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Clinical Experiences Are Not Predictive of Outcomes on the NATABOC Examination

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Objective: To determine the efficacy of the National Athletic Trainers' Association Board of Certification (NATABOC) clinical experience requirements and individual student characteristics to predict candidate outcomes on the NATABOC certification examination.

Design and Setting: For all subjects, we gathered survey information and examination scores. The survey information included age, sex, route to certification, previous athletic training and allied health experience, and clinical education experiences.

Subjects: A total of 269 subjects, 22.25% of all first-time candidates for the June and November 1993 NATABOC examinations, were included in this study.

Measurements: Data were analyzed for standard descriptive statistics and parametric linear regression and correlational relationships.

Results: Total clinical hours, high-risk sport experiences, and previous athletic training experience were not predictive of examination outcomes. Although our results indicated a relationship between previous allied health experience and both outcome on the written section of the examination and age and outcome on the oral/practical section, these characteristics also were not predictive of examination outcomes.

Conclusions: Gaining clinical experience hours in excess of 400 hours beyond the 800- or 1500-hour requirement may yield no greater benefit for an entry-level professional than less time. The quality, rather than the quantity, of clinical experiences should be evaluated. More emphasis should be placed on the achievement of an entry level of clinical competency, rather than on total hour collection. Also, because high-risk sport experiences did not predict outcomes on the NATABOC examination, the emphasis of clinical education should be on students' receiving a more structured clinical experience, in which they are progressively required to assume greater responsibilities integrating both cognitive and psychomotor skills, while working under the supervision of a certified athletic trainer.

Key Words: clinical education, professional preparation, national certification, high-risk sport experiences, previous experience, predictors of success

The requirements for clinical education experiences in athletic training recently came under great scrutiny by the National Athletic Trainers' Association (NATA) Task Force on Educational Standards, as well as the NATA Education Council. One area of review continues to be clinical education. Clinical education experiences are required of all athletic training students; however, the assessment of those experiences varies significantly from education program to education program. The 2 consistent measures of athletic training clinical education are the number of hours and category of clinical experience under the direct supervision of an athletic trainer certified by the NATA Board of Certification (NATABOC). These clinical education requirements have persisted and been modified without specific scientific study; therefore, little information is available as to the effectiveness or validity of the effects of clinical experience hours on the preparation of entry-level athletic trainers. We examined the efficacy of the NATABOC clinical experience requirements and student characteristics to predict first-time candidates' outcomes on the NATABOC certification examination.

The current clinical experience requirements evolved from the first standards, which were developed in 1969. The original criteria, established by the Committee on Certification Standards of the Professional Advancement Committee, set a minimum standard of clinical preparedness for entry-level athletic trainers. These standards were developed empirically by the NATA Subcommittee on Certification as a temporary standard for clinical education. The committee members' personal experiences as athletic trainers, their knowledge of the needs of the athletic training profession at that time, and their knowledge and understanding of the criteria used by other health-related professions, such as physical therapy, were the bases for the development of the clinical education requirements.[1] These criteria were designed as temporary standards until all athletic trainers were educated through approved athletic training education programs. The committee estimated that it would "take a number of years to develop a sufficient number of educational programs to qualify athletic trainers (as professionals in the field of athletic training)" (personal communication, L. McLean, ATC, PT, February 25, 1993).

The 1969 criteria recognized 4 routes by which student athletic trainers could gather clinical education experiences and become eligible to take the national certification examination. Athletic trainers actively engaged within the profession, but not yet certified, were required to provide proof of 5 years of athletic training experience beyond that as a student athletic trainer at the high school level. Students who were enrolled in NATA-approved graduate or undergraduate programs had to

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acquire a minimum of 800 clinical experience hours, in no fewer than 2 years, under the supervision of NATA-approved supervisors. Physical therapy degree graduates needed to acquire 2 years of athletic training experience beyond that as students on the secondary school level under direct NATA-approved supervision. Lastly, apprenticeship candidates were able to receive on-the-job training for a minimum of 1800 hours under direct supervision of a certified NATA member as determined on a district-wide basis.[2,3]

Today, there are still 2 routes for gaining clinical experience and becoming eligible for national certification as an athletic trainer: accredited athletic training education programs (ATEPs) and internship experiences. Students from ATEP programs must collect a minimum of 800 hours in a variety of athletic training experiences, in no fewer than 2 years, under the supervision of an NATABOC-certified athletic trainer. Internship students must document at least 1500 hours of athletic training experience under the supervision of an NATABOC-certified athletic trainer. At least 1000 of those internship hours must be attained in a traditional athletic setting at the interscholastic, intercollegiate, or professional sport level. The additional 500 hours may be attained from an allied clinical setting or sport camp setting under the supervision of an NATABOC-certified athletic trainer.[4]

Twenty-five percent of all athletic training clinical experiences required of curriculum and internship students must be acquired in actual (on-location) practice and game coverage of 1 or more of the following (high-risk) sports: football, soccer, hockey, wrestling, basketball, gymnastics, lacrosse, volleyball, and rugby.[4] All other sports are considered low-risk sports, and assignment to such activities must not constitute more than 75% of a student's total experience hours. By 2004, there will be only 1 route to certification: successful completion of an ATEP, reviewed by the Joint Review Committee of Educational Programs in Athletic Training (JRC-AT) and accredited by the Commission on the Accreditation of Allied Health Education Programs (CAAHEP).

METHODS

Candidate Criteria

We solicited survey information and NATABOC examination scores from the 1209 first-time candidates for the June and November 1993 NATABOC examinations. We obtained permission and gathered information on 269 (22.25%) new candidates for the examinations. All candidates met the following criteria: (1) current cardiopulmonary resuscitation and standard first-aid certification; (2) completion of the curricular content found in the common courses of basic and advanced athletic training, personal and community health, anatomy, physiology, and physiology of exercise; (3) completion of clinical experience hours under the direct supervision of an NATABOC-certified athletic trainer; (4) a minimum of a bachelor's degree or being in the last semester of that degree process; (5) eligibility for either the June 20, or November 21, 1993 NATABOC National Examination.

Instrument Validity and Reliability

We validated the survey instrument using analyses of construct, content, face, and criterion-related validity, as well as reliability (test-retest correlation) assessments. The NATABOC examination also was validated using construct, content, face, and criterion-related validity assessment techniques based upon the current NATA Role Delineation Study.[5] The reliability of the NATABOC examination was estimated using the Kuder-Richardson test for reliability.[6]

Statistical Analysis

The independent variables in this investigation included the candidate's demographic profile, years of previous athletic training and related experiences, length of time taken to meet clinical experience requirements, years of experience of the endorsing athletic trainer, and type and quantity of clinical experiences acquired. The category of clinical experience hours contained the subcategories of specific sport assignments, total number of hours acquired in each assignment, sex of athletes in each sport assignment, type and level of each sport assignment, and level of autonomy experience in each sport assignment, as collected via a self-reporting system. The dependent variables consisted of the student's results on the 3 parts of the NATABOC Certification Examination for Athletic Trainers. We gathered these scores in both their absolