college and professional. A follow-up letter was mailed three weeks later to all the athletic trainers who were non-responders (Appendix E).

The physicians were selected through two listings of sports medicine physicians. Two societies of sports medicine physicians are the American Society of Sports Medicine, which includes primary practice physicians, and the American Orthopedic Society of Sports Medicine, which includes orthopedic surgeons who specialize in sports medicine. Every physician listed in the American Society of Sports Medicine roster was given a number while in the American Orthopedic Society of Sports Medicine roster the physicians who were listed as "active" were given a number. There were a total of 664 physicians in the American Society of Sports Medicine and 999 active members of the American Society of Orthopedic Sports Medicine. Therefore, the physicians were numbered from 1 through 1663. A statistical randomization of all the numbers was then performed and the first 600 physicians whose numbers were selected were included in the mailing. The investigator sent a cover letter, questionnaire, results sheet, and return envelope to each physician requesting his or her participation. A follow-up letter was not mailed to the physicians. This decision was made because the investigator believed the yield from a follow up mailing to physician non-responders would be very low. This decision was reached after speaking with a team physician about the possible reasons for non-response. For example, a secretary may screen the physicians mail and throw out the survey without the physician's knowledge. Another reason may be that the physician is a sports medicine doctor, but may not work with an athletic trainer. Lastly, many physicians

have large time demands so they may not take the time to complete a survey not specifically related to physicians. Therefore, to save time and money, they were only sent one questionnaire.

Each participant was asked to rate the measurability and importance of each competency statement in the general medical conditions and disabilities content area using the definitions provided in the instructions. The cover letter contained an explanation that informed consent was implied if the survey was completed and returned.

Sample Size

The profession of athletic training has approximately 21,000 ATCs. The sample size goal for the athletic trainer groups was 300 as recommended by Krejcie & Morgan, 1970. The sports medicine physician goal was 50 because it was the minimum number needed for statistical comparisons and because this goal was practical.

The potential sample size from the NATA directory listing included $\underline{n}$ = 1200 ATCs randomly selected from the college/university employment settings, $\underline{n}$ = 1200 ATCs randomly selected from the employment settings in the professional category, and $\underline{n}$ = 600 physicians randomly selected from the sports medicine physician directories.

The actual sample size included 420 for the college/university ATCs (return rate 35%), 384 for professional ATCs (return rate 32%), and 122 for sports medicine physicians (return rate of 20%). An additional five participants did not include their employment setting, thus the total was 931 participants. This sample size was sufficient for statistical analysis according to the recommendations provided by Krejcie and Morgan (1970).

Sample Characteristics

The participants were asked to identify their place of employment. These areas included: (a) athletic trainer at division I university; (b) athletic trainer at division II university; (c) athletic trainer at division III university; (d) athletic trainer at junior college; (e) athletic trainer at high school; (f) athletic trainer at clinical or industrial setting; (g) athletic trainer-other; and (h) team physician. Overall the ATC participants were fairly evenly distributed across all employment settings. The athletic trainers were then grouped into the two stakeholder groups, college/university and professional, discussed previously.

Demographic characteristics including employment status, gender, education, and years of certification or licensure are reported in Table 2. Overall, teaching responsibilities were reported by approximately half (47%) of the athletic trainers while only 10% of them reported that they were curriculum directors. Also, only a third of the participants overall, and 37% of athletic trainers reported that they had used the NATA competencies in their curriculum development; however, of those who indicated that they were curriculum/program directors at their institutions, 92% stated that they used the NATA Athletic Training Educational Competencies in planning their curricula.

Table 2

Demographic Characteristics of Sample

	University/ College ATCs (n = 421)	Professional ATCs (n = 388)	Sports Medicine Physicians (n = 122)	Overall (n = 931)
Gender:				
Female	40%	53%	7%	39%
Male	60%	47%	93%	61%
Highest Degree Earned:				
BA/BS	8%	37%		20%
MA/MS	82%	58%		61%
EdD/PhD	10%	5%		6%
MD/DO			100%	13%
Year of Certification or Licensure:				
Prior to 1960	0%	0%	2%	1%
1961 – 1970	1%	1%	12%	2%
1971 – 1980	16%	7%	30%	14%
1981 – 1990	32%	30%	35%	32%
1991 – 2000	51%	62%	21%	51%
ATC Educator	70%	23%	43%	47%
ATC Curriculum Director	18%	2%	1%	9%
Read NATA Competencies	77%	45%	16%	55%
Used NATA Competencies	57%	15%	8%	33%

This sample of athletic trainers is similar to the total athletic training population when compared to a recent NATA membership profile survey (NATA, 2001a). The NATA survey found 35% of the membership employed at the college level, 23% in the high schools, 14% within the clinical setting, and an additional 11% working at both high schools and clinics. Thus 10% more of athletic trainers (45%) in the collegiate setting responded to this study when compared to the NATA membership profile survey. This study did not separate those who work in clinics and high schools, so it is difficult to compare directly to the NATA membership. When compared to the membership study, the participants in this study were more educated. The membership study showed that 60% of athletic trainers have attained a master's degree or higher compared to 81% in this study, and 32 % hold a bachelors degree versus 19% in the current study. The slightly higher percent with bachelor's degree only in the NATA study was expected because prior to selecting the sample those who declared themselves as students were eliminated from this study. Therefore, certified athletic trainers currently in a masters program were not included because they were identified as students. In the NATA database 43% of the members are female; whereas there was a 46% female ATC participant rate in the current study.

Instrumentation

The Competency Evaluation Survey was developed by the investigator and contained several components. The instrument (Appendix A) was structured as follows:

1. Cover sheet. The cover sheet provided the details of the study, including the importance of the study, participation time, confidentiality, and informed consent information.

2. Demographic information. The participants were asked to provide demographic information including gender, work setting, specialty, year of certification or medical degree, educational background, teaching and/or curriculum director experience, familiarity with the competencies, and use of the competencies within the curriculum.

3. Instructions for rating the competencies. The participants were provided with an instruction sheet to help them rate the competencies. Definitions for both the measurability and importance scales were provided to the participants.

4. Competency statements. The actual questionnaire included the competency statements presented exactly as printed in the general medical conditions and disabilities content area of the NATA educational competencies (NATA, 1999) accompanied by Likert scales. Each competency statement was rated twice, once for measurability and once for importance.

5. Likert scales. The Likert scales were defined for the participants in the rating instructions. The 4-point Likert scale for importance ranged from 1 "non-essential" to 4 "extremely essential." The 4-point Likert scale for measurability ranged from 1 "unmeasurable" to 4 "easily measurable." Full definitions of the scales and ratings can be found with the survey in Appendix A.

6. Results address form. To help insure confidentiality, a separate address sheet was provided so the participant could request the results of the survey independent of submitting the questionnaire.

7. Return envelope. A stamped, addressed return envelope was also included to help encourage the return of the questionnaire.

Instrument Development

The original investigator-developed survey was pilot tested after the University Committee on Research Involving Human Subjects (UCRIHS) approval (Appendix B) in May 2000 to determine any problems with the survey. A selected group of certified athletic trainers and sports medicine physicians were participants in the first pilot study. The investigator asked athletic trainers and sports medicine physicians who worked in the Greater Lansing Area if they were interested in participating in a study. If they were interested in participating, the investigator either hand delivered or mailed a questionnaire to them. Thirty questionnaires were delivered to potential participants, and 24 (80%) completed surveys were returned. The results of this survey suggested that a few changes be made in the original questionnaire. The Likert scales were changed from an end point of "5" to "4" because of a concern over the number of responses for each point. In the pilot study the participants had a propensity to choose options near the middle of the scale leaving the ends of the scale with very few ratings. It was thought that a better discrimination would take place with no middle value. The statement for measurability was changed from the original end points of 1 "not clear" and 5 "very clear" to the current measurability statements of "unmeasurable" and "easily measurable," respectively. This change was made because after the participants voiced concerns about the definitions of clarity. After discussions with athletic trainers and experts in the field of education, it was decided that clarity would be better defined as measurability. If a competency statement is clearly written, then it is measurable. If a competency can be measured, then the statement clearly indicates outcomes that are observable.

Pilot Test to Determine Instrument Reliability

After the changes, and further IRB approval (Appendix C), the revised questionnaire was pilot tested. This second pilot study was performed to check for any issues with the new scale, wording, and to verify rater stability. The investigator recruited athletic training participants at the NATA national convention in Nashville, TN, in June 2000. The investigator identified an individual as a certified athletic trainer (ATC) by the color of his/her name badge. The ATCs who were in the exhibit arena or lobby area of the convention center during the meeting breaks were approached by the investigator and were asked to participate in the study. They were given a cover letter explaining the importance of the study for the athletic training profession and what their participation would require, especially noting the requirement to respond to the survey on two separate occasions. Athletic trainers ($n = 30$) who agreed to participate were provided a questionnaire that included consent provisions. Informed consent was implied if subjects completed and submitted the survey. A second survey was hand delivered or mailed to each of the participants five months later. They were informed in advance that the study would require them to complete the Likert scales for the competency statements two different times, several months apart. This was explained to them in the survey cover sheet along with the consent procedures. Since the pilot study was done to establish stability, it was important for them to realize the need to complete the questionnaire twice.

The results of the pilot study were analyzed using a test-retest reliability procedure to establish the stability of the rater responses. Twenty-two of the original 30 participants (73%) completed both sets of surveys. The pilot study yielded acceptable, moderate test-

retest reliability with a correlation of r = .67 Data from the pilot study can be found in Appendix D.

Psychometric Properties

The analyses of the Competency Evaluation Survey focused on four characteristics. First, a dimensionality analyses was performed to determine the degree to which measurability and importance are distinct and cohesive constructs as defined by the items. Second, the structure of each rating scale was evaluated to determine whether the categorizations that were utilized by athletic trainers were sufficiently defined. Third, each scale was analyzed to determine its reliability. Fourth, fit analyses were done to determine the quality of individual items within each scale.

Dimensionality. Factor analyses to evaluate the dimensionality of the instrument were conducted. Specifically, an exploratory factor analysis was performed on the raw scores from both scales simultaneously (measurability and importance). Promax rotation was used to determine whether the empirical factor loadings were logical considering the content of the competencies. An item was declared to have a primary loading on the factor for which the rotated factor loading was the largest. An item was declared to have a cross-loading if it had rotated factor loadings greater than .40 on two factors.

The first step of the analyses was to evaluate the factor structure of the data to determine whether it is reasonable to generate different scores for measurability and importance, and whether it is reasonable to generate different subscales within these sets for cognitive, psychomotor, and affective items. A scree plot was used to evaluate the number of useful dimensions by identifying the location at which the eigenvalues show negligible change with additional subsequent factors. Also, factors were eliminated from

consideration if no items exhibited a rotated factor loading greater than .40. A relatively flat line that appears for each point to the right of the fifth factor is noted on the x-axis. Therefore, based on the scree plot of the eigenvalues of each extracted factor (see Figure 1), substantive interpretations of the first five extracted factors will be conducted.

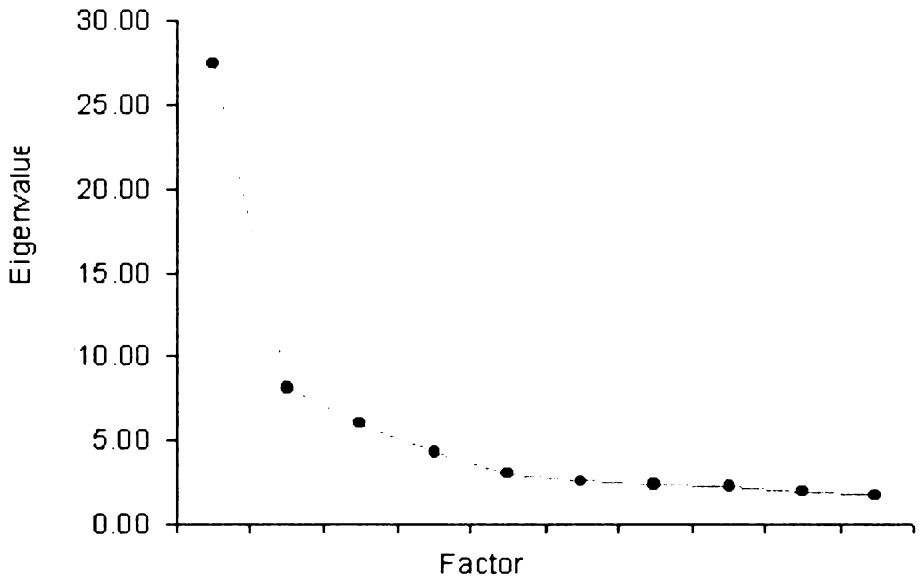


Figure 1. Scree plot for measurability scale

The exploratory factor analysis of raw scores using Promax rotation produced substantively interpretable factor loadings for virtually all items on these five factors. Table 3 shows the number (and percent) of items in each item category that had primary loadings on the first five factors. These factor loadings demonstrate that the first, third, and fifth extracted factors are defined exclusively by measurability items, and the second and fourth factors are defined exclusively by importance items. It is important to note that there are no large cross-loadings between the three factors defined by the measurability items and the two factors defined by the importance items.

Table 3

Primary Factor Loading Summary

Construct/Category	Factor				
	1	2	3	4	5
Measurability					
Cognitive	32	0	5	0	0
	(86%)	(0%)	(14%)	(0%)	(0%)
Psychomotor/Treatment	0	0	8	0	0
	(0%)	(0%)	(100%)	(0%)	(0%)
Psychomotor/Assessment	0	0	1	0	8
	(0%)	(0%)	(11%)	(0%)	(89%)
Affective	0	0	3	0	0
	(0%)	(0%)	(100%)	(0%)	(0%)
Importance					
Cognitive	0	29	0	8	0
	(0%)	(78%)	(0%)	(22%)	(0%)
Psychomotor/Treatment	0	1	0	7	0
	(0%)	(13%)	(0%)	(88%)	(0%)
Psychomotor/Assessment	0	4	0	5	0
	(0%)	(44%)	(0%)	(55%)	(0%)
Affective	0	0	0	3	0
	(0%)	(0%)	(0%)	(100%)	(0%)

Note. There are a total of 57 items for each construct—37 cognitive, 8 psychomotor treatment, 9 psychomotor assessment, and 3 affective. The values shown are the number (and percent) of items within each of these categories that have a primary loading on each of the first five extracted factors.

The largest potential cross-loading equals .20 for measurability items loading on importance factors and .34 for importance items loading on measurability factors. In both cases, the average potential cross-loading was very low (.01 for measurability items loading on importance factors and .02 for importance items loading on measurability factors).

The three measurability factors are defined by cognitive items, psychomotor treatment and affective items, and psychomotor assessment items (the first, third, and fifth extracted factors, respectively). Only one item, psychomotor item #54, exhibited a cross-loading between the measurability factors (i.e., had loadings on multiple factors that were greater than .40). This item had a primary loading on the assessment factor and a secondary loading on the cognitive factor. This competency includes the demonstration of a peak-flow meter for the assessment of asthmatic physically active people. This competency is very similar to competency #8, a cognitive competency that requires the athletic trainer to describe the use of the peak-flow meter in the evaluation and management of respiratory conditions. Therefore, it may have been perceived that the demonstration of this skill will require the cognitive abilities to explain as they demonstrate, creating a cross-loading.

In addition, three cognitive measurability items had weak primary loadings (i.e., the largest factor loading was < .40), although the lowest primary factor loading was still reasonably strong (.29). Competencies #4, recognition of common eye pathologies, #5, recognition of common ear pathologies, and #6, recognition of common mouth, sinus, and nose pathologies all involve the recognition of pathologies in the facial region.

The two importance factors separate items into two substantively meaningful subsets. One subset defined primarily by cognitive and psychomotor assessment items, and the other is defined primarily by psychomotor treatment and affective items.

The ratings of importance did not separate into three subsets like the measurability ratings. This may be due to the fact that the psychomotor assessment competencies are skills that are based heavily on the cognitive knowledge in order to execute the skills. The psychomotor treatment and affective competencies discuss more recognition and management of conditions. In evaluating these competencies it is thought that most of the conditions described in the psychomotor treatment will require the athletic trainer to make a referral to a physician.

There were no between factor cross-loadings for the importance items. However, ten importance items had weak primary loadings (i.e., the largest factor loading was < .40), although the lowest primary factor loading was still reasonably strong (.33).

The results of the analyses of the two scales demonstrate that they measure separate constructs and the subscales of cognitive, psychomotor, and affective are unidimensional measures.

Rating scale structure. The structure of the Likert rating scales was evaluated by using six criteria proposed by Linacre (1999). First, the minimum of 10 observations in each category was verified. Second, a unimodal shaped rating scale distribution was confirmed. Third, it was ensured that the average category measures increase with the rating scale categories. Fourth, it was determined that the outfit mean square statistics lie within a reasonable range of values (between 0.8 and 1.4 for this study). Fifth, it was confirmed that category thresholds (τ_x) increase with the rating scale categories. Sixth, it

was verified that the category thresholds are at least 1.4 logits apart and no more than 5 logits apart.

Measurability rating scale structure. The pertinent rating scale evaluation statistics are shown in Table 4. From these indices, it is apparent that the rating scale is functioning as intended. There are sufficient ratings within each category, and the category distribution is unimodal. Additionally, the average measure (Mean θ) and threshold values (τ_x) increase with rating scale categories. Finally, the magnitudes of the outfit mean square statistics are all reasonable.

Table 4

Measurability Rating Scale Summary

Category	Index			
	N	Mean θ	MS Outfit	τ_x
1 - Unmeasurable	1,609	-0.10	1.2	
2 – Somewhat Measurable	10,432	0.39	1.1	-1.80
3 – Measurable	21,648	1.05	0.9	-0.02
4 – Easily Measurable	18,053	2.37	1.0	1.81

Note. N indicates the number of ratings in each category, Mean θ indicates the average measurability estimate of trainers using that category, MS Outfit indices that unweighted mean square residual, and τ_x indicates the value of the rating scale threshold.

Importance rating scale structure. The relevant rating scale evaluation statistics are presented in Table 5. These indices unmistakably demonstrate that the rating scale is functioning as intended. The category distribution is unimodal; there are sufficient ratings

within each category, and the average measure (Mean θ) and threshold values (τ_x) increase with rating scale categories. Finally, the magnitudes of the outfit mean square statistics are all reasonable.

Table 5

Importance Rating Scale Summary

Category	Index			
	N	Mean θ	MS Outfit	τ_x
1 - Unessential	2,384	-0.77	1.1	
2 – Somewhat Essential	11,387	0.12	1.0	-1.91
3 – Essential	18,368	1.19	0.9	0.16
4 – Very Essential	20,503	2.59	1.0	1.74

Note. N indicates the number of ratings in each category, Mean θ indicates the average importance estimate of trainers using that category, MS Outfit indices that unweighted mean square residual, and τ_x indicates the value of the rating scale threshold.

Reliability. Four indices were computed to evaluate the reliability of measures from each of the two scales and the relevant subscales. First, the computation of the α coefficient was based on the raw scores. Second, the raw score point-biserial correlations were computed on the raw scores. Third, Rasch scaled scores were used to compute the reliability of separation for persons and for items. Lastly, the average Rasch equivalent of the point-biserial correlation was examined.

Measurability scale reliability. The measurability scale exhibits strong unidimensional trends, however, the subscales exhibit sufficient distinct cohesiveness to create substantively interesting distinctions.

Coefficient α for the measurability raw scores equals .96. Coefficient α for the cognitive, behavioral, and affective raw score subscales for measurability equals .96, .90, and .93, respectively. The average raw score point-biserial correlations for the measurability scale and for the cognitive, behavioral, and affective subscales equal .56, .63, .55, and .85, respectively. The reliability of separation for the measurability scale equals .96, and the average scaled score point-biserial correlation equals .55. All of these indices support the conclusions that were based upon the dimensionality evaluations.

Importance scale reliability. The importance scale also exhibits fairly strong unidimensional trends with distinct subscales. Coefficient α for the importance raw scores equals .96. The coefficient α for the cognitive, behavioral, and affective raw score subscales for importance equals .94, .85, and .78, respectively. The average raw score point-biserial correlations for the importance scale and for the cognitive, behavioral, and affective subscales equal .48, .53, .46, and .63, respectively.

The reliability of separation for the importance scale equals .95, and the average scaled score point-biserial correlation equals .49. All of these indices support the conclusions that were based upon the dimensionality evaluations, that the importance scale exhibits fairly strong unidimensional trends, but that the subscales exhibit sufficient distinct cohesiveness to be substantively interesting distinctions.

Fit analyses. The fit of items to the underlying scale was evaluated by examining the Rasch mean-square infit and outfit indices. The purpose of this was to determine

whether item responses exhibited reasonable consistency with the Rasch-based expectations. The criterion used was established through the work of Wright and Linacre (1994). That is, fit indices were considered moderately large if greater than 1.4 and very large if greater then 2.0. Likewise, applying the same criteria to person infit and outfit indices assessed the fit of persons to the underlying scale.

Measurability scale fit analyses. Descriptive statistics for the Rasch-based infit and outfit statistics for the items in the measurability scale are shown in Table 6. These statistics indicate that each item appears to function well as a measure of the common construct. In addition, the evidence supports that response vectors for individual items are in line with the expected values from the Rasch rating scale model as seen by the average mean square fit values around 1 and maximum values for infit and outfit indices less than 2.2.

Table 6

Measurability Item Fit Summary

Statistic	Index	
	Mean Square Infit	Mean Square Outfit
Mean	1.00	1.01
SD	0.32	0.34
Minimum	0.65	0.64
Maximum	2.14	2.19
N > 1.4	6	6
% > 1.4	11%	11%

Note. There are a total of 57 items.

Only 11% of the total infit and outfit items exhibited fit values greater than 1.4. Although these values are not ideal, they provide evidence that there was not substantial item misfit on the measurability scale.

Descriptive statistics for the Rasch-based person infit and outfit statistics are presented in Table 7. These statistics indicate that there is some evidence that response vectors for individual people may be out of line with the expected values from the Rasch rating scale model as evidenced by the maximum values in the range of 4.5. However, the average mean square fit values around 1 indicate that this is not a pervasive trend. The percentage of persons who exhibited misfit values greater than 1.4 confirm that there is some concern about misfit at the person-level. There are approximately 19% of the people exhibiting large infit statistics and 16% exhibiting large outfit statistics.

Table 7

Measurability Person Fit Summary

Statistic	Index	
	Mean Square Infit	Mean Square Outfit
Mean	1.03	1.01
SD	0.50	0.48
Minimum	0.14	0.15
Maximum	4.42	4.78
N > 1.4	175	151
% > 1.4	19%	16%

Note. There are a total of 930 participants, 15 are non-measurable due to extreme data.

Importance scale fit analyses. Descriptive statistics for the Rasch-based infit and outfit statistics for the items in the Importance scale are shown in Table 8. These statistics indicate that response vectors for individual items are in line with the expected values from the Rasch rating scale model as evidenced by the average mean square fit values around 1 and maximum values for infit and outfit indices less than 1.50. Only 4% of both the infit and outfit items exhibited fit values greater than 1.4. These values confirm that there was little item misfit on the importance scale.

Table 8

Importance Item Fit Summary

Statistic	Index	
	Mean Square Infit	Mean Square Outfit
Mean	1.02	1.01
SD	0.21	0.22
Minimum	0.59	0.60
Maximum	1.50	1.51
N > 1.4	2	2
% > 1.4	4%	5%

Note: There are a total of 57 items.

Descriptive statistics for the Rasch-based person Importance scale infit and outfit statistics are shown in Table 9. These statistics suggest that there is some evidence that response vectors for individual people may be out of line with the expected values from the Rasch rating scale model as evidenced by the maximum values in the range of 4.15 to

7.02. Overall, about 12% of the person response vectors exhibited noteworthy misfit on both the infit and outfit indices.

Table 9

Importance Person Fit Summary

Statistic	Index	
	Mean Square Infit	Mean Square Outfit
Mean	1.00	1.01
SD	0.37	0.44
Minimum	0.33	0.34
Maximum	4.15	7.02
N > 1.4	110	109
% > 1.4	12%	12%

Note: There are a total of 930 participants, 16 are non-measurable due to extreme data.

Data Analyses

To perform the analyses two types of scores were used, raw scores and Rasch scaled scores. The raw scores were the responses observed for each participant on each item. Summing responses for each item of these scales produced measurability and importance composite raw scores. Scaled Rasch scores were formed by fitting the Rasch rating scale model to the raw scores using FACETS (Linacre, 1994).

The Rasch rating scale model is an additive linear model that describes the probability that a participant will give a particular response to a Likert type questionnaire item (Wolfe, Chiu, & Reckase, 1999). Therefore, in this study, it will determine the

probability that a specific athletic trainer or physician will rate a particular competency using a specific rating scale category. In addition, the probability that a specific competency item will receive a particular rating is ascertained. This model is useful for this study because it is able to compensate for missing data, evaluate the stability of individual participant responses and instrument items, and create interval measures that can be subjected to further statistical analysis such as analysis of variance (ANOVA).

For purposes of data analyses, the 57 competencies were categorized as cognitive (37 items—1 through 37 in the instrument), psychomotor (17 items—38 through 54 in the instrument), or affective competencies (3 items—55 through 57 in the instrument). The data were analyzed for each research question as follows.

Research Questions 1 and 3. The first and third research question were concerned about the stakeholder's perceptions of measurability and importance of the competency statements. For these questions the frequencies of rating scores for each competency statement were tabulated. Scaled Rasch scores were used to calculate the means and standard deviations for each competency. These numbers were then analyzed to determine the measurability and importance of each competency. The competencies that have the highest ratings and are most often perceived "easily measurable" and "extremely essential" are discussed. Also those competencies that were on the low end of ratings and are perceived to be more "unmeasurable" and "nonessential" are discussed.

Research Questions 2 and 4. The remaining two research questions were concerned with the differences in stakeholder group perceptions of the measurability and importance of the competencies. The responses of the various groups of participants were evaluated to determine whether there were any correlations between particular

persons and their responses. Specifically, the mean ratings of the stakeholder groups, namely college/university athletic trainers, professional athletic trainers, and team physicians, were compared to establish any differences in their perceptions of measurability and importance for each of the general medical conditions and disabilities educational competency statements. Second, a comparison was made of the mean ratings assigned by individuals who were curriculum directors, were teachers, and those who had no teaching responsibilities. Third, a comparison of the mean scaled scores of females and males was completed. Fourth, a correlation of the certification year with ratings was executed.

The data were analyzed by an analysis of variance (ANOVA) to determine any differences among stakeholder groups or demographic characteristics for perceived measurability ($p < .05$). There were no post-hoc analyses conducted.

CHAPTER 4

RESULTS

Results are presented separately for each research question. In general, the results showed that there are concerns about the measurability of certain competencies and that many of the competencies are not considered to be essential for the entry-level certified athletic trainer (ATC).

Research Question 1

The first research question was concerned with the extent to which stakeholders perceive that the educational competency statements in the general medical conditions and disabilities content area are measurable. Descriptive results showing the frequencies, means, and standard deviations for measurability for each competency are presented in Table 10. Descriptive results showing the mean logits for measurability associated with each competency are presented in Table 11. The reader can think of logits as standardized means, with positive numbers representing better measurability, and negative numbers representing less measurability. Further statistics for each competency are presented in Appendix F.

The ratings for the measurability scale range from the easiest to measure competency (#52) about assessing vital signs ($\underline{M}$ = 3.80, $\underline{SD}$ = .44, $\underline{M}_{logit}$ = 2.34) to the hardest to measure competency (#55) supporting the moral and ethical behavior of athletic trainers in dealing with diseases for the persons who are physically active ($\underline{M}$ = 2.50, $\underline{SD}$ = 1.04, $\underline{M}_{logit}$ = -1.32). Overall, the majority of the competencies were in the "somewhat measurable" to "measurable" range.

Table 10

Frequencies and Means for Importance and Measurability Ratings of NATA Competencies

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
1. Describes congenital or acquired abnormalities, physical disabilities, and diseases.	922	36	342	401	143	2.71 (0.77)	920	16	208	422	274	3.04 (0.77)
2. Identifies common illnesses and diseases of the body's systems based on contemporary epidemiological studies of the injuries of athletes and others involved in physical activity.	921	16	155	441	309	3.13 (0.75)	919	12	197	451	259	3.04 (0.74)
3. Describes the general principles of health maintenance and personal hygiene, including skin care, dental hygiene, sanitation, immunizations, avoidance of infectious and contagious diseases, diet, rest, exercise, and weight control.	926	5	86	356	479	3.41 (0.68)	924	6	112	397	409	3.31 (0.70)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
4. Recognizes common eye pathologies (e.g., conjunctivitis, hyphema, corneal injury, and scleral trauma).	925	9	117	415	384	3.27 (0.71)	923	6	136	444	337	3.20 (0.71)
5. Recognizes common ear pathologies (e.g., otitis, ruptured tympanic membrane, and impacted cerumen.)	929	34	271	422	202	2.85 (0.80)	924	17	232	441	234	2.97 (0.76)
6. Recognizes common pathologies of the mouth, sinus, oropharynx, and nasopharynx.	925	35	288	472	130	2.75 (0.74)	922	15	255	452	200	2.91 (0.74)
7. Lists the common causes, signs, and symptoms of respiratory infections (e.g., pneumonia, bronchitis, sinusitis, URI, and asthma).	925	25	220	445	235	2.96 (0.77)	922	15	159	373	375	3.20 (0.78)
8. Describes the use of a peak-flow meter in the evaluation and management of respiratory conditions.	924	178	407	241	98	2.28 (0.89)	918	35	149	308	426	3.23 (0.85)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
9. Describes strategies for reducing the frequency and severity of asthma attacks.	926	15	153	406	352	3.18 (0.76)	924	12	131	401	380	3.24 (0.74)
10. Compares and contrasts the signs and symptoms of respiratory tract conditions (e.g., common cold, influenza, allergic rhinitis, sinusitis, bronchitis, asthma, pneumonia, and pleurisy).	926	51	336	390	149	2.69 (0.80)	923	20	223	425	255	2.99 (0.78)
11. Identifies the possible causes of sudden death syndrome among athletes and others involved in physical activity.	928	19	108	298	503	3.38 (0.77)	923	28	169	369	357	3.14 (0.82)
12. Recognizes the relationship between changes in blood pressure and changes in activity level.	928	9	134	406	379	3.24 (0.73)	921	10	98	384	429	3.34 (0.71)
13. Recognizes the relationship between changes of respiratory rate and changes inactivity level.	922	16	158	413	335	3.16 (0.76)	918	9	119	397	393	3.28 (0.72)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
14. Explains the typical history, signs, and symptoms associated with cardiopulmonary conditions.	922	16	161	394	351	3.17 (0.77)	919	8	127	432	352	3.23 (0.71)
15. Describes common heart conditions, such as coronary artery disease, hypertrophic cardiomyopathy, heart murmurs, and mital valve prolapse.	921	53	315	347	206	2.77 (0.86)	921	21	201	405	294	3.06 (0.79)
16. Identifies the typical symptoms and clinical signs of an injury or illness, including, those associated with local tissue inflammation (cellulites) and systemic infection (lymphangitis, lymphadenitis, bacteremia).	925	41	207	360	317	3.03 (0.86)	922	24	199	427	272	3.03 (0.78)
17. Describe the common conditions that affect the liver, gall bladder, and pancreas (e.g., jaundice, hepatitis, diabetes mellitus, and pancreatitis).	927	73	419	341	94	2.49 (0.78)	923	28	236	426	233	2.94 (0.79)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
18. Explains and recognizes the etiology, signs, symptoms, and management of diabetes mellitus.	926	30	223	377	296	3.01 (0.83)	920	9	153	434	324	3.17 (0.73)
19. Describes the signs and symptoms of the common disorders of the gastrointestinal tract.	926	58	389	378	101	2.56 (0.77)	918	26	212	422	258	2.99 (0.79)
20. Lists examples of the common conditions of the urinary tract, kidneys, and bladder (e.g., urinary tract infection [UTI] and kidney stones).	928	69	433	345	81	2.47 (0.76)	920	28	204	396	292	3.03 (0.81)
21. Lists the common infections and conditions of the male reproductive organs (e.g., epididymitis, varicocele, hydrocele, undescended testicle, and testicular cancer.	928	119	443	291	75	2.35 (0.80)	920	37	241	363	279	2.96 (0.85)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
22. Lists the common infections and conditions of the female reproductive organs (e.g., pelvic inflammatory disease [PID], ectopic pregnancy, and pregnancy.	928	112	458	285	73	2.34 (0.79)	920	39	239	364	278	2.96 (0.85)
23. Describes the common conditions of the breast (e.g., gynecomastia, cancer, and fibrous cysts).	928	197	468	219	44	2.12 (0.79)	920	62	266	363	229	2.83 (0.88)
24. Describes the various menstrual irregularities, the relationship that physical activity plays in their development, their resolutions, and their implications on performance, as well as detrimental systemic effects (e.g., oligomenorrhea, amenorrhea, and dysmenorrhea).	927	19	198	430	280	3.05 (0.77)	920	20	179	420	301	3.09 (0.78)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
25. Identifies the physiological effects and the changes to woman's body caused by pregnancy, and describes the body's response to exercise during pregnancy. Also identifies the indications and contraindications for exercise throughout pregnancy.	925	157	428	269	71	2.27 (0.83)	915	40	258	402	215	2.87 (0.82)
26. Describes the signs, symptoms, and management of common sexually transmitted diseases (STD).	925	57	318	361	189	2.74 (0.85)	918	21	134	436	327	3.16 (0.75)
27. Recognizes skin lesions (e.g., wounds and thermal, electrical, and radiation injury), infections (e.g., bacterial, fungal, and viral), and disorders (e.g., bites, acne, dermatitis, folliculitis, and eczema).	926	9	85	415	417	3.34 (0.68)	918	12	171	436	299	3.11 (0.74)
28. Identifies skin infections that are potentially contagious (e.g., impetigo, staph infection).	926	2	31	269	624	3.64 (0.56)	918	8	134	433	343	3.21 (0.71)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
29. Recognizes conditions that affect bones and joints, (e.g., epiphysitis, apophysitis, aseptic necrosis, arthritis, gout, and felon.	924	24	169	363	368	3.16 (0.81)	918	15	221	447	235	2.98 (0.75)
30. Describes common conditions that affect muscles (e.g., myositis, rhabdomyolysis).	923	17	138	372	396	3.24 (0.77)	916	14	154	455	293	3.12 (0.73)
31. Recognizes the main cerebral lesions caused by trauma (e.g., subdural, epidural hematoma, aneurysm).	924	10	67	197	650	3.61 (0.67)	918	25	182	410	301	3.08 (0.79)
32. Describes the etiology, signs, symptoms, and management of convulsive disorders.	921	18	192	404	307	3.09 (0.78)	918	15	163	454	286	3.10 (0.74)
33. Recognizes postconcussional syndrome.	927	0	5	91	831	3.89 (0.33)	917	8	113	395	401	3.29 (0.71)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
34. Identifies the common signs and symptoms of contagious viral diseases.	922	13	202	469	238	3.01 (0.73)	912	16	213	441	242	3.00 (0.75)
35. Lists the advantages and disadvantages of sports participation by individuals with hepatitis B virus or human immunodeficiency virus (HVA).	925	32	222	364	307	3.02 (0.84)	916	19	146	377	374	3.21 (0.78)
36. Describes the etiology, signs, symptoms, and management of common viruses (e.g., human papillomavirus, Epstein-Barr virus, and hepatitis B virus.	921	47	356	382	136	2.66 (0.79)	918	18	224	426	250	2.99 (0.77)
37. Describes where and how to seek appropriate medical assistance on disease control, notification, and epidemic prevention.	926	24	147	278	477	3.30 (0.83)	919	23	146	369	381	3.21 (0.79)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
38. Assesses the patient for congenital or acquired abnormalities, physical disabilities, and diseases that would predispose him or her to other injury or illness, or would exacerbate the existing conditions(s).	925	35	185	367	338	3.09 (0.84)	916	35	281	414	186	2.82 (0.79)
39. Manages acute asthma attacks and takes appropriate steps to reduce the frequency and severity of asthma attacks.	926	3	49	228	646	3.64 (0.60)	924	25	190	418	291	3.06 (0.79)
40. Recognizes and refers individuals exhibiting a history, signs, and symptoms of cardiopulmonary conditions to the appropriate medical authority.	930	3	36	200	691	3.70 (0.55)	921	14	200	391	316	3.10 (0.78)
41. Recognizes and manages the common disorders of the gastrointestinal tract.	927	45	309	415	158	2.74 (0.79)	920	19	340	400	161	2.76 (0.76)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
42. Recognizes and applies the appropriate treatments for diabetic coma and insulin shock.	929	11	52	203	663	3.63 (0.64)	923	13	183	386	341	3.14 (0.78)
43. Acts quickly to contain skin infections that are potentially contagious and refers the patient when appropriate.	928	1	37	276	614	3.62 (0.57)	920	39	197	388	296	3.02 (0.84)
44. Takes the appropriate steps to treat a seizure.	927	5	36	187	699	3.70 (0.56)	922	27	151	347	397	3.21 (0.82)
45. Recognizes and takes the appropriate steps to manage and control common contagious viral and infectious diseases.	923	8	101	385	429	3.34 (0.70)	917	23	237	418	239	2.95 (0.79)
46. Uses an otoscope correctly to examine the ear and nasal passages.	929	182	364	273	110	2.33 (0.92)	920	47	190	319	364	3.09 (0.89)
47. Use and interprets urine diagnostic Chemstrips (dipsticks).	927	127	368	255	107	2.29 (0.93)	915	36	140	288	451	3.26 (0.86)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
48. Uses a penlight to examine pupil responsiveness, equality, and ocular motor function.	930	2	27	167	734	3.76 (0.51)	923	3	39	238	643	3.65 (0.58)
49. Palpates the abdominal quadrants for tenderness and rigidity.	930	15	66	288	561	3.50 (0.70)	923	12	111	308	492	3.39 (0.75)
50. Uses the stethoscope correctly to auscultate the heart, lungs, and bowel.	924	103	270	292	259	2.77 (0.98)	919	36	175	339	369	3.13 (0.86)
51. Assesses body temperature.	929	3	37	234	655	3.66 (0.57)	922	0	21	169	732	3.77 (0.47)
52. Assesses vital signs.	930	1	4	97	828	3.88 (0.34)	924	1	12	156	755	3.80 (0.44)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
53. Refers an individual who presents with complaints of genitourinary or reproductive disorders to a physician.	924	28	126	319	451	3.29 (0.81)	919	57	255	347	260	2.88 (0.89)
54. Demonstrates the proper use and interpretation of a peak-flow meter (hand-held spirometer) in the assessment of asthmatic athletes and other asthmatics involved in physical activity.	922	79	326	363	154	2.64 (0.86)	919	19	147	339	414	3.25 (0.79)
55. Supports the moral and ethical behavior of athletic trainers in issues dealing with diseases of athletics and physical activity.	921	10	56	233	622	3.59 (0.65)	914	177	296	237	204	2.51 (1.04)

Table 10, continued

Competency Statement	Importance						Measurability					
	N	1	2	3	4	X (SD)	N	1	2	3	4	X (SD)
56. Recognizes the moral and ethical responsibility of taking situational control in the containment of common contagious viral and infectious diseases.	922	6	63	298	555	3.52 (0.65)	916	138	292	285	201	2.60 (0.99)
57. Accepts the roles of medial and allied health personnel in the referral, management, and treatment of athletes and others involved in physical activity suffering from general medical conditions.	925	2	26	181	716	3.74 (0.51)	916	151	262	265	238	2.64 (1.04)

Table 11

Mean Logits for Measurability and Importance Ratings

Competency Number	Measurability ($\underline{M}_{logit}$)	Importance ($\underline{M}_{logit}$)
1	- .18	-.94
2	- .18	- .04
3	.49	.66
4	.22	.28
5	-.34	- .64
6	-.48	- .85
7	.21	- .41
8	.27	- 1.82
9	.32	.08
10	- .29	- .98
11	.07	.58
12	.57	.23
13	.41	.01
14	.28	.05
15	- .14	- .82
16	- .20	- .27
17	- .41	- 1.38
18	.13	- .30
19	- .28	- 1.24
20	- .19	- 1.42

Table 11, continued

Competency Number	Measurability ($\underline{M}_{logit}$)	Importance ($\underline{M}_{logit}$)
21	- .35	- 1.69
22	- .36	- 1.69
23	- .66	- 2.18
24	- .06	- .23
25	- .57	- 1.83
26	.12	- .87
27	- .01	.47
28	.23	1.38
29	- .31	.04
30	.01	.23
31	- .10	1.28
32	- .04	- .14
33	.45	2.87
34	- .27	- .30
35	.22	- .27
36	- .29	- 1.04
37	.22	.37
38	- .66	- .13
39	- .14	1.38
40	- .04	1.63
41	- .78	- .87

Table 11, continued

Competency Number	Measurability ($\underline{M}_{logit}$)	Importance ($\underline{M}_{logit}$)
42	.07	1.36
43	- .21	1.32
44	.23	1.65
45	- .38	.45
46	- .06	- 1.71
47	.36	- 1.79
48	1.57	1.90
49	.70	91
50	.05	- .82
51	2.16	1.47
52	2.34	2.79
53	- .53	.34
54	.33	- 1.07
55	- 1.32	1.21
56	- 1.14	.97
57	- 1.05	1.83

In examining the frequency of measurability ratings, it is interesting to note that only one competency, assesses body temperature (# 51) was rated by all participants as "somewhat measurable," "measurable," or "easily measurable," no respondents rated this competency as "unmeasurable." Competency #52 only has one respondent perceiving the competency as unmeasurable. Otherwise, surprisingly, respondents used all of the categories, from "unmeasurable" to "easily measurable," to characterize the remaining competencies.

Table 12 indicates the distribution of competencies by relative measurability. This table shows that most of the competencies are in the "somewhat measurable" to "measurable" categories.

The relative ratings within the measurability scale by domain are displayed in Figure 2. This figure shows the four item types by position on the Y-axis and the location the parameter estimate in logits for each item on the x-axis. The difference between the means of the three subscales is statistically significant with a large effect size, $\underline{F}(2,56) = 8.95$, $\underline{p} = .0004$, $\underline{R}^2 = .25$. From this figure, it is clear that, overall, the affective items were believed to be the least measurable of the items ($\underline{M}_{logit} = -1.17$). For example, the three competencies that participants rated as least measurable focused on maintaining ethical behavior in issues dealing with diseases of athletes (# 55, $\underline{M} = 2.51$, $\underline{SD} = 1.04$, $\underline{M}_{logit} = -1.32$), maintaining ethical behavior when taking situational control in the containment of contagious diseases (# 56, $\underline{M} = 2.60$, $\underline{SD} = 0.99$, $\underline{M}_{logit} = -1.14$), and accepting the roles of medical personnel in the treatment of the medical conditions of athletes (# 57, $\underline{M} = 2.64$, $\underline{SD} = 1.04$, $\underline{M}_{logit} = -1.05$).

Table 12

Distribution of Numbered Competency Statements by Mean Values for Measurability

Mean Rating for Measurability	Cognitive Competencies (n=37)	Psychomotor Treatment Competencies (n=8)	Psychomotor Assessment Competencies (n=9)	Affective Competencies (n=3)
2.41-2.60				55,56
2.61-2.80		41		57
2.81-3.00	5,6,10,17,19,21,22,23,25,29,34,36	38,39,40,45	46,53	
3.01-3.20	1,2,4,7,11,15,16,18,20,24,26,27,30,31,32,35,37	42,43	50	
3.21-3.40	3,8,9,12,13,14,28,33	44	47,49,54	
3.41-3.60				
3.61-3.80			48,51,52	

The next two competencies that were difficult to measure were from the psychomotor treatment area. Competency #41 concerning the recognition and management of gastrointestinal disorders had a mean rating of 2.76, ($\underline{SD}$ = 0.76, $\underline{M}_{logit}$ = -.78), while Competency #38 which included the assessment of patients for abnormalities, disabilities, or diseases had a mean rating of 2.82 ($\underline{SD}$= 0.79, $\underline{M}_{logit}$ = -.66).

The cognitive and psychomotor treatment items were of about the same level of measurability, at the threshold between being rated "measurable" and "somewhat measurable" with means of -0.04 and -0.23 logits, respectively. Overall, the psychomotor assessment competencies ($\underline{M}_{logit}$ = 0.76) were considered to be more easily measured than competencies in the cognitive ($\underline{M}_{logit}$ = -0.04) and psychomotor treatment ($\underline{M}_{logit}$ = 0.23) areas. Four of the competencies that were rated easiest to measure were within the psychomotor assessment area. These competencies focused on assessing vital signs (# 52), assessing body temperature (# 51), using a penlight to examine pupil responsiveness (# 48), and palpating abdominal quadrants for rigidity and tenderness (# 49). These competencies had mean ratings that ranged from 3.80 to 3.39. An interesting outcome was the larger range of item difficulties for the psychomotor assessment items. These competencies vary considerably in the degree to which participants believed them to be amenable to observation. The psychomotor assessment competencies ranged from the easiest to measure, #52, assessing vital signs ($\underline{M}$ = 3.80, $\underline{SD}$ = .44, $\underline{M}_{logit}$ = 2.34) to the hardest to measure, #53, referring an individual with genitourinary or reproductive disorders ($\underline{M}$ = 2.88, $\underline{SD}$ = 0.89, $\underline{M}_{logit}$ = -.53).

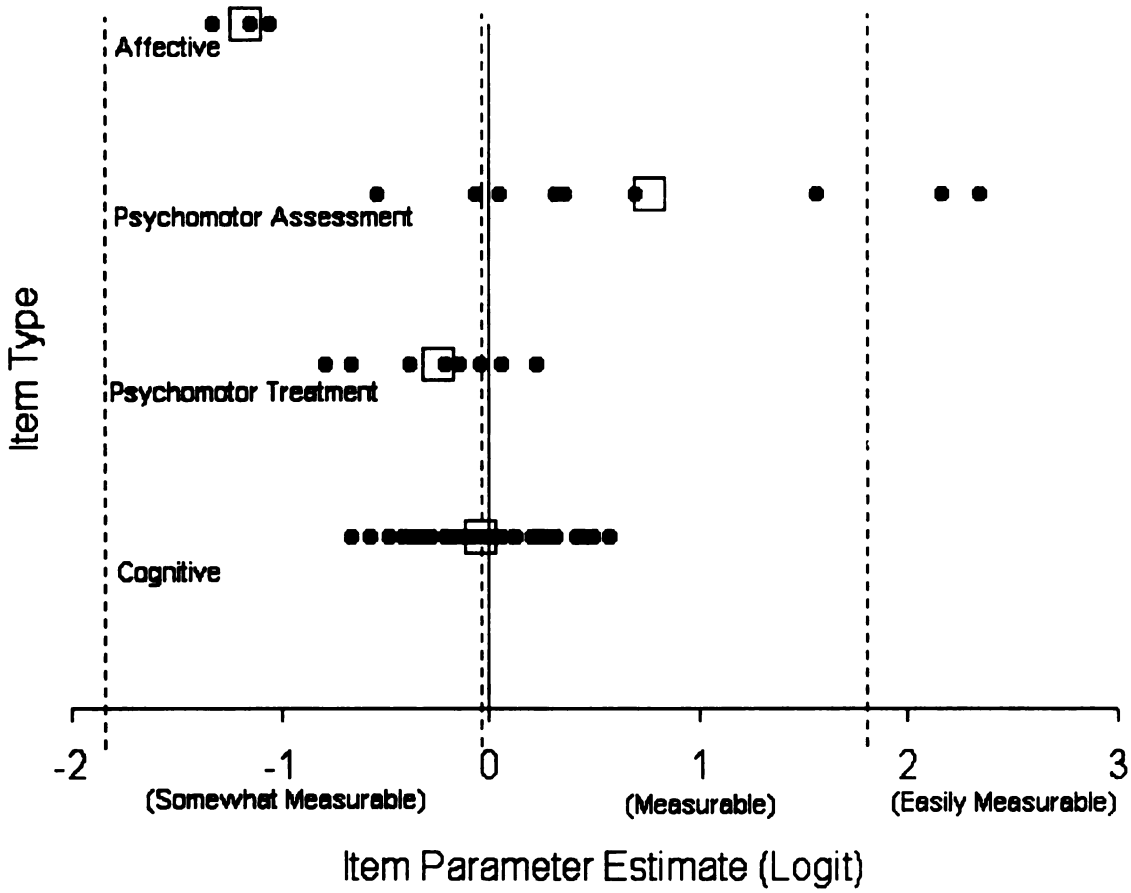


Figure 2. Item Difficulty Plot for Measurability Scale

The final competency rated in the top five for measurability was a cognitive domain competency, #12, the recognition and relationship between changes in blood pressure and activity levels. The cognitive domain competencies all clustered in the "somewhat measurable" to "measurable" range. The cognitive competencies ranged from the easiest to measure, #12, recognizing the relationship between blood pressure changes and exercise ($M = 3.34$, $SD = 0.78$, $M_{logit} = .57$) to the hardest to measure, #23, describing conditions of the breast ($M = 2.83$, $SD = 0.88$, $M_{logit} = -.66$). The cognitive competencies are usually amenable to paper and pencil tests for evaluation of competence.

Research Question 2

The second research question analyzed the extent to which the stakeholder groups differed on the perceived measurability of each of the general medical conditions and disabilities educational competency statements. Ratings were analyzed for differences across stakeholder groups (ATC college/university, ATC professional, MD/DO), gender, years of certification or licensure, and teaching responsibility.

The analyses of the data determined that there are only small differences in the means of these groups. ANOVAs were not statistically significant for stakeholder groups $F(2,914) = 1.15$, $p = .32$; teaching responsibility $F(2,906) = 0.01$, $p = .99$; or gender $F(2,905) = 0.00$, $p = 0.98$. In addition, the correlations between years since certification and scaled measurability scores were weak for athletic trainers ($r = -.06$, $p = .12$), physicians ($r = -.18$, $p = .05$), and for both groups combined ($r = -.09$, $p = .01$). Although the p value for some of the correlations are statistically significant, the effect size is miniscule and therefore not meaningful. Therefore it can be concluded that years since certification or licensure is not related to perceived measurability of competency items. All of these statistics suggest that the ratings are fairly consistent across the subgroups of athletic trainers. Consequently, there is no perceived need for further consideration of demographic variables when examining the measurability of the NATA educational competencies.

Research Question 3

The third research question was concerned with the extent to which stakeholders perceive that the educational competency statements in the general medical conditions and disabilities content area are important. Descriptive results showing the frequencies,

means, and standard deviations for the importance of each competency are presented in Table 10. Mean logits for the importance assigned to each competency are presented in Table 11. Additional statistics for each competency are presented in Appendix F.

The results revealed that the mean values for importance ranged from 3.89 (SD = 0.33, M_{logit} = 2.87) for competency # 33, about recognizing postconcussional syndrome, to 2.12 (SD = 0.79, M_{logit} = -2.18) for competency #23, about describing common conditions of the breast. Thus, the mean importance ratings of the competencies range from "very essential" to "nonessential." Table 13 indicates the distribution of competencies by importance. This table shows that the competencies are spread across all rating categories.

The relative ratings within the importance scale by domain are displayed in Figure 3. This figure demonstrates the four item domain types by position on the Y-axis and the location of each item's parameter estimate in logits on the x-axis. The difference between the means of the three subscales is statistically significant with a moderately large effect size, $F(2,56) = 5.75$, $p = .005$, $R^2 = .18$. From this figure, it is apparent that overall, the affective items were perceived to be among the most important competencies (M_{logit} = 1.34). The psychomotor treatment items were rated slightly lower, on average, with a mean of 0.85 logits. The competencies perceived to be the least important were the items in the cognitive and psychomotor assessment domains with means of - 0.35 and 0.22 logits, respectively. A notable element is the wide dispersion of items within each of these categories, much wider than for the measurability scale. For example the psychomotor assessment competencies ranged from the "somewhat essential" competency #41, about recognizing and managing gastrointestinal disorders (M = 2.74,

SD = 0.79, M_{logit} = -.87) to the "essential" competency # 42, about recognizing and treating diabetic issues (M = 3.63, SD = 0.64, M_{logit} = 1.36). The psychomotor treatment competencies ranged from the "essential" competency #53, refers individuals with genitourinary complaints (M = 3.29, SD = 0.81, M_{logit} = .34) to the "very essential" competency #52, assesses vital signs (M = 3.88, SD = 0.34, M_{logit} = 2.79). The cognitive competencies had the largest distribution ranging from the lowest rated, "nonessential" competency #23, describes conditions of the breast (M = 2.12, SD = 0.79, M_{logit} = -2.18) to the highest rated, "very essential" competency #33, about recognizing postconcussional syndrome (M = 3.89, SD = 0.33, M_{logit} = 2.87).

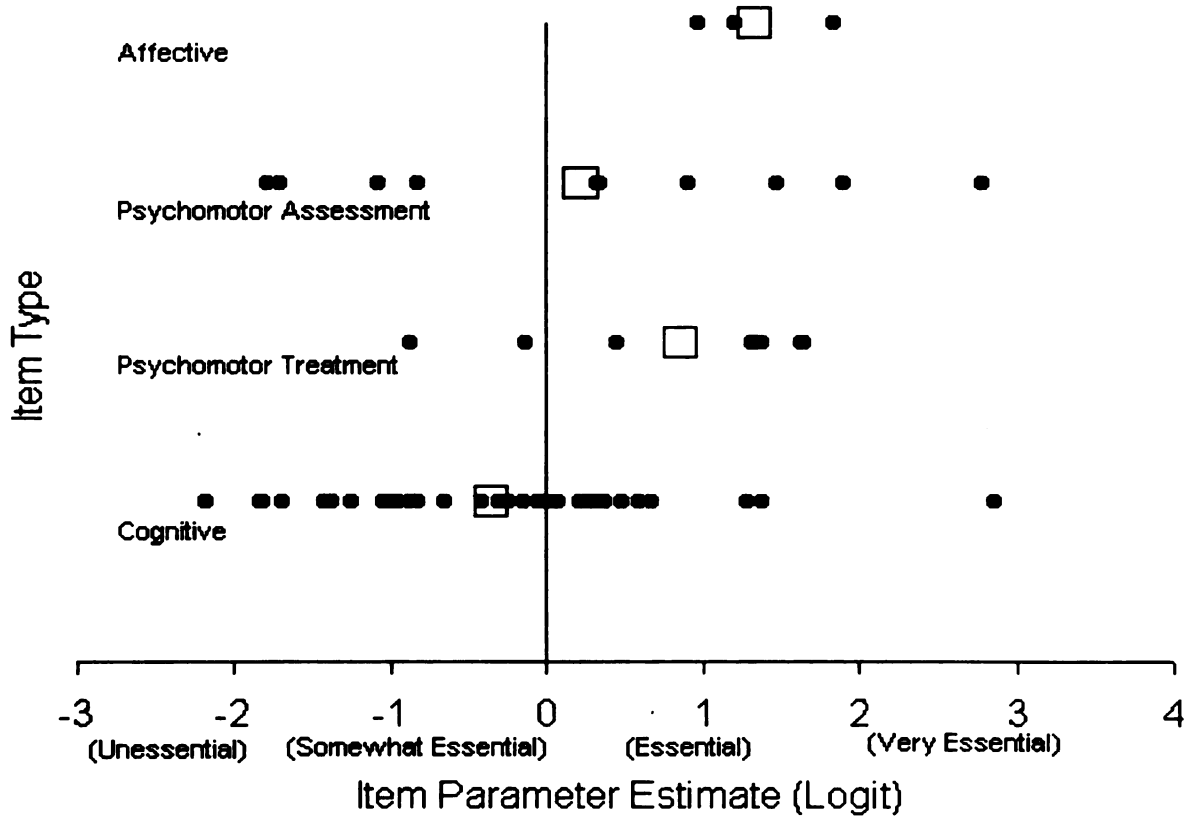


Figure 3. Item Difficulty Plot for Importance Scale

Table 13

Distribution of Numbered Competency Statements by Mean Values for Importance

Mean Rating for Importance	Cognitive Competencies (n=37)	Psychomotor Treatment Competencies (n=8)	Psychomotor Assessment Competencies (n=9)	Affective Competencies (n=3)
2.01-2.20	23			
2.21-2.40	8,12,21,22,25		46,47	
2.41-2.60	17,19,20			
2.61-2.80	1,6,10,15,26,36	41	50,54	
2.81-3.00	5,7			
3.01-3.20	2,9,13,14,16,18,24,29,32,34,35,	38		
3.21-3.40	4,11,27,30,37	45	53	
3.41-3.60	3		49	55,56
3.61-3.80	28,31	39,40,42,43,44	48,51	57
3.81-4.00	33		52	

The five competencies rated as most important represent all four of the item type categories. These competencies had mean ratings that ranged from 3.89 ($\underline{M}_{logit}$ = 2.87) to 3.70 ($\underline{M}_{logit}$ = 1.63)

- Item #3, recognizes postconcussional syndrome (cognitive)
- Item #52, assesses vital signs (psychomotor assessment)
- Item #48, uses a penlight to examine pupil responsiveness (psychomotor assessment)
- Item #57, accepts roles of medical and allied health personnel in treatment of athletes suffering form general medical conditions (affective)
- Item #40, recognizes and refers individuals with symptoms of cardiopulmonary conditions to medical authorities (psychomotor treatment)

The five competencies rated least important fell into the cognitive and psychomotor assessment categories. These competencies had mean ratings that ranged from 2.33 ($\underline{M}_{logit}$ = -1.71) to 2.11 ($\underline{M}_{logit}$ = -2.18).

- Item #23, describes common conditions of the breast (cognitive)
- Item #25, identifies physiological effects of pregnancy (cognitive)
- Item #8, describes the use of peak-flow meters in the management of respiratory conditions (cognitive)
- Item #47, uses and interprets urine diagnostic chemsticks (psychomotor assessment)
- Item #46, uses an otoscope correctly to examine the ear and nasal passages (psychomotor assessement)

In examining the frequency of importance ratings, only competency #33, recognizes postconcussional syndrome, was rated by all respondents as "somewhat essential," "essential," and "very essential." No respondents rated it as "nonessential." A few other competencies, #28, identifies contagious skin infections, #39, manages acute asthma attacks, #40, recognizes individuals with cardiopulmonary conditions, #43, acts quickly to contain skin infections, #48, uses a penlight to examine pupils, #51, assesses body temperature, #52, assesses vital signs, and #57, accepts the role as an allied health personnel, had three or fewer respondents rating them as "nonessential." Therefore, each of the remaining competencies had a minimum of four respondents for each rating category, from "nonessential" to "very essential."

Research Question 4

The extent that stakeholder groups differ on the perceived importance of the competency statements in the general medical conditions and disabilities area was examined in Research Question 4. Ratings were analyzed for differences across stakeholder groups (ATC college/university, ATC professional, MD/DO), gender, years of certification or licensure, and teaching responsibility.

The analyses of the data determined that there are only small differences in the means of these groups. ANOVAs were not statistically significant for any of these variables: stakeholder group $F(2,928) = 0.45$, $p = .64$; teaching responsibilities $F(2,920) = 1.54$, $p = .22$; and gender $F(2,917) = 0.64$, $p = 0.42$. Furthermore, the correlations between years since certification and ratings were weak and statistically non significant for athletic trainers ($r = -.03$, $p = .44$), physicians ($r = -.13$, $p = .14$), and for both groups combined ($r = -.04$, $p = .27$). All of these statistics suggest that the ratings are fairly

consistent across the subgroups of athletic trainers. Consequently, there is no perceived need for further consideration of demographic variables when examining the importance of athletic training competencies.

Conclusions

There is considerable variability in the perceptions of measurability of the general medical conditions and disabilities competencies by athletic trainers and team physicians. The overall results showed most of the competencies to be in the "somewhat measurable" to "measurable" range. However, there are some competencies that are suspect with respect to measurability, especially those in the affective domain.

The results also yielded a wide range of perceptions concerning the importance of these competencies. The overall range of perceptions for importance was larger than that found for measurability. Most of the competencies were perceived to be in the "somewhat essential" to "essential" range. However, these results demonstrated that some of the competencies that are considered "nonessential" or only "somewhat essential" in the general medical conditions and disabilities content area of the NATA Athletic Training Educational Competencies.

CHAPTER 5

DISCUSSION, RECOMMENDATIONS, CONCLUSION

This study focused on one of twelve parts of the National Athletic Trainers' Association (NATA) Educational Competencies (1999). Specifically, the dimension of general medical conditions and disabilities was the section evaluated. The educational competencies are presented in three domains, cognitive, psychomotor, and affective. For this study, the psychomotor competencies were subdivided into treatment and assessment areas. Athletic trainers and team physicians rated each of the competencies for their measurability and importance.

The results of this study demonstrate that the NATA educational competencies should be further refined to focus only on the essential knowledge and skills deemed necessary for the entry-level certified athletic trainer (ATC). This study provides evidence that the importance of some of the competencies need to be further evaluated. In addition, some competencies need to be evaluated and refined to increase their clarity, which in turn would improve their measurability. Improving the clarity and measurability of the statements is important to defining entry-level ATC knowledge and skills. These strategies will help athletic training educators develop appropriate curricula and educational experiences for athletic training students. The results of these proposed changes should also improve the competence level of entry-level athletic trainers since educators can focus intensely and directly on the knowledge and skills deemed essential.

Discussion

In this study the NATA competency statements were evaluated for their perceived measurability. The term measurability describes how clearly the competency statement

indicates what the entry-level ATC should know or be able to do. In turn, it is the knowledge and skills that educators should teach and evaluate in an athletic training program. More specifically, measurability refers to the specific outcomes that can be observed in order to determine competence.

NATA competencies were designed for use as criterion-referenced measurements, which compare student performance with a pre-set standard to determine competence, rather than comparing students to one another (Schuldenfrei, 1993; Shanklin & Beach, 1980). These measurements are a key component to competency-based education, which requires clearly written competency statements to define outcomes that are measurable.

In addition to measurability, the importance of the competencies was also addressed in this study. Importance is the degree to which a competency statement represents a critical knowledge or skill, or one that is frequently used by entry-level ATCs. The term critical refers to the extent to which the health and well being of the athlete or physically active person depends upon an ATC's knowledge, skill, or attitude for addressing client health. As well, an ATC skill is critical if an athlete might suffer serious consequences if the ATC does not posses that knowledge or skill, specified in the competency. In addition, the ATC knowledge, skills, or attitudes are important if they are used by an entry-level ATC on a regular basis.

The measurability and importance of the competencies were studied because athletic training professionals have not effectively considered the measurability of the competencies nor have standards been published for the evaluation of competence. The issue of measurability is vital to the athletic training profession because the goal of athletic training education programs is to produce competent entry-level athletic trainers.

Thus, it is important to be able to determine when a student has achieved competence in each specific knowledge or skill. There are questions that need to be answered to ensure consistency in the interpretation of the competencies. For example, does each person understand which knowledge or skills were intended by the competency? If different ATCs were to evaluate a student, would they agree on the student's competence level? An inconsistency in the interpretation of the NATA educational competencies makes it difficult to establish valid and reliable evaluation tools and creates variance across programs. Each athletic training educator individually interprets each competency, develops evaluation tools, and determines the standards on which to evaluate students. Autonomy for every program is desired, but this can effectively occur in the instructional strategies used to educate students, it cannot occur in the outcome standards.

In addition to the measurability of the competencies, the perceived importance of these competencies has not been investigated. The athletic training profession is defined by these competencies, so it is imperative that the profession is founded on competencies that are deemed important.

Measurability

There is a wide range of perceptions among ATC professionals and team physicians on the effectiveness of the competency statements as useful tools for measuring athletic training student competence. This variability in measurability ratings is apparent in the frequency values in Table 10. Variability is noted because there is only one competency (out of the 57) that did not have at least one entry in each of the four rating categories. However, despite such overall variability, the majority of competencies are considered to be "measurable" or "somewhat measurable."

Easiest to measure competencies. Two psychomotor assessment competencies are considered as the easiest to measure. Competencies #51, regarding assessment of body temperature ($\underline{M}$ = 3.77, $\underline{SD}$ = 0.47, $\underline{M}_{logit}$ = 2.16) and #52, regarding assessment of vital signs ($\underline{M}$ = 3.80, $\underline{SD}$ = 0.44, $\underline{M}_{logit}$ = 2.34) are thought to be easy to measure. They are easy to measure because they are succinct, clearly stated, and involve common readily observable skills. These skills can be taught and evaluated easily in the classroom setting. The only apparent ambiguity is which specific method is required or how many techniques are necessary for an ATC to be deemed competent in assessing body temperature or vital signs. Nonetheless for these measurements, the most common methods are easily understood and easy to evaluate.

The competency next easiest to measure is #48, which involves using a penlight to examine the pupils of the eyes ($\underline{M}$ = 3.65, $\underline{SD}$ = 0.58, $\underline{M}_{logit}$ = 1.57). Again, that competency is stated succinctly, is clearly written, and specifies the exact skills required. Therefore, competencies which are perceived to be easily measured are broken down into discrete statements and, as a result, are easy to assess or observe. That outcome was anticipated because it is consistent with the findings of previous research which points to increased understanding and ease of evaluation by breaking competencies into more specific, discrete statements (Klingstedt, 1972; Lutrell et al., 1999).

In general, the psychomotor assessment competencies were rated as more measurable than the psychomotor treatment competencies. The assessment competencies are thought to be easier to measure because they represent more specific behaviors and are easier to observe. For example, as noted earlier, using a penlight (#48), assessing body temperature (#51), and assessing vital signs (#52) are some of the treatment

competencies. The psychomotor assessment competency with the lowest measurability involves referral to a physician. Competency #53 requires the ATC to refer an individual who has genitourinary or reproductive issues to a physician ($\underline{M}$ = 2.88, $\underline{SD}$ = .89, $\underline{M}_{logit}$ = .34). This competency is different from the other assessment competencies because it is not a specific or observable skill that can be easily measured in the classroom. This competency is therefore comparable, and its rating similar, to the psychomotor treatment competencies, which are rated lower than the psychomotor assessment competencies. In addition, many of the psychomotor treatment competencies are conceptually broader and involve more than one action, including "recognizes and manages," or "manages and takes appropriate steps." Therefore, they are more complex than the psychomotor assessment competencies.

In addition, the conditions or situational content of the psychomotor treatment competencies need to be simulated, whereas, the techniques in the psychomotor assessment area can be performed and evaluated on anyone. For example, the psychomotor assessment competency of assessing a temperature can be performed on any individual; however, the psychomotor treatment competency of demonstrating how to manage and take appropriate steps of a diabetic coma is more complex and must involve a simulation of a diabetic emergency in the classroom.

Overall, psychomotor assessment competencies may be perceived as easier to measure than other competency statements; however, there was a variation in the ratings for these competencies when compared to the others. This larger range may be due to the variety of the competency statements in this area. For instance, as discussed earlier, some of these competencies are very succinct and involve only one skill such as "assesses

temperature" while others involve more skills such as "correctly auscultates the heart, lung and bowels." In addition, competency #53, as pointed out earlier, is the lowest rated in the psychomotor assessment area and is very similar to the competencies in the psychomotor treatment area.

Difficult to measure competencies. Some competencies are difficult to measure because the competency is not easily observed. This is especially true when evaluating a person's attitudes and moral beliefs. The affective domain competencies are very difficult to measure because a person's moral development or true intentions are not easily observed and measured (Harbeck, 1972). This perception held true in this study with all three affective domain competencies rated low or only "somewhat measurable." These three difficult to measure competencies include #55, maintaining ethical behavior in issues dealing with diseases of athletes ($\underline{M}$= 2.50, $\underline{SD}$ = 1.04, $\underline{M}_{logit}$ = -1.32), #56, maintaining ethical behavior when taking situational control in the containment of contagious diseases ($\underline{M}$= 2.59, $\underline{SD}$ = .99, $\underline{M}_{logit}$ = -1.14), and #57, accepting the roles of medical personnel in the treatment of medical conditions of athletes ($\underline{M}$ = 2.64, $\underline{SD}$ =1.04, $\underline{M}_{logit}$ = -1.05).

Although the affective domain competencies are all in the "somewhat measurable" category, the participants have rated these competencies as some of the most important in the general medical conditions and disabilities content area. Since these competencies are deemed to be very important, it is essential to include them in an athletic training curriculum and, as well, to develop an effective method for measuring them.

There are other competencies that may also be difficult to measure because the conditions are uncommon and because the situation or athlete condition in which the competency is needed may not present itself. Competencies in the psychomotor treatment domain that require skills to be demonstrated in the management of various conditions or disabilities may never truly be tested due to the inability to create that condition. For example, many student athletic trainers may never encounter a person with a diabetic reaction or one who is experiencing a seizure. Because a patient with the actual conditions or disabilities may not be available, and because clearly it is unethical to create an injury, illness, or disability for the purposes of assessing the skills of an athletic training student, a measurement difficulty is created. This concern was voiced when one respondent commented that the only way the psychomotor treatment competencies can be measured is "if they a see an athlete with the condition" listed. In addition, these competencies are to be taught and evaluated in the classroom setting where these conditions will not be observed. This creates a measurement difficulty in the classroom setting that must be addressed.

To overcome this limitation, sometimes a simulation can be created representing the real life setting. Simulations can be created in a variety of ways, including role-playing, videotapes, or through computerized simulations. With a simulation the student can demonstrate his or her competence and an evaluation by an instructor can occur. The evaluation of competence needs to be related, as closely as possible, to real life situations so that students can demonstrate the independent performance of the athletic training competencies (Beare, 1985; Chambers, 1995; Chambers et al., 1996; Lutrell et al., 1999; Mitchell, 1990; Spady, 1977; Spady & Mitchell, 1977). Although, simulations may be

difficult to create for some competencies they are useful and need to be developed for evaluating student competence.

Another reason for decreased measurability is if the expected outcome of the competency is not clear. Clarity and thus measurability may be an issue if the competency is too broad or the language unclear. Vague language creates a problem because the desired outcome is difficult to determine. If a competency is explicitly stated, its measurability increases.

Some of the athletic training competencies, as discussed previously, were perceived to be only "somewhat measurable." Although this may be due to the difficulty in observing behavior, there is also some confusion in the interpretation of the competencies. In examining competency #38, which requires the athletic trainer to "assess the patient for congenital or acquired abnormalities, physical disabilities, and diseases that would predispose him or her to other injury or illness, or would exacerbate the existing condition(s)," the wording is broad with no distinctions as to which abnormalities, disabilities, and diseases need to be included. This imprecision may create variability in what is perceived as essential to teach and learn. The confusion in interpreting competencies is illustrated when one respondent commented that the ability to rate one competency depended on how it is interpreted. The respondent illustrated the point by writing two different interpretations of one competency, rating each one at opposite ends of the Likert scale. The respondent noted that for competency #57, accepts the roles of medical and allied health personnel in the referral of those physically active people suffering from medical conditions, that if the interpretation were "accepts the roles of other medical personnel," he would rate it as a "1-nonessential." However, if the

interpretation were "accepts referral to other medical personnel," then the rating would be a "4-very essential." Thus, the interpretation and perception of the intent of the competency may be variable across the athletic training profession.

This difficulty in measuring competencies is not unexpected since the measurement of competence has been a weak area within competency-based education (CBE) in other fields (Harbeck, 1972; Lane & Ross, 1994b; Lane & Ross, 1998; Reilly et al., 1977; Scott, 1982). The difficulty in evaluating competence has been referred to as the "Achilles heel" of CBE (Reilly et al., 1977). Some health care professions, including preventive medicine, dental hygiene, and dietetics, have recognized this lack of reliability and validity and, in turn, have taken steps to improve the understanding and evaluation of their professional competency statements (Lane et al., 1995; Lane & Ross, 1998; Scott, 1982).

The preventive medicine profession has acknowledged this lack of reliability and validity and made advances in alleviating the problem (Lane & Ross, 1998; Lane et al., 1995). Performance indicators have been identified for each competency necessary for preventive medicine physicians. These indicators define the interpretation of the competency such that educators and students will not interpret a competency in varied or differing of ways. These performance indicators provide a template for developing measures to assess competency achievement.

McGaghie (1991) discusses the competence level in terms of whether or not a person is "fit to practice." In theory, when student athletic trainers pass all the competencies during their educational experience they should also be capable of passing the NATABOC exam and be capable of practicing as entry-level certified athletic

trainers. Conversely, if an ATC does not posses the basic knowledge and skills, the patient may suffer. Accreditation, along with certification, offers an assurance of minimal competency (Gelmon, 1996; Young et al., 1983). ATC certification protects the athlete or client and maintains the integrity of the profession.

In addition, liability may be an issue if the athletic trainer cannot perform tasks correctly or does not perform a skill they are expected to administer as the established standard of care for athletic trainers (Arnheim & Prentice, 1997). Therefore, if the ATC cannot perform a competency, the ATC may be legally responsible for any harm caused to the person. Thus, it is extremely important that every athletic trainer is educated in what is considered the knowledge and skills of a professional in the field of athletic training so that he or she can provide the expected standard of care.

Variability across programs cannot be tolerated because uniformity of understanding of each competency statement is necessary for every athletic training educator and student to know the expectations for entering the profession. This reliability within and across athletic training programs has to date not been effectively addressed within the profession. The mandated accreditation/curriculum route has created the need for increased course work and demonstration of teaching the NATA Educational Competencies (NATA, 1999). Current educators from internship routes now need to increase or revise class content and courses within their programs in order to meet the accreditation requirements. This creates a concern because these educators may not have the experience or knowledge of pedagogical and evaluation techniques to understand how to measure certain competencies. If there is a lack of understanding, the profession needs to ensure that there are opportunities to educate athletic trainers in measuring

competencies. Athletic training professionals have made many positive strides in this area through more offerings of lectures, seminars, workshops, and conferences for athletic training educators. However, there are many ATCs who cannot or do not take advantage of these opportunities, so other avenues need to be explored to minimize variance across programs.

Lastly, because the athletic training profession is eliminating the internship route to certification and is focusing on more structured classroom instruction, it is important that the essential and "somewhat measurable" competencies are evaluated. Improvement in clarity of the competency statements will help increase the measurability of the competencies which, in turn, will help standardize program outcomes. This will allow the development of standards and subsequent criterion reference evaluations to ensure competence and professional integrity.

Importance

Analysis of the competencies in this study also revealed variability in the perceived importance of the competencies. The decision of what to include in a curriculum is of the utmost importance. Importance was defined for this study as a knowledge or skill that is critical to the health and well being of the patient as well as competencies that are used on a regular basis.

The NATA educational competencies were developed from role delineation studies that were performed to determine the knowledge and skills required of athletic trainers (Grace, 1999; Grace & Ledderman, 1982; NATA, 1996; NATA, 1999). The competencies are used in athletic training programs to provide the template for student athletic trainer education. These competencies are also recorded so proof of student

attainment can be documented for the accreditation process. In addition, the competencies are the foundation of the National Athletic Trainers' Association Board of Certification (NATABOC) exam for students seeking athletic training certification. Therefore, the competencies must be truly essential for the entry-level athletic trainer. However, as the results of this study indicate, there is obviously not unanimous support by athletic training professionals as to the importance of the competencies in the general medical conditions and disabilities content area.

Characteristics of more important competency statements. Only one competency, #33, recognizing postconcussional syndrome, received zero ratings of "non-essential" across the 927 participants who rated this item. Since this competency deals with cognitive problems for the patient, it is obviously a critical issue and rated as "very essential." The variability in perceptions of importance is demonstrated by the ratings. Every other competency was rated as "non-essential" by at least one person and conversely, every competency was also rated as "very essential" by at least one person (Table 10).

As expected, the majority of respondents agreed that assessing vital signs (#52) is an essential competency ($\underline{M}$= 3.88, $\underline{SD}$ = .34, $\underline{M}_{logit}$ = 2.79). When life or death may be involved, the importance of the competency seems evident. However, the competency in using a peak-flow meter (#8) that helps asthmatics was rated as one of the least important ($\underline{M}$ = 2.27, $\underline{SD}$ = .89, $\underline{M}_{logit}$ = -1.82), even though an asthma attack can cause death. On the other hand, the participants rated the psychomotor competency of managing an asthma attack (#39) as important ($\underline{M}$= 3.63, $\underline{SD}$ = .60, $\underline{M}_{logit}$ = 1.38), along with the cognitive aspects of competency #9, describing strategies to reduce the problems with

asthma ($\underline{M}$ = 3.17, $\underline{SD}$ = .76, $\underline{M}_{logit}$ = .08). Thus, with similar competencies, there was discrimination by ATCs and physicians among these various statements as to which knowledge or skill is essential.

In general, the psychomotor competencies were thought to be more important than the cognitive competencies. Therefore, the ability to actually perform a skill was valued as more important than listing and describing conditions or disabilities. However, cognitive knowledge is often necessary in order to perform a skill. The importance of skills as compared to the cognitive knowledge may help explain the longevity of the internship route to certification. The internships often focused more on the development of skills by performing them in the training room setting. The athletic training room setting may provide an environment that is more conducive to teaching and evaluating the psychomotor competencies than the classroom.

The affective domain competencies were also perceived to be essential competencies. As discussed earlier, they were perceived to be only "somewhat measurable," but perceived to be important. These are interesting ratings because it is questionable whether they are perceived as critical or frequently utilized.

Characteristics of less important competency statements. The competencies perceived to be the least important were some cognitive and psychomotor assessment competencies. Examination of some of those competencies suggested that they would not be used frequently. For example, the need to be able to describe common conditions of the breast, competency #23, does not occur frequently. In addition, although some of these competencies may be critical to the health of the individual, they will be addressed through the referral to a physician, as required in other competencies. In examining some

of the least important competencies, the investigator noticed that the competencies dealing with genitourinary or reproductive areas were rated low. There are five competencies in this area that were rated among the lowest eight for importance. The competencies include #20, the ability to list common conditions of the urinary system ($\underline{M}$ = 2.47, $\underline{SD}$ = 0.76, $\underline{M}_{logit}$ = -1.42), #21, the knowledge to list the common infections of the male reproductive organs ($\underline{M}$ = 2.35, $\underline{SD}$ = 0.80, $\underline{M}_{logit}$ = -1.69), #22, the knowledge to list the common infections of the female reproductive organs ($\underline{M}$ = 2.34, $\underline{SD}$ = 0.79, $\underline{M}_{logit}$ = -1.69), #23, the ability to describe common conditions of the breast ($\underline{M}$ = 2.12, $\underline{SD}$ = 0.79, $\underline{M}_{logit}$ = -2.18), and #25, the knowledge to identify the physiological effects and changes to a women's body caused by pregnancy and its effects on exercise ($\underline{M}$ = 2.27, $\underline{SD}$ = 0.83, $\underline{M}_{logit}$ =-1.83). These results demonstrate that the majority of the participants did not consider the ability to list the infections and conditions of the reproductive organs, or have the knowledge to describe common conditions of the breast, as important for the entry-level ATC. However, competency #53, states the need to refer a person who presents with complaints in the genitourinary or reproductive areas, is rated twenty-first with a $\underline{M}$ = 3.29, $\underline{SD}$ of 0.81 and $\underline{M}_{logit}$ of .34. Recognizing the need to refer people with genitourinary or reproductive issues was perceived as more important than requiring the entry-level athletic trainer to have the knowledge to list the common problems in these areas. Thus, these competencies may not be used frequently, but they may also be perceived as beyond the scope of practice for the entry-level ATC.

When discussing the importance of the competencies in terms of frequency of use, one respondent rated a number of the competencies as "somewhat essential" because she felt that athletic trainers might never encounter these competencies in their lifetime.

Included among these "somewhat essential" skills were describing congenital or acquired abnormalities and identifying the physiological effects of pregnancy. She did not think it would be a critical issue if the ATC did encounter these conditions or disabilities because they could refer the person to a physician or hospital. Therefore, some of the infrequently required knowledge or skills will actually be addressed when performing other competencies that require physician referral.

Comparing the current study to the only other study found on the importance of the athletic training competencies (Zylks, 1988), it was determined that variability in importance ratings existed in both studies. The participants in Zylks study found the general NATA membership ($\underline{n}$ = 179) did not rate any of the 175 competencies in 7 content areas with only "5's-very important" and "4's-important." The current study, using a 4-point scale, did not find any competencies that received only ratings of "very essential" and "essential." Therefore, both studies had a wide range of perceptions on the importance of each competency.

In addition to examining competencies that received only the top two ratings, Zylks also noted competencies that 50% or more of the respondents rated as less than "important," a "3" or below rating. Five competencies had 50% or more of the ratings below "important." The content areas were two in education, one in counseling and guidance, and two in prevention of athletic injuries and illnesses. The current study found nine competencies, seven cognitive and two psychomotor assessments, were rated below "essential," (a rating of "2" or "1") by over 50% of the respondents. Although the competencies have changed dramatically since 1988, the fact that Zylks' study reported only 5 of 175 competencies as rated below "important" by over 50% of the participants,

whereas the current study found 9 out of 57 competencies as rated below "essential" by over 50% of the participants demands attention. In other words, 16% of the competencies were rated below "essential" by 50% of the respondents in the current study as compared to only 3% of the competencies rated below "important" by 50% of the respondents in Zylks' study. This demonstrates that some of the current competencies may not be necessary for the entry-level ATC.

In the current study, one of the competencies rated only "somewhat essential" or "nonessential" by over 50% of the respondents was, #46, "uses the otoscope correctly to examine ear and nasal passages" ($\underline{M}$ = 2.33, $\underline{SD}$ = 0.92, $\underline{M}_{logit}$ = -1.71). In addition, this competency received an unfavorable comment by a respondent claiming that this competency was unnecessary because an otoscope is an expensive tool and he felt the patient should be referred to a physician regardless of the ATC's assessment. This respondent went on to further discuss affective competency #57, stating that this important competency refers to an athletic trainer's role in the referral process. The respondent thought that if this competency is met, there is no need for the ATC to have some of the skills, such as using an otoscope, listed in the general medical conditions and disabilities content area.

With regard to this referral issue, another respondent commented about making an assessment that could lead to a liability issue. For example the respondent thought that listening to a patient's heart and then not referring to a physician would create a liability issue. Further, the respondent mentioned that if every patient was going to be referred to the physician regardless of the athletic trainer's assessment, then why waste the athletic trainer's time when he or she could be performing another duty. Again, this demonstrates

that some of these competencies may require knowledge and skill beyond the scope of duty of the ATC. Recognition and referral to a physician was deemed more important than having the skills to assess and treat the conditions listed. Therefore, it might be better to refer a patient to a physician for a diagnosis, which would also reduce the liability issues for the ATC. Although beyond the scope of this study, an examination of all state laws needs to be undertaken because current state licensure or registration bills for athletic trainers may restrict the scope of practice for the ATC and prevent them from performing some of the competencies.

The developers of the NATA competencies believed that all the competencies were important, and many of the competencies in the general medical conditions and disabilities content area were thought to be important by the current study participants. However, there is always a limited amount of time to teach, develop, and evaluate competencies; therefore, a rank order of competencies should be developed and re-analyzed by athletic training professionals to determine if each competency is critical or essential to know or just "nice to know." This is especially true for the competencies that were rated low on both importance and measurability.

For example, two of the cognitive competencies that were rated low on both the measurability and importance scales were "describing common conditions of the breast," (#23- $\underline{M} = 2.11$, $\underline{SD} = 0.79$, $\underline{M}_{logit} = -2.18$) and "identifying the physiological effects and changes due to pregnancy with the implications for physical activity," (#25- $\underline{M} = 2.27$, $\underline{SD} = 0.83$, $\underline{M}_{logit} = -1.83$). Competency #23 has a mean of 2.82 ($\underline{SD} = 0.89$, $\underline{M}_{logit} = -.66$) while #25 has a mean of 2.86 ($\underline{SD} = 0.82$, $\underline{M}_{logit} = -.57$) for the measurability scale. Therefore, these competencies are between "somewhat measurable" and "measurable,"

and they are also regarded as only "somewhat essential." These are the type of competencies that need to be reassessed and possibly eliminated.

After reviewing the results of the research questions, scatterplots (Figures 4, 5, 6, 7, and 8) were created to provide a "big" picture of the competencies when plotted by both measurability and importance. The patterns shown in the scatterplots support the earlier comments that many of the cognitive competencies are not considered essential. Also, the affective domain competencies are considered important, but are difficult to measure. Furthermore, these figures show that there are a number of competencies that are both low in importance and measurability.

For example, Figure 4 reveals that 21 (37%) of the 57 competencies were rated as low in importance as well as low in measurability, while 17 (30%) were rated as high in both importance and measurability. This finding demonstrates the need to examine some of these competencies and reassess their necessity. Some of the competencies may need to be rewritten to increase their measurability in order to obtain an accurate evaluation of importance. Once the competency is measurable, it should be re-rated to determine importance. In addition, if a competency is deemed essential, but only "somewhat measurable" it should be rewritten.

Figure 4

Scatterplots of Measurability and Importance

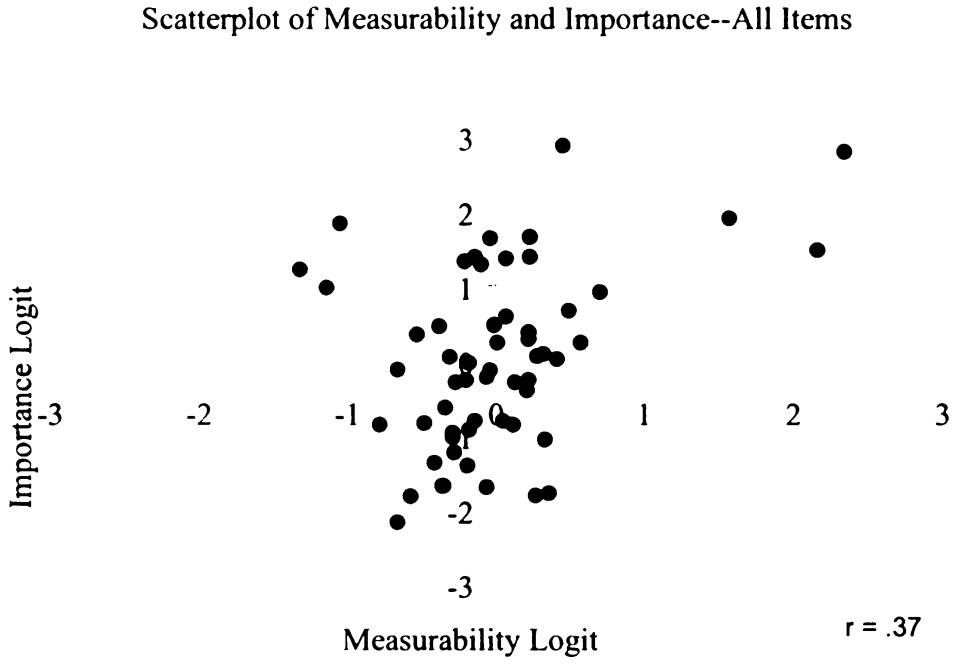


Figure 5 shows that the cognitive competencies cluster toward the midline of measurability. It also demonstrates that 23 (62%) of the 37 cognitive competencies are in the lower aspect in regard to importance. Additionally, 18 of these competencies are also in the lower quadrant for measurability; therefore, 49% of the cognitive competencies are in the low-low quadrant. These data indicate that almost half of the cognitive competencies should either be deleted or revised.

Figure 5

Scatterplot for Measurability and Importance of Cognitive Items

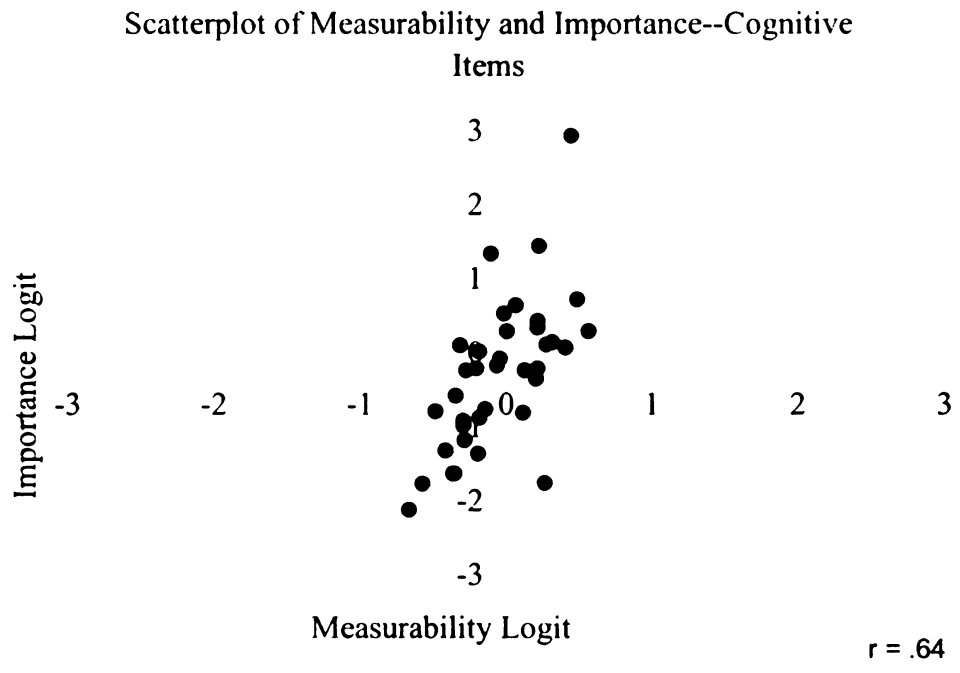
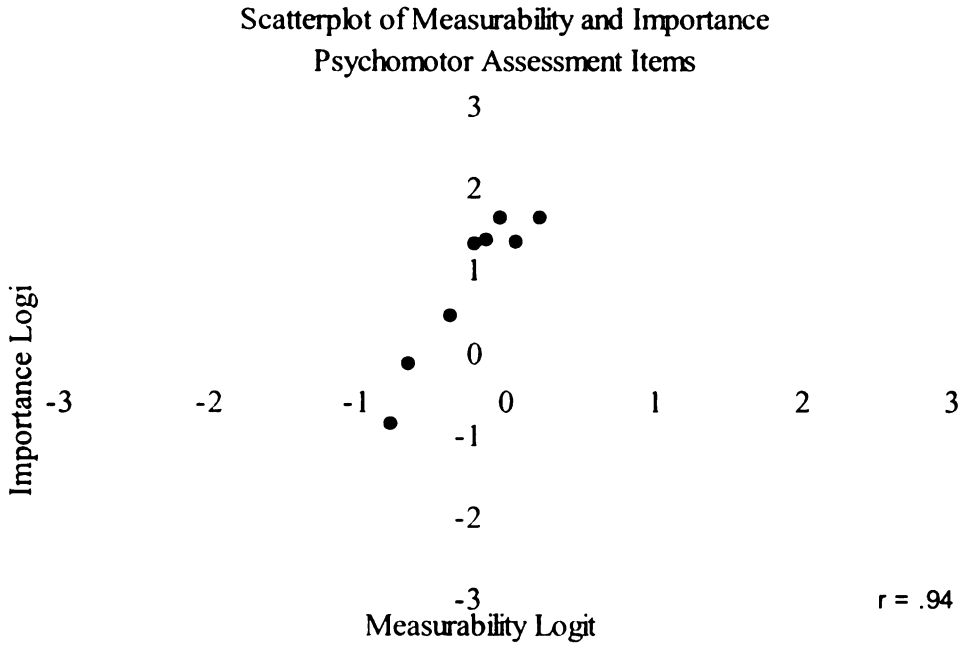


Figure 6 displays the psychomotor assessment items, which are mostly found in the upper quadrants for importance and close to the midline for measurability. Only two of the 8 competencies are found in the lower quadrant for both measurability and importance. These competencies involve the recognition and management of common disorders of the gastrointestinal tract and the assessment of patients for congenital or acquired abnormalities, physical disabilities, and diseases that would predispose him or her to other injury or illness, or would exacerbate the existing condition(s). The low importance may be due to the perception that these competencies are beyond the scope of the entry-level ATC.

Figure 6

Scatterplot for Measurability and Importance of Psychomotor Assessment Items



The scatterplot in Figure 7 exhibits that five of the nine psychomotor treatment competencies were found to be important, while the other four are in the lower quadrants for importance. Four of the five competencies in the upper quadrants for importance are also in the upper quadrant for measurability. Therefore, these four competencies are essential and do not require revision.

Figure 7

Scatterplot for Measurability and Importance of Psychomotor Treatment Items

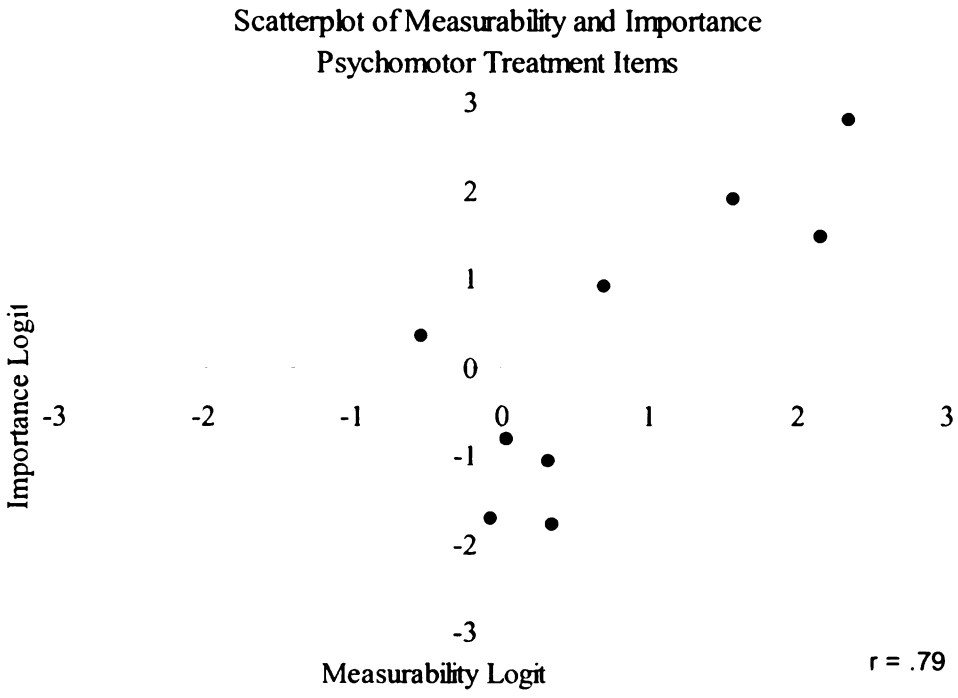
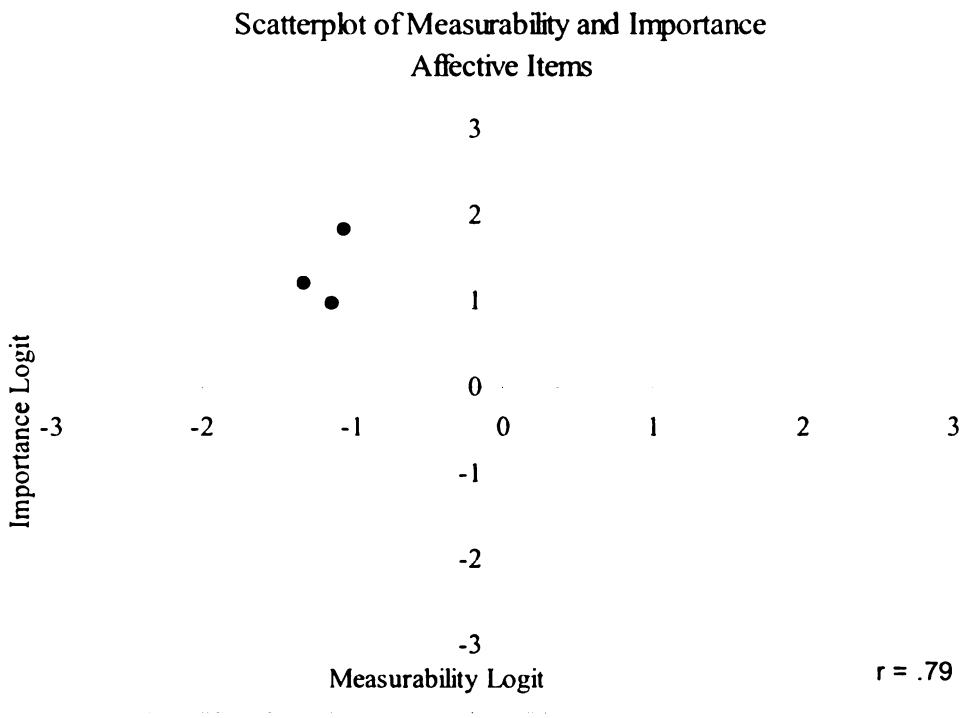


Figure 8 reveals that all of the affective domain competencies are perceived to be important, but are considered only somewhat measurable. As discussed earlier, measurement of affective skills is difficult. This is a challenge that must be addressed by the NATA given the importance of these competencies.

Figure 8

Scatterplot for Measurability and Importance of Affective Items



The results of this study demonstrate the need to examine the competencies in terms of measurability and importance. This sort of analysis is critical to determine what is truly essential within athletic training educational programs. Other professions, such as dental hygienists, have developed a comprehensive curriculum, reconsidered what was perceived to be very essential or critical, and determined the academic time frame required (DeWald & McCann, 1999). The profession of athletic training needs to take a similar step.

One way to determine the rank order and develop consensus of the essential competencies is through a Delphi study. A Delphi study of the competencies within each

domain and then throughout the entire list of competencies would create discussions among a variety of experts in the profession who could discuss the importance and rationale of each competency. These discussions could help ferret out the competencies that are critical or essential as compared to those considered somewhat essential or not necessary for the entry-level athletic trainer. The other competencies may be listed as "nice to know" for those students who are capable of demonstrating competence in the mandatory competencies and still have time left in their academic program. If a true rank order were developed, then the number of competencies that can be accomplished in an undergraduate program with the time available could be determined. If some of the competencies that are not included were still considered necessary, an adjustment in the educational time frame would need to be undertaken.

Athletic trainers are concerned about the understanding of competency statements and the number of competencies required within the academic programs. This study supports these concerns. The measurability and importance of the competencies needs to be re-addressed to help standardize athletic training education, maintain profession integrity, and protect the patients of athletic trainers.

Limitations

There are a few limitations of the study that should be considered. One limitation of this study was that the participants were not forced to make a choice among the competencies; they were able to rank each one as important if they perceived it to be important. If the inclusion of competencies is based on these ratings, it may create an unrealistic amount of material to cover, the original concern of many athletic training educators. A second limitation was that the sample in this study was randomly selected,

so the respondents may include athletic trainers or physicians who do not possess the expertise to evaluate measurability. Finally, the statistical analyses resulted in no differences in stakeholder group ratings of measurability and importance. This result may differ if each individual competency statement was analyzed separately in the statistical analysis.

Recommendations

The following recommendations are based upon the findings of this study.

1. A study on importance and measurability for the remaining eleven content areas of the NATA Educational Competencies (1999) should be undertaken. The use of an instrument similar to the Competency Evaluation Survey is recommended.

2. Examine the competencies that are perceived to be important and viewed as less than "measurable" and rewrite them into more specific statements so they will be better understood.

3. Develop performance indicators for each of the competency statements. Follow up with evaluation rubrics for each competency statement to help validate the competency statement and standardize student evaluations.

4. Perform a Delphi study to determine the ranking of importance of each competency in each content area, and then overall for all the competency statements. This type of study will help develop consensus of the truly essential competencies. The time to develop true competence and the time frame of the academic programs should be taken into consideration.

5. Establish a CEU or Certificates of Added Qualifications (CAQ's) program that must be obtained during the first few years following certification, and which covers the

competencies that are "nice to know," but not truly essential. This would help guide ATCs in their professional education.

6. Place the genitourinary and reproductive competencies into CEU or CAQ programs. These competencies could be required in a CEU or CAQ program within the first few years after certification. This would be considered an advanced area of study.

7. Continue to update the role delineation studies and observe for specialized athletic training skills necessary for specific employment sites. As the profession continues to advance, specific employment competencies may need to be developed or offered as CEU or CAQ programs.

Conclusions

The results of this study demonstrate a need to further evaluate the NATA educational competencies (NATA, 1999). These competencies are the heart of the accreditation of athletic training programs and the certification of athletic trainers. Therefore, the competencies that are necessary for an entry-level certified athletic trainer need to be refined to reflect what is truly essential. In addition, they need to be completely and clearly understood in order for valid, reliable measurements of competence to occur. This is of extreme importance to the athletic training profession since the current competencies are deemed necessary by the profession and they define a certified athletic trainer's knowledge and skills to society; yet, there are some genuine concerns regarding their measurability and importance. As athletic training education programs are converting from internship routes to accredited curriculum programs, it is critical that they are founded on measurable and essential athletic training competencies.

APPENDICES

APPENDIX A

Follow up Letter to Non-responsers

January 26, 2001

Dear Certified Athletic Trainer,

You received a survey from me approximately three weeks ago. The questionnaire was about rating the General Medical Conditions and Disabilities section of the NATA Educational Competencies.

This letter is a reminder that I have not yet received your survey. If you have already sent it, please disregard this letter and I thank you. If you have not returned the survey, I understand this is a busy time of year, but I would really appreciate it if you would take a small time out of your day today to fill it out and return it in the envelope that was enclosed. If you have misplaced the envelope the survey can be returned to: Sally Nogle, Michigan State University, Football Building, East Lansing, MI 48824. If you no longer have the survey, but are still willing to fill it out, please email (nogle@msu.edu) or call me (517-353-4412) and I will send or fax you a new one.

I appreciate your time and effort.

Sincerely,

Sally Nogle, ATC

APPENDIX B

Survey Instrument

Importance of NATA Educational Competencies

The National Athletic Trainers Association (NATA) recommends that entry-level athletic trainers achieve 542 educational competencies across 12 content areas (NATA, 1999). Athletic training educational programs must prepare student athletic trainers who are competent in all these areas. There is a limited amount of instructional time in every curriculum; therefore, critical decisions about curriculum content must be made. Hence, the most important competencies must be identified. The important or essential competencies are the ones that are critical in nature or frequently performed by an entry-level athletic trainer. In addition, the competencies must be measurable so the instructor can judge when a student is competent.

I want your assistance to help rate these competencies. My dissertation research focuses on one section of the NATA educational competencies. Specifically, I want you to rate the competencies in the General Medical Conditions and Disabilities content area on measurability and importance. The results of my study will help you and other athletic trainers to determine curriculum content. My study will also serve as a model for refining the remaining sections of the NATA competencies.

Participation in this study will require about 15-20 minutes of your time. Participation is voluntary. You may choose not to participate at all, not to answer certain questions, or discontinue participation at any time without penalty. You indicate your consent to participate by completing and returning this questionnaire.

Confidentiality will be protected in several ways: (a) your name will not appear on the questionnaire; (b) results will be presented in aggregate form in any presentations and publications; and (c) completed questionnaires will be stored in a locked file cabinet. Confidentiality will be protected to the maximum extent allowable by law.

Thank you for participating in this research. Please contact Sally Nogle (517/353-4412) if you have any questions or concerns about completing the questionnaire. If you have any questions about your rights as a participant in research, please contact Dr. David Wright, Chairperson, University Committee on Research Involving Human Subjects (517/355-2180).

PART 1: Demographic Information

Primary Employment (check one):

[ ]1 Athletic trainer at Division I university
[ ]2 Athletic trainer at Division II university
[ ]3 Athletic trainer at Division III university
[ ]4 Athletic trainer at a Junior College
[ ]5 Athletic trainer at a High School
[ ]6 Athletic trainer at a clinical or industrial setting
[ ]7 Athletic trainer- other _____
[ ]8 Team physician – medical specialty _____

Do you teach athletic training courses in any setting?

[ ]0 Yes
[ ]1 No

Are you an athletic training curriculum director at your college/university?

[ ]0 Yes
[ ]1 No

Gender [ ]0 Male
[ ]1 Female

Highest degree earned

[ ]0 Doctoral degree (including medical degrees)
[ ]1 Master's degree
[ ]2 Bachelor's degree

Year in which you were certified as an athletic trainer

_____ Year
[ ]9 Does not apply

Year in which you earned your medical degree

_____ Year
[ ]9 Does not apply

Have you read the *NATA Athletic Training Educational Competencies* (1999)?

[ ]0 Yes
[ ]1 No

Have you used the *NATA Athletic Training Educational Competencies* in curriculum development in your athletic training program?

[ ]0 Yes
[ ]1 No

PART 2: Competency Ratings

Please read each competency carefully and rate each competency on two characteristics: 1) **measurability**- the scale on the left hand side of the page and 2) **importance**- the scale on the right hand side of the page.

Measurability Rating Scale

Measurability means that the competency statement clearly indicates what entry-level athletic trainers should know or be able to do, or what instructors in athletic training programs should teach. The term "measurable" is used because the outcome should be easily observable. Thus, the question is to what degree does this competency **describe measurable** behaviors:

1= unmeasurable
2= somewhat measurable
3= measurable
4= easily measurable

Importance Rating Scale

Importance is the degree to which this competency represents a critical knowledge or skill, or one that is frequently used by entry-level athletic trainers. **Critical** means the health and well being of the athletes depends upon the competence of the athletic trainer, or conversely, that athletes might suffer serious consequences if the athletic trainer is not competent. **Frequency** means that the skill or knowledge is used on a regular basis.

1= unessential for the entry-level ATC
2= somewhat essential for the entry-level ATC
3= essential for the entry-level ATC
4= very essential for the entry-level ATC

* Note: An entry-level ATC is one who has graduated from an undergraduate athletic training program and has recently passed the NATA Certification exam.

General Medical Conditions and Disabilities

The degree to which the knowledge or skills in this competency are measurable.					The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable			Easily Measurable		**Importance** Non Essential			Extremely Essential
1	2	3	4	1. Describes congenital or acquired abnormalities, physical disabilities, and diseases.	1	2	3	4
1	2	3	4	2. Identifies common illnesses and diseases of the body's systems based on contemporary epidemiological studies of the injuries of athletes and other involved in physical activity.	1	2	3	4
1	2	3	4	3. Describes the general principles of health maintenance and personal hygiene, including skin care, dental hygiene, sanitation, immunizations, avoidance of infectious and contagious diseases, diet, rest, exercise, and weight control.	1	2	3	4
1	2	3	4	4. Recognizes common eye pathologies (e.g., conjunctivitis, hyphema, corneal injury and scleral trauma).	1	2	3	4
1	2	3	4	5. Recognizes common ear pathologies (e.g., otitis, ruputured tympanic membrane, and impacted cerumen).	1	2	3	4
1	2	3	4	6. Recognizes common pathologies of the mouth, sinus, oropharynx and nasopharynx.	1	2	3	4
1	2	3	4	7. Lists common causes, signs, and symptoms of respiratory infections (e.g., pneumonia, bronchitis, sinusitis, URI and asthma.	1	2	3	4

General Medical Conditions and Disabilities, continued

The degree to which the knowledge or skills in this competency are measurable.					The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable			Easily Measurable		**Importance** Non Essential			Extremely Essential
1	2	3	4	8. Describes the use of a peak-flow meter in evaluation and management of respiratory conditions.	1	2	3	4
1	2	3	4	9. Describes strategies for reducing the frequency and severity of asthma attacks.	1	2	3	4
1	2	3	4	10. Compares and contrasts the signs and symptoms of respiratory tract conditions (e.g., common cold, influenza, allergic rhinitis, sinusitis, bronchitis, asthma, pneumonia, and pleurisy).	1	2	3	4
1	2	3	4	11. Identifies the possible causes of sudden death syndrome among athletes and others involved in physical activity.	1	2	3	4
1	2	3	4	12. Recognizes the relationship between changes in blood pressure and changes in activity level.	1	2	3	4
1	2	3	4	13. Recognizes the relationship between changes in respiration rate and changes in activity level.	1	2	3	4
1	2	3	4	14. Explains the typical history, signs and symptoms associated with cardiopulmonary conditions.	1	2	3	4
1	2	3	4	15. Describes common heart conditions, such as coronary artery disease, hypertrophic cardiomyopathy, heart murmurs, and mitral valve prolapse.	1	2	3	4

General Medical Conditions and Disabilities, continued

The degree to which the knowledge or skills in this competency are measurable.					The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable....Easily Measurable					**Importance** Non Essential.....Extremely Essential
1	2	3	4	16. Identifies the typical symptoms and clinical signs of an injury or illness, including those associated with local tissue inflammation (cellulitis) and systemic infection (lymphangitis, lymphadenitis, bacteremia).	1 2 3 4
1	2	3	4	17. Describes common conditions that affect the liver, gall bladder, and pancreas(e.g., jaundice, hepatitis, diabetes mellitus, and pancreatitis.	1 2 3 4
1	2	3	4	18. Explains and recognizes the etiology, signs, symptoms, and management of diabetes mellitus.	1 2 3 4
1	2	3	4	19. Describes the signs and symptoms of the common disorders of the gastrointestinal tract.	1 2 3 4
1	2	3	4	20. Lists examples of the common conditions of the urinary tract, kidneys, and bladder(e.g., urinary tract infection[UTI] and kidney stones.	1 2 3 4
1	2	3	4	21. Lists the common infections and conditions of the male reproductive organs (e.g., epididymitis, varicocele, hydrocele, undescended testicle, and testicular cancer.	1 2 3 4
1	2	3	4	22. Lists the common infections and conditions of the female reproductive organs (e.g., pelvic inflammatory disease [PID], ectopic pregnancy, and pregnancy.	1 2 3 4

General Medical Conditions and Disabilities, continued

The degree to which the knowledge or skills in this competency are measurable.					The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable....Easily Measurable					**Importance** Non Essential.....Extremely Essential
1	2	3	4	23. Describes the common conditions of the breast (e.g., gynecomastia, cancer, and fibrous cysts).	1 2 3 4
1	2	3	4	24. Describes the various menstrual irregularities, the relationship that physical activity plays in their development, their resolutions, and their implications on performance, as well as detrimental systemic effects (e.g., oligomenorrhea, amenorrhea, and dysmenorrhea).	1 2 3 4
1	2	3	4	25. Identifies the physiological effects and the changes to woman's body caused by pregnancy, and describes the body's response to exercise during pregnancy. Also identifies the indications and contraindications for exercise throughout pregnancy.	1 2 3 4
1	2	3	4	26. Describes signs, symptoms, and management of common sexually transmitted diseases (STD)	1 2 3 4
1	2	3	4	27. Recognizes skin lesions (e.g., wounds and thermal, electrical, and radiation injury), infections (e.g., bacterial, fungal, and viral), and disorders (e.g., bites, acne, dermatitis, folliculitis and eczema).	1 2 3 4
1	2	3	4	28. Identifies skin infections that are potentially contagious (e.g., impetigo, staph infection).	1 2 3 4
1	2	3	4	29. Recognizes conditions that affect bones and joints (e.g., epiphysitis, apophysitis, aseptic necrosis, arthritis, gout, and felon).	1 2 3 4

General Medical Conditions and Disabilities, continued

The degree to which the knowledge or skills in this competency are measurable.					The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable				Easily Measurable	**Importance** Non Essential				Extremely Essential
1	2	3	4	30. Describes common conditions that affect muscles (e.g., myositis, rhabdomyolysis).	1	2	3	4
1	2	3	4	31. Recognizes the main cerebral lesions caused by trauma (e.g., subdural, epidural, hematoma, aneurysm).	1	2	3	4
1	2	3	4	32. Describes etiology, signs, symptoms, and management of convulsive disorders.	1	2	3	4
1	2	3	4	33. Recognizes postconcussional syndrome.	1	2	3	4
1	2	3	4	34. Identifies the common signs and symptoms of contagious viral diseases.	1	2	3	4
1	2	3	4	35. Lists the advantages and disadvantages of sports participation by individuals with hepatitis B virus or human immunodeficiency virus (HIV).	1	2	3	4
1	2	3	4	36. Describes the etiology, signs and symptoms, and management of common viruses (e.g., human papilloma virus, Epstein-Barr virus, and hepatitis B virus).	1	2	3	4
1	2	3	4	37. Describes where and how to seek appropriate medical assistance on disease control, notification, and epidemic prevention.	1	2	3	4

General Medical Conditions and Disabilities, continued

The degree to which the knowledge or skills in this competency are measurable.					The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable			Easily Measurable		**Importance** Non Essential			Extremely Essential
1	2	3	4	38. Assesses the patient for congenital or acquired abnormalities, physical disabilities, and diseases that would predispose him or her to other injury or illness, or would exacerbate the existing condition(s).	1	2	3	4
1	2	3	4	39. Manages acute asthma attacks and takes appropriate steps to reduce the frequency and severity of asthma attacks.	1	2	3	4
1	2	3	4	40. Recognizes and refers individuals exhibiting a history, signs and symptoms of cardiopulmonary conditions to the appropriate medical authority.	1	2	3	4
1	2	3	4	41. Recognizes and manages the common disorders of the gastrointestinal tract.	1	2	3	4
1	2	3	4	42. Recognizes and applies the appropriate treatments for diabetic coma and insulin shock.	1	2	3	4
1	2	3	4	43. Acts quickly to contain skin infections that are potentially contagious, and refers the patient when appropriate.	1	2	3	4
1	2	3	4	44. Takes the appropriate steps to treat a seizure.	1	2	3	4
1	2	3	4	45. Recognizes and takes the appropriate steps to manage and control common contagious viral and infectious diseases.	1	2	3	4

General Medical Conditions and Disabilities, continued

The degree to which the knowledge or skills in this competency are measurable.		The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable....Easily Measurable		**Importance** Non Essential.....Extremely Essential
1 2 3 4	46. Uses an otoscope correctly to examine ear and nasal passages.	1 2 3 4
1 2 3 4	47. Uses and interprets urine diagnostic Chemstrips(dipsticks).	1 2 3 4
1 2 3 4	48. Uses a penlight to examine pupil responsiveness, equality, and ocular motor function.	1 2 3 4
1 2 3 4	49. Palpates the abdominal quadrants for tenderness and rigidity.	1 2 3 4
1 2 3 4	50. Uses the stethoscope correctly to auscultate the heart, lungs and bowel.	1 2 3 4
1 2 3 4	51. Assesses body temperature.	1 2 3 4
1 2 3 4	52. Assesses vital signs.	1 2 3 4
1 2 3 4	53. Refers an individual who presents with complaints of genirourinary or reproductive disorders to a physician.	1 2 3 4
1 2 3 4	54. Demonstrates the proper use and interpretation of a peak-flow meter (hand-held spirometer) in the assessment of asthmatic athletes and other asthmatics involved in physical activity.	1 2 3 4
1 2 3 4	55. Supports the moral and ethical behavior of athletic trainers in issues dealing with diseases of athletics and physical activity.	1 2 3 4

General Medical Conditions and Disabilities, continued

The degree to which the knowledge or skills in this competency are measurable.		The degree to which this competency is important for the entry-level athletic trainer?
Measurable Un Measurable....Easily Measurable		**Importance** Non Essential.....Extremely Essential
1 2 3 4	56. Recognizes the moral and ethical responsibility of taking situational control in the containment of common contagious viral and infectious diseases.	1 2 3 4
1 2 3 4	57. Accepts the roles of medical and allied health personnel in the referral, management, and treatment of athletes and others involved in physical activity suffering from general medical conditions.	1 2 3 4

APPENDIX C

IRB Approval for Pilot Study

MICHIGAN STATE
UNIVERSITY

May 30, 2000

TO: Gail DUMMER
132 IM Sports Circle

RE: **IRB# 00-306** CATEGORY: 1-C

APPROVAL DATE: May 23, 2000

TITLE: PILOT STUDY OF PERCEPTIONS OF THE IMPORTANCE AND CLARITY OF THE GENERAL MEDICAL CONDITIONS AND DISABILITIES COMPETENCIES OF THE NATA EDUCATIONAL COMPETENCIES

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS approved this project.**

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email: UCRIHS@pilot.msu.edu. Please note that all UCRIHS forms are located on the web: http://www.msu.edu/unit/vprgs/UCRIHS/

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:

cc: Sally Nogle
131 Football Bldg.

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects
Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046
517/355-2180
FAX: 517/353-2976
www.msu.edu/user/ucrihs
E-Mail: ucrihs@msu.edu

APPENDIX D

IRB Approval for Study

MICHIGAN STATE
UNIVERSITY

June 21, 2000

TO: Gail DUMMER
132 IM Sports Circle

RE: **IRB # 00-306** **CATEGORY:** 1-C

TITLE: THE IMPORTANCE AND CLARITY OF SELECTED NATA EDUCATIONAL COMPETENCIES AS PERCEIVED BY ATHLETIC TRAINERS AND TEAM PHYSICIANS: A PILOT STUDY

ANNUAL APPROVAL DATE: May 23, 2000
REVISION REQUESTED: June 21, 2000
REVISION APPROVAL DATE: **June 21, 2000**

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS APPROVED THIS PROJECT'S REVISION.**

This letter also notes approval for changed title, revised questionnaire, additional pilot study, and consent form.

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewal are possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email: UCRIHS@pilot.msu.edu.

Sincerely,

David E. Wright

David E. Wright, Ph.D.
UCRIHS Chair

DEW: br

cc: Sally Nogle
131 Football Bldg.

OFFICE OF
RESEARCH AND GRADUATE STUDIES
University Committee on Research Involving Human Subjects
Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046
517/355-2180
FAX 517/353-2976
www.msu.edu/user/ucrihs
E-Mail ucrihs@msu.edu

MICHIGAN STATE
UNIVERSITY

September 28, 2000

TO: Gail DUMMER
132 IM Sports Circle

RE: **IRB # 00-306** **CATEGORY:** 1-C

TITLE: THE IMPORTANCE AND CLARITY OF SELECTED NATA EDUCATIONAL COMPETENCIES AS PERCEIVED BY ATHLETIC TRAINERS AND TEAM PHYSICIANS A PILOT STUDY

ANNUAL APPROVAL DATE: May 23, 2000
REVISION REQUESTED: September 15, 2000
REVISION APPROVAL DATE: **September 27, 2000**

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS APPROVED THIS PROJECT'S REVISION.**

This letter approves the title change and slight modification in survey directions and acknowleges that participants will be contacted by the investigator via mail.

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewal are possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email UCRIHS@pilot.msu.edu.

Sincerely,

Ashir Kumar, M.D.
Interim Chair, UCRIHS

AK: bd

cc: Sally Nogle
131 Football Bldg.

OFFICE OF
RESEARCH AND GRADUATE STUDIES
University Committee on Research Involving Human Subjects
Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046
517/355-2180
FAX: 517/353-2976
Web www.msu.edu/user/ucrihs
E-Mail ucrihs@msu.edu

APPENDIX E

Pilot Study Data

Table 14

Importance and Measurability Ratings for Rounds 1 and 2 of the Pilot Study

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
1	1st	0	8	12	2	2.73 (x.xx)	1	10	8	3	2.59
	2nd	0	9	9	4	2.74 (0.75)	4	8	7	3	2.43 (0.95)
2	1st	0	3	14	5	3.09	0	5	12	5	3.00
	2nd	0	1	16	5	3.17 (0.49)	1	11	6	4	2.61 (0.84)
3	1st	0	1	12	9	3.36	0	3	14	5	3.09
	2nd	0	2	7	13	3.48 (0.67)	0	5	10	7	3.04 (0.77)
4	1st	0	5	10	7	3.09	0	5	9	8	3.14
	2nd	0	2	10	9	3.31 (0.75)	1	2	13	6	3.04 (0.77)
5	1st	0	4	15	3	2.95	2	5	8	7	2.90
	2nd	0	5	13	4	2.91 (0.67)	2	5	9	6	2.83 (0.94)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
6	1st	1	6	12	3	2.77	0	7	10	5	2.90
	2nd	0	4	16	2	2.87 (0.55)	0	8	10	4	2.78 (0.74)
7	1st	1	4	14	3	2.86	0	4	7	11	3.32
	2nd	0	1	15	6	3.22 (0.52)	0	6	8	8	3.09 (0.79)
8	1st	2	12	6	2	2.36	0	6	9	7	3.05
	2nd	0	10	9	3	2.68 (0.72)	1	5	8	8	3.05 (0.90)
9	1st	0	2	13	7	3.23	0	5	9	8	3.14
	2nd	0	1	13	8	3.30 (0.56)	0	6	9	7	3.04 (0.77)
10	1st	0	5	13	3	2.90	1	6	9	6	2.91
	2nd	0	5	12	5	3.00 (0.67)	0	6	10	6	3.00 (0.74)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
11	1st	0	2	8	12	3.45	2	3	10	7	3.00
	2nd	1	0	8	13	3.52 (0.73)	2	3	12	5	2.91 (0.85)
12	1st	1	4	8	9	3.14	1	6	5	10	3.09
	2nd	0	5	7	10	3.22 (0.80)	1	7	5	9	3.00 (0.95)
13	1st	0	6	10	6	3.00	1	6	6	9	3.05
	2nd	0	5	8	9	3.17 (0.78)	1	7	6	8	3.00 (0.95)
14	1st	0	9	9	4	2.77	1	4	12	5	2.95
	2nd	0	5	9	8	3.13 (0.76)	0	5	11	6	3.04 (0.71)
15	1st	2	10	8	2	2.45	0	6	12	4	2.91
	2nd	2	5	10	5	2.83 (0.89)	0	5	13	4	2.96 (0.64)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
16	1st	1	5	13	3	2.82	0	7	11	4	2.86
	2nd	2	4	10	6	2.96 (0.93)	1	7	9	5	2.78 (0.85)
17	1st	1	14	6	1	2.32	0	8	10	4	2.82
	2nd	1	10	11	0	2.48 (0.59)	1	9	8	4	2.70 (0.82)
18	1st	1	5	11	5	2.91	0	4	12	6	2.91
	2nd	0	4	6	12	3.35 (0.78)	0	2	13	7	3.22 (0.60)
19	1st	0	8	12	2	2.73	0	8	10	4	2.82
	2nd	1	4	14	3	2.83 (0.72)	2	6	9	5	2.78 (0.90)
20	1st	0	12	9	0	2.43	0	6	9	7	3.05
	2nd	0	7	13	2	2.74 (0.62)	0	6	10	6	3.00 (0.74)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
21	1st	2	15	4	0	2.10	2	4	10	6	2.91
	2nd	3	9	6	4	2.48 (0.95)	2	5	9	6	2.87 (0.92)
22	1st	1	15	5	0	2.19	2	5	8	7	2.91
	2nd	2	12	7	1	2.30 (0.70)	2	5	10	5	2.83 (0.89)
23	1st	3	14	4	1	2.14	1	7	9	5	2.82
	2nd	4	11	7	0	2.13 (0.69)	2	7	8	5	2.74 (0.92)
24	1st	0	2	15	5	3.14	0	3	13	6	3.14
	2nd	0	4	10	8	3.13 (0.76)	2	2	13	5	2.91 (0.85)
25	1st	7	10	2	3	2.01	2	5	10	5	2.82
	2nd	3	12	6	1	2.26 (0.75)	1	7	9	5	2.78 (0.85)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
26	1st	0	9	10	3	2.73	0	4	13	5	3.01
	2nd	0	7	11	4	2.91 (0.73)	0	4	9	9	3.22 (0.74)
27	1st	0	3	11	7	3.20	0	4	14	4	3.00
	2nd	0	3	11	8	3.22 (0.67)	0	6	12	4	2.91 (0.67)
28	1st	0	0	13	9	3.41	0	6	11	5	2.95
	2nd	0	0	10	12	3.57 (0.51)	0	7	10	5	2.91 (0.73)
29	1st	1	4	10	7	2.86	1	5	11	5	2.91
	2nd	0	2	12	8	3.30 (0.63)	o	6	10	6	3.00 (0.74)
30	1st	0	3	12	7	3.18	1	3	11	7	3.09
	2nd	1	0	15	5	3.18 (0.66)	0	5	10	7	3.09 (0.73)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
31	1st	0	2	8	12	3.45	1	4	12	5	2.95
	2nd	1	3	4	14	3.43 (0.90)	2	7	7	6	2.83 (0.98)
32	1st	1	3	11	7	3.09	0	6	7	9	3.14
	2nd	0	4	13	5	3.00 (0.67)	0	7	8	7	2.96 (0.82)
33	1st	0	0	5	17	3.77	0	4	8	10	3.27
	2nd	0	0	2	20	3.91 (0.29)	0	5	10	7	3.13 (0.76)
34	1st	0	7	8	7	3.00	0	6	11	5	2.95
	2nd	0	5	11	6	3.04 (0.71)	0	7	11	4	2.87 (0.69)
35	1st	1	12	6	3	2.50	0	7	8	7	3.00
	2nd	0	6	12	4	2.91 (0.67)	1	3	9	9	3.13 (0.87)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
36	1st	1	9	9	3	2.63	1	6	10	5	2.86
	2nd	1	7	10	4	2.78 (0.80)	1	5	9	7	2.96 (0.88)
37	1st	1	4	7	9	3.14	2	1	9	10	3.23
	2nd	0	2	12	8	3.30 (0.63)	0	5	10	7	3.13 (0.76)
38	1st	1	8	8	5	2.77	1	12	7	2	2.45
	2nd	0	4	11	6	3.19 (0.68)	0	9	7	5	2.86 (0.79)
39	1st	0	3	5	14	3.50	0	6	7	9	3.14
	2nd	0	1	4	17	3.74 (0.54)	1	5	8	8	3.04 (0.88)
40	1st	0	2	6	14	3.55	0	5	7	10	3.23
	2nd	0	0	1	21	3.96 (0.21)	0	7	7	8	3.09 (0.85)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
41	1st	0	10	10	2	2.64	1	6	11	4	2.82
	2nd	1	4	12	5	2.91 (0.79)	0	10	8	4	2.70 (0.76)
42	1st	0	2	6	14	3.55	0	4	10	8	3.18
	2nd	0	1	3	18	3.74 (0.54)	1	6	7	8	3.00 (0.90)
43	1st	0	2	11	9	3.14	1	7	10	4	2.77
	2nd	0	2	6	14	3.57 (0.66)	2	8	8	4	2.65 (0.88)
44	1st	0	3	6	13	3.45	0	4	11	7	3.14
	2nd	0	1	5	16	3.65 (0.57)	3	4	8	7	2.87 (1.01)
45	1st	0	8	6	8	3.00	1	6	12	3	2.77
	2nd	0	1	9	12	3.48 (0.59)	1	9	7	4	2.67 (0.86)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
46	1st	1	12	8	1	2.41	1	6	8	7	2.95
	2nd	2	8	9	3	2.61 (0.84)	1	2	7	11	3.29 (0.90)
47	1st	2	10	8	2	2.45	0	2	9	11	3.41
	2nd	1	6	9	6	2.96 (0.88)	0	3	4	14	3.57 (0.75)
48	1st	0	1	6	15	3.64	0	0	9	13	3.59
	2nd	0	0	3	19	3.87 (0.34)	0	0	5	17	3.78 (0.42)
49	1st	0	2	11	9	3.32	0	2	10	10	3.36
	2nd	0	1	6	15	3.65 (0.57)	0	2	7	13	3.52 (0.67)
50	1st	3	14	3	2	2.18	1	3	11	7	3.09
	2nd	2	6	6	8	2.91 (1.00)	1	4	7	10	3.13 (0.92)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
51	1st	0	1	5	16	3.68	0	0	4	18	3.82
	2nd	0	0	3	19	3.87 (.34)	0	1	3	18	3.78 (0.52)
52	1st	0	0	3	19	3.86	0	0	6	16	3.73
	2nd	0	0	2	20	3.91 (0.29)	0	0	5	17	3.78 (0.42)
53	1st	0	5	6	11	3.27	3	6	7	5	2.67
	2nd	0	2	10	10	3.35 (0.65)	3	9	5	5	2.57 (0.99)
54	1st	2	8	8	4	2.64	1	3	11	7	3.09
	2nd	1	9	8	4	2.68 (0.84)	1	1	11	9	3.27 (0.77)
55	1st	0	1	6	15	3.64	7	7	2	6	2.32
	2nd	0	2	9	11	3.39 (0.66)	5	9	4	4	2.30 (1.02)

Table 14, continued

Competency Number	Round	Importance					Measurability				
		1	2	3	4	M (SD)	1	2	3	4	M (SD)
56	1st	0	3	7	12	3.41	6	7	5	4	2.32
	2nd	0	4	8	10	3.26 (0.75)	3	10	6	3	2.39 (0.89)
57	1st	0	1	5	16	3.68	5	9	3	5	2.36
	2nd	0	0	8	14	3.65 (0.49)	4	7	7	4	2.52 (0.99)

APPENDIX F

Measurability and Importance Data

MEASURABILITY SCALE

ITEM	Measure	Model SE	Infit MnSq	Infit ZStd	Outfit MnSq	Outfit ZStd	PtBis
1	-.18	.05	1.0	0	1.3	4	.48
2	-.18	.05	1.0	0	1.1	2	.47
3	.49	.05	1.0	0	1.0	0	.45
4	.22	.05	.9	-2	.9	-1	.53
5	-.34	.05	.9	-2	1.0	0	.55
6	-.48	.05	.8	-4	.8	-3	.56
7	.21	.05	1.0	0	1.0	0	.56
8	.27	.05	1.4	8	1.4	6	.45
9	.32	.05	.9	-2	.9	-1	.57
10	-.29	.05	.9	-3	1.0	0	.59
11	.07	.05	1.1	2	1.2	2	.53
12	.57	.05	1.0	0	1.1	1	.48
13	.41	.05	1.0	0	1.0	0	.51
14	.28	.05	.7	-5	.8	-4	.63
15	-.14	.05	.8	-3	.8	-3	.64
16	-.20	.05	.8	-3	.8	-3	.62
17	-.41	.05	.7	-6	.7	-6	.68
18	.13	.05	.7	-8	.7	-7	.68
19	-.28	.05	.7	-7	.7	-6	.70
20	-.19	.05	.8	-4	.8	-5	.69
21	-.35	.05	.9	-3	.8	-3	.68
22	-.36	.05	.9	-3	.8	-3	.68
23	-.66	.05	.8	-3	.8	-3	.70
24	-.06	.05	.7	-6	.7	-5	.68
25	-.57	.05	.7	-6	.7	-5	.69
26	.12	.05	.8	-5	.7	-5	.66
27	-.01	.05	.8	-4	.8	-3	.61
28	.23	.05	.8	-5	.7	-5	.62
29	-.31	.05	.7	-6	.7	-5	.64
30	.01	.05	.7	-6	.7	-6	.64
31	-.10	.05	1.0	0	1.0	0	.55
32	-.04	.05	.7	-8	.6	-7	.69
33	.45	.05	1.0	0	1.0	0	.48
34	-.27	.05	.7	-8	.7	-7	.68
35	.22	.05	1.0	0	.9	0	.59
36	-.29	.05	.7	-8	.7	-7	.69
37	.22	.05	1.0	0	1.0	0	.57
38	-.66	.05	1.0	0	1.0	0	.52
39	-.14	.05	1.1	1	1.1	2	.50
40	-.04	.05	1.0	0	1.0	0	.51
41	-.78	.05	.7	-9	.7	-8	.66
42	.07	.05	1.0	0	1.0	0	.55
43	-.21	.05	1.2	5	1.3	4	.46
44	.23	.05	1.2	4	1.2	3	.48
45	-.38	.05	.8	-4	.8	-4	.63
46	-.06	.05	1.4	7	1.4	7	.48
47	.36	.05	1.4	7	1.4	5	.48
48	1.57	.07	1.0	0	1.0	0	.44
49	.70	.06	1.2	4	1.3	3	.44
50	.05	.05	1.4	8	1.4	6	.42
51	2.16	.08	1.1	1	.9	0	.34
52	2.34	.08	1.0	0	.9	0	.33
53	-.53	.05	1.4	7	1.4	8	.44
54	.33	.05	1.1	2	1.1	1	.52
55	-1.32	.05	2.1	9	2.2	9	.28
56	-1.14	.05	1.8	9	1.8	9	.37
57	-1.05	.05	2.1	9	2.2	9	.28
Mean	.00	.05	1.0	-1.0	1.0	-.8	.55
S.D.	.63	.01	.3	5.1	.3	4.7	.11

RMSE (Model) .05 Adj S.D. .63 Separation 11.98 Reliability .99
Fixed (all same) chi-square: 6063.9 d.f.: 56 significance: .00
Random (normal) chi-square: 55.8 d.f.: 55 significance: .45

IMPORTANCE SCALE

ITEM	Measure	Model SE	Infit MnSq	Infit ZStd	Outfit MnSq	Outfit ZStd	PtBis
1	-.94	.05	1.1	1	1.2	4	.37
2	-.04	.05	1.0	0	1.1	1	.42
3	.66	.05	1.1	1	1.1	1	.39
4	.28	.05	1.0	-1	1.0	0	.46
5	-.64	.05	.9	-1	.9	-1	.52
6	-.85	.05	.8	-5	.8	-5	.54
7	-.41	.05	.9	-3	.9	-2	.53
8	-1.82	.05	1.3	6	1.3	6	.45
9	.08	.05	.9	-1	.9	-1	.53
10	-.98	.05	.9	-2	.9	-1	.52
11	.58	.05	1.2	4	1.2	3	.45
12	.23	.05	1.0	0	1.0	0	.48
13	.01	.05	1.0	0	1.0	0	.50
14	.05	.05	.9	-2	.9	-2	.57
15	-.82	.05	1.0	0	1.0	0	.57
16	-.27	.05	1.2	4	1.2	3	.48
17	-1.38	.05	.7	-7	.7	-7	.63
18	-.30	.05	1.0	0	1.0	0	.54
19	-1.24	.05	.7	-8	.7	-8	.65
20	-1.42	.05	.6	-9	.6	-9	.68
21	-1.69	.05	.7	-6	.7	-6	.65
22	-1.69	.05	.7	-8	.7	-7	.66
23	-2.18	.05	.7	-6	.7	-6	.65
24	-.23	.05	.8	-4	.8	-4	.59
25	-1.83	.05	1.0	0	1.0	0	.51
26	-.87	.05	1.0	0	1.0	0	.54
27	.47	.05	.9	-3	.9	-2	.51
28	1.38	.06	.8	-3	.8	-3	.51
29	.04	.05	1.1	1	1.1	1	.51
30	.23	.05	1.0	0	1.0	0	.51
31	1.28	.06	1.3	5	1.3	3	.39
32	-.14	.05	.9	-2	.9	-2	.57
33	2.87	.11	.9	0	.8	-1	.33
34	-.30	.05	.8	-6	.8	-5	.57
35	-.27	.05	1.1	2	1.1	2	.50
36	-1.04	.05	.7	-7	.7	-7	.65
37	.37	.05	1.4	8	1.4	6	.39
38	-.13	.05	1.2	4	1.2	4	.46
39	1.38	.06	1.1	1	1.0	0	.43
40	1.63	.07	1.1	1	1.0	0	.38
41	-.87	.05	.8	-4	.8	-4	.59
42	1.36	.06	1.2	4	1.5	5	.42
43	1.32	.06	.9	-1	.9	-1	.44
44	1.65	.07	1.2	2	1.0	0	.37
45	.45	.05	.9	-3	.8	-3	.54
46	-1.71	.05	1.3	5	1.3	5	.51
47	-1.79	.05	1.4	7	1.4	7	.47
48	1.90	.07	1.1	1	1.0	0	.37
49	.91	.06	1.2	4	1.2	3	.40
50	-.82	.05	1.5	9	1.5	9	.46
51	1.47	.07	1.1	1	1.0	0	.38
52	2.79	.10	1.1	0	.9	0	.27
53	.34	.05	1.4	7	1.4	6	.37
54	-1.07	.05	1.1	2	1.1	2	.49
55	1.21	.06	1.3	4	1.2	2	.37
56	.97	.06	1.1	1	1.0	0	.44
57	1.83	.07	1.2	2	1.2	1	.29
Mean	.00	.05	1.0	-.1	1.0	-.3	.49
S.D.	1.20	.01	.2	4.5	.2	4.2	.10

RMSE (Model) .06 Adj S.D. 1.20 Separation 21.40 Reliability 1.00
Fixed (all same) chi-square: 22783.7 d.f.: 56 significance: .00
Random (normal) chi-square: 55.9 d.f.: 55 significance: .44

REFERENCES

REFERENCES

Albanese, M. A., & Mitchell, S. (1993). Problem-based learning: A review of literature of its outcomes and implementation issues. Academic Medicine, 8, 52-81.

Allen, R. (1998). Content priorities among representative stakeholder groups for physical education programs in Michigan: A delphi study. Unpublished doctoral dissertation, Michigan State University.

Ali, J., Hogan, T., & Blanchard, R. J. (1992). Establishing goals and priorities in a surgery department. Medical Teacher, 14, 363-369.

Alspach, J. G. (1984). Designing a competency-based orientation for critical care nurses. Heart and Lung, 13, 655-662.

APTA (2001). American Physical Therapy Association [on-line]. Available at www.apta.org.

Arnheim, D. D., & Prentice, W. E. (1997). Principles of athletic training. St. Louis, MO: McGraw-Hill.

Aston-McCrimmon, E. (1986). Analysis of the ratings of competencies used in physical therapy practice. Physical Therapy, 66, 954-960.

Barr, J. S. (1977). A problem-solving curriculum design in physical therapy. Physical Therapy, 57, 262-272.

Barris, R. (1978). Competency-based education and creative thinking. The American Journal of Occupational Therapy, 32, 363-368.

Barrows, H. S. (1986). A taxonomy of problem-based learning method. Medical Education, 20, 481-486.

Beare, P. (1985). The clinical contract: An approach to competency-based clinical learning and evaluation. Journal of Nursing Education, 24(2), 75-77.

Bell, C. (1976). Role vs. entry-level competencies in competency-based education. Journal of the American Dietetic Association, 69, 133-137.

Bell, H. S., Kozakowski, S. M., & Winter, R. O. (1997). Competency-based education in family practice. Family Medicine, 29, 701-704.

Benner, P. (1984). From novice to expert: Excellence and power in clinical nursing practice. Menlo Park, CA: Addison-Wesley.

Bensley, Jr., L. B. (1990). A perspective on lack of continuity and standards of master's degree programs in health education and health promotion. Health Education, 21(2), 59-60.

Block, J. H., (Ed.). (1971). Master learning: Theory and practice. New York: Holt, Rinehart, and Winston.

Broski, D., Alexander, D., Brunner, M., Chidley, M., Finney, W., Johnson, C., Karas, B., & Rothenberg, S. (1977). Competency-based curriculum development: A pragmatic approach. Journal of Allied Health, 6, 38-44.

Bruer, J. T. (1993). The mind's journey from novice to expert. American Educator, 17(2), 6-15, 38-46.

Bruess, C. E., Hendricks, C.M., Poehler, D. L., & Redford, J. (1987). Application of the role delineation project "framework" to a professional preparation program. Journal of School Health, 7(5), 183-185.

Bruhn, J. G. (1993). The nemesis of allied health accreditation: The emperor needs new clothes. Journal of Allied Health, 22, 335-351.

Buck, M. M., Tilson, E. R., & Andersen, J. C. (1999). Implementation and evaluation of an interdisciplinary health professions core curriculum. Journal of Allied Health, 28, 174-178.

Burns, R. W. (1972). Behavioral objectives for competency-based education. Educational Technology, 12, 22-25.

Burns, R. W., & Klingstedt, J. L. (1972). Introduction to competency-based education. Educational Technology, 12, 9-14.

CAAHEP (Commission on Accreditation of Allied Health Education Programs). (2001). Standards and guidelines for an accredited educational program for the athletic trainer. [On-line]. Available at www.caahep.org/standards/at-st.htm.

Caplow, J. A., Donaldson, J. F., Kardash, C. A., & Hosokawa, M. (1997). Learning in problem-based medical curriculum: Students' conceptions. Medical Education, 31, 440-447.

Chambers, D. W. (1995). Some issues in problem-based learning. Journal of Dental Education, 59, 567-572.

Chambers, D. W., Gilmore, C. J., Maillet, J. O., & Mitchell, B. E. (1996). Another look at competency-based education in dietetics. Journal of the American Dietetic Association, 96, 614-617.

Chidley, M. J., & Kisner, C. B. (1979) Systematic curricular development in physical therapy. Physical Therapy, 59, 409-417.

Commission on Institutions of Higher Education (1984-1985). A handbook of accreditation. Chicago, IL: The Commission.

Conger, C. O., Baldwin, J. H., Abegglen, J., & Callister, L. C. (1999). The shifting sands of health delivery: Curriculum revision and integration of community health nursing. Journal of Nursing Education, 38, 304-311.

del Bueno, D. J., & Altano, R. (1984). Competency-based education: No magic feather. Nursing Management, 15(4), 48-53.

del Bueno, D. J., Barker, F., & Christmyer, C. (1980). Implementing a competency-based orientation programme. Nurse Educator, 5, 16-20.

Delforge, G. D., & Behnke, R. S. (1999). The history and evolution of athletic training education in the United States. Journal of Athletic Training, 34(1), 53-61.

Deming, M., Doyle, K., & Woods, S. (1993). A comprehensive assessment plan for professional preparation programs in health education at Eastern Illinois University. Journal of School Health, 63(5), 210-213.

DeWald, J. P., & McCann, A. L. (1999). Developing a competency-based curriculum for a dental hygiene program. Journal of Dental Education, 63, 793-804.

Doyle, K., Woods, S., & Deming, M. (1995). Assessment in higher education: implications for health education professional preparation programs. Journal of Health Education, 26(2), 101-103.

Dummer, G. M., Reuschlein, P. L., Haubenstricker, J. L., Vogel, P. G., & Cavanaugh, P. L. (1993). Evaluation of K-12 physical education programs: A self study approach. Dubuque, IA: Brown and Benchmark.

Dunn, W. R., Hamilton, D. D., & Harden, R. M. (1985). Techniques of identifying competencies needed of doctors. Medical Teacher, 7(1), 15-25.

Ebel, R. G. (1999). Far beyond the shoe box: Fifty years of the national athletic trainers' association. New York, NY: Forbes Custom Publishing.

Ebert, R. H., & Ginzberg, E. (1988). The reform of medical education. The case for medical education reform. Millwood, VA: Project Hope.

Edwards, C., & Keeley, O. (1998). Competency-based learning for the surgical assistant. Nursing Standard, 12(20), 44-47.

Elam, S. (1971). Performance-based teacher education: What is the state of the art? Washington D.C.: American Association of Colleges Teacher Education.

Ende, J. & Davidoff, F. (1992). What is a curriculum? Annals of Internal Medicine, 116, 1055-1057.

Farrell, J. P. (1996). In search of clinical excellence. Journal of Sports Physical Therapy, 24, 115-212.

Fauser, J. J. (1990). G. Allen Stull's view of accreditation: A response. Journal of Allied Health, 19, 1-14.

Fauser, J. J. (1992). Accreditation of allied health education. Journal of American Medical Association, 268, 1123-1126.

Fearon, M. (1998) Assessment and measurement of competence in practice. Nursing Standard, 12(22), 43-47.

Gelmon, S. B. (1996). Can educational accreditation drive interdisciplinary learning in the health professions? Journal on Quality Improvement, 22(3), 213-222.

Gelmon, S. B. (1997). Accreditation, core curriculum and allied health education: barriers and opportunities. Journal of Allied Health, 26(3), 119-125.

Golaszewski, T., Couzelis, P., Corry, J., Baun, W., & Eickhoff-Shemek, J. (1994). Role delineation for the position of director of worksite health promotion programs. American Journal of Health Promotion, 9(1), 10-18.

Grace, P. (1999). Milestones in athletic trainer certification. Journal of Athletic Training, 34, 285-291.

Grace, P., & Ledderman, L. (1982). Role delineation study for the certification examination for entry-level athletic trainers. Athletic Training, 4, 264-265.

Gupta, G. C. & Hendrick, H. L. (1990). Allied health education and accreditation. Journal of American Medical Association, 264, 843-848.

Hallet, C. E. (1997). Pragmatism and project 2000: The relevance of Dewey's theory of experimentalism to nursing education. Journal of Advanced Nursing, 26, 1229-1234.

Hanken, M. A. (1979). Should institutions of higher education adopt a competency-based educational philosophy? Medical Recorder News, 50, 41-44.

Harbeck, M. B. (1972). The student will appreciate competently. Educational Technology, 12, 26-28.

Harcleroad, F. F. (1980). Accreditation- history, process and problems. Washington D.C.: American Association for Higher Education.

Hart, M. (1976). Competency-based education. Journal of the American Dietetic Association, 69, 616-620.

Healy, P. (1999). Education department proposes rules to increase flexibility in accreditation. The Chronicle of Higher Education, 45, 34-35.

Heestand, D. E., Templeton, B. B., & Adams, B. D. (1989). Responding to perceived needs of the twenty-first century: A case study in curriculum design. Medical Teacher, 11, 157-167.

Henderson, A. C., McIntosh, D. V., & Schaller, W. E. (1981). Project report of the role delineation project. The Journal of School Health, 51, 373-376.

Hinojosa, J. (1985). Implications for occupational therapy of a competency-based orientation. The American Journal of Occupational Therapy, 39, 539-541.

Holmes, R. W. (1982). Essential competencies for baccalaureate dietetic programs. Journal of the American Dietetic Association, 81, 573-579.

Houston, W. R., & Warner, A. R. (1977). The competency-based movement: Origins and future. Educational Technology, 17, 14-19.

Hunt, A. D. (1991). Medical education, accreditation and the nation's health: Reflections of an atypical dean. East Lansing, MI: Michigan State University Press.

Hunt, V. (1998). Progress of a profession: Athletic training matures, sets stage for future. NATA News, January, 8-11.

Jarrett, Jr., H. H. (1977). Implication of implementing competency based education in the liberal arts. Educational Technology, 17, 21-26.

Jensen, G. M., Shepherd, K. R., & Hack, L. M. (1990). The novice versus the experienced clinician: Insights into the work of the physical therapists. Physical Therapy, 70, 314-323.

JRC-AT (2001). Joint Review Committee- Athletic Training [On-line]. Available at www.cewl.com/jrc-at.

Klingstedt, J. L. (1972). Learning modules for competency-based education. Educational Technology, 12, 29-31.

Kniffel, L. (1999). No need for accreditation, Berkeley dean explains. American Libraries, 30, 15-17.

Knight, E. A. (1991). Curriculum planning for professional education: Meeting national standards and local needs. Journal of Health Education, 22(4), 226-232.

Knowles, M. S. (1980). The modern practice of adult education: From pedagogy to andragogy. Chicago, IL: Follett Publishing.

Knowles, M. S. (1984). The adult learner: A neglected species (3rd ed.). Houston, TX: Gulf Publishing.

Koehneke, P. (1999). Seeking accreditation: JRC-AT offers insight to decision. NATA News, September, 14-16.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30, 607-610.

Lane, D. S., & Ross, V. (1994a). Consensus on core competencies for preventive Medicine residents. American Journal of Preventive Medicine, 10(1), 52-55.

Lane, D. S., & Ross, V. (1994b). The importance of defining physicians' competencies: Lessons from preventive medicine. Academic Medicine, 69, 972-974.

Lane, D. S., & Ross, V. (1998). Defining competencies and performance indicators for physicians in medical management. American Journal of Preventive Medicine, 14, 229-234.

Lane, D. S., Ross, V., Parkinson, M. D., & Chen, D. W. (1995). Performance indicators for assessing competencies of preventive medicine residents. American Journal of Preventive Medicine, 11, 1-8.

Linacre, J.M. (1994). Many-facet Rasch measurement. Chicago, IL: MESA.

Linacre, J. M. (1999). Guidelines for rating scales. Journal of Outcome Measurements, 3, 103-122.

Loyd, M. S., & Vaden, A. G. (1977). Practitioners identify competencies for entry-level generalist dietitians. Journal of the American Dietetic Association, 71, 510-517.

Luebke, J. K., & Bohnenblust, S. E. (1994). Responsibilities and competencies: Implications for health education professional preparation programs. Journal of Health Education,25(4), 227-229.

Lutrell, M. F., Lenburg, C. B., Scherubel, J. C., Jacob, S. R., & Koch, R. W. (1999). Competency outcomes for learning and performance assessment. Nursing and Health Care Perspectives, 20(3), 134-141.

Mager, R. F. (1962). Preparing instructional objectives. Belmont, CA: Fearon Press.

Mangan, K. S. (1999). Accreditation blasted for health programs. The Chronicle of Higher Education, 45, 39.

Mathies, A. L., Denegar, C. R., & Arnhold, R. W. (1995). Changes in athletic training education as a result of changing from NATA-PEC to CAAHEP. Journal of Athletic Training, 30(2), 129-132.

McGaghie, W. C. (1991). Professional competence evaluation. Educational Researcher, 20, 3-9.

McGaghie, W. C., Miller, G. E., Sajid, A. W., & Telder, T. V. (1978). Competency based curriculum development in medical education: An introduction. Public Health Paper, No. 68. Geneva, Switzerland: World Health Organization.

McLean, J. L. (1999). Does the national athletic trainers' association need a certification examination? Journal of Athletic Training, 34, 292-293.

McMahon, J. D., Bruess, C. E., & Lohrmann, D. K. (1987). Three applications of the role delineation project 1985 curriculum framework. Journal of School Health, 57, 274-278.

McMullan, D. (1996). Renewing athletic training education: A step into the future. NATA News, February, 17-18.

McMullan, D. (1997). NATA board takes first step in reform. NATA News, February, 4-6, 25.

Menne J. M. (1975). A comprehensive set of counselor competencies. Journal of Counseling Psychology, 212, 547-553.

Minghella, E., & Benson, A. (1995). Developing reflective practice in mental health nursing through critical incident analysis. Journal of Advanced Nursing, 21, 205-213.

Mitchell, R. (1990, January 24). Performance assessment: An emphasis on 'activity'. Education Week. p.36, 25.

Moncur, C. (1985). Physical therapy competencies in rheumatology. Physical Therapy, 65, 1365-1371.

Moore-West, M., Regan-Smith, M., Dietrich, A., & Kollisch, D. O. (1990). Innovations in medical education. In H. C. Hendrie & C. Lloyd (Eds.), Educating

competent and humane physicians (pp. 128-174). Indianapolis, IN: Indiana University Press.

NATA (National Athletic Trainers' Association). (1996). A report from the education task force. NATA News, February, 19-27.

NATA (National Athletic Trainers' Association). (1999). Athletic Training Educational Competencies. Dallas, TX: NATA.

NATA (National Athletic Trainers' Association). (2000). As internships end, experts offer advice, alternatives. NATA News, May, 8-10.

NATA (National Athletic Trainers' Association). (2001a). Survey offers statistics useful for NATA members. NATA News, February, 14.

NATA (National Athletic Trainers' Association). (2001b). NATABOC announces change in curriculum route requirements for 2002-2003. NATA News, March, 16-17.

NATA Education Council. (1999a). JRC-AT news: Chair news- Peter Koehneke. Education Council News, June, 2-3.

NATA Education Council. (1999b). Role delineation study. Education Council News, June, 5-6.

NATA Education Council. (1999c). Competencies matrix and self-study. Education Council News, December, 2.

NATA Education Task Force. (1997). Recommendations to reform athletic training education. NATA News, February, 16-25.

NATABOC. (1999). Role delineation study (4th ed.). Morrisville, NC: Columbia Assessment Services.

NATABOC. (2000a). Athletic training internships draw to a close. Certification Update, Summer, 4.

NATABOC. (2000b). Change in curriculum route requirements. Certification Update, Winter, 5-6.

Nuccio, S. A., Lingen, D., Burke, L. J., Kramer, A., Ladewig, N., Raaum, J., & Shearer, B. (1996). The clinical practice developmental model: The transition process. The Journal of Nursing Administration, 26(12), 29-37.

Peer, K. S., & Rakich, J. S. (2000). Accreditation and continuous quality improvement in athletic training education. Journal of Athletic Training, 35, 188-193.

Pew Health Professions Commission. (1995). Critical challenges: Revitalizing the health professions for the twenty-first century. San Francisco, CA: UCSF Center for Health Professions.

Pololi, L. H., Coletta, E. M., Kern, D. G., Davis, S., Kiessling, L. S., Garber, C. E., Entin, E. J., Opal, S. M., & Rakowski, W. (1994). Developing a competency-based preventive medicine curriculum for medical schools. American Journal of Preventive Medicine, 10(4), 240-244.

Posey, L. M. (1983). Why not the medical model for pharmaceutical education? Journal of Hospital Pharmacy, 40, 959.

Price, M., Swartz, L., & Thurn, K. (1983). Made to measure learning. Nursing Mirror, 156, 38-40.

Regan-Smith, M. G. (1998). Teachers' experiential learning about learning. International Journal of Psychiatry in Medicine 28, 11-20.

Reilly, D. H., Barclay, J., & Culbertson, F. (1977). The current status of competency-based training, part 1: Validity, reliability, logistical and ethical issues. Journal of School Psychology, 15, 68-74.

Rice, R. B., & Rapson, M. F. (1999). Competency model development. Journal of Nursing Education, 38, 294.

Roberts, M. D., Cordova, D., & Saxe, E. (1978). A process model for competency-based education. The American Journal of Occupational Therapy, 32, 369-374.

Rossel, C. L., & Kakta, B. A. (1990). Clinical evaluation of nursing students: A criterion-referenced approach to clinical evaluation based on terminal characteristics. In C.F. Waltz & O.L. Strickland (Eds.), Measurement of Nursing Outcomes (pp. 17-29). New York: Springer.

Russell, M L., & Weinstein, J. M. (1978). Guidelines for competency-based instruction in psychiatry. Medical Educator, 12, 214-221.

Schmaus, D. C. (1987). Competency-based education: Its implementation in the OR. Association of Operating Room Nurses Journal, 45, 474-482.

Schmidt, G., & Beall, S. (1988). Role delineation competencies and the entry level health educator. Health Education, 19, 45-48.

Schuldenfrei, P. (1993). Can competency-based education survive the nineties. Nurse Educator, 18(5), 38.

Scott, B. (1982). Competency based learning: A literature review. International Journal of Nursing Studies, 19(3), 119-124.

Segall, A., Barker, W. H., Cob, S., Jackson, G., Noren, J., Shindell, S., Stokes, J., & Ericcson, S. (1981). Development of a competency-based approach to teaching preventive medicine. Preventive Medicine, 10, 726-735.

Selden, W. K. (1960). Accreditation. New York: Harper & Brothers.

Senior, J. R. (1976). Toward the measurement of competence in medicine. Philadelphia, PA: John R. Senior, Graduate Hospital of the University of Pennsylvania.

Shanklin, C. W., & Beach, B. L. (1980). Implementation and evaluation of a competency-based dietetic program. Journal of The American Dietetic Association, 77, 450-455.

Shirer, W. R. (1987). Why accreditation is important. The North Central Association Quarterly, 61, 399-405.

Spady, W. G. (1977). Competency based education: A bandwagon in search of a definition. Educational Researcher, 6, 9-14.

Spady, W. G., & Mitchell, D. E. (1977). Competency based education: Organizational issues and implications. Educational Researcher, 6, 9-15.

Starkey, C. (1997). Reforming athletic training education. Journal of Athletic Training, 32(2), 113-114.

Starkey, C. (1998). Council Revises Educational Competencies. NATA News, November, 34.

Stephens, P. (1999). Development of standards for differentiated competencies of the nursing workforce at time of entry/advanced beginner. Journal of Nursing Education, 38, 298-300.

Stull, G. A. (1989). Accreditation in the allied health professions. Journal of Allied Health, 18, 425-435.

Turnbull, J. M. (1989). What is...normative versus criterion-referenced assessment. Medical Teacher, 11(2), 145-150.

Turocy, P. S., Comfort, R. E., Perrin, D. H., & Gieck, J. H. (2000). Clinical experiences are not predictive of outcomes on the NATABOC examination. Journal of Athletic Training, 35(1), 70-75.

Walker, D. (1990). Fundamentals of curriculum. Orlando, FL: Harcourt Brace College.

Weinstein, H. M., & Russell, M. L. (1976). Competency-based psychiatric education. American Journal of Psychiatry, 133(8), 935-939.

Weithaus, B., & Fauser, J. J. (1991). Committee on allied health education and accreditation. Journal of American Medical Association, 266(7), 968-969.

Wolfe, E.W., Chiu, C.W.T., & Reckase, M.D. (1999). Changes in secondary teachers' perceptions of barriers to portfolio assessment. Assesssing Writing, 6,(1), 85-105.

Wright, B., & Linacre, M. (1994). Reasonable mean-square fit values. Rasch Measurement Transactions, 8, 370.

Young, E. A., Weser, E., McBride, H. M., Page, C. P., & Littlefield, J. H. (1983). Development of core competencies in cinical nutrition. The American Journal of Clinical Nutrition, 38, 800-810.

Young, J. I., & Van Mondfrans, A. P. (1972). Psychological implications of competency-based education. Educational Technology, 12, 15-17.

Young, K. E., Chambers, C. M., Kells, H. R., & Associates (1983). Understanding accreditation. San Francisco, CA: Jossey-Bass.

Zylks, D. R. (1988). The importance of educational competencies in athletic training as perceived by selected certified athletic trainers. Unpublished doctoral dissertation, Texas A & M University.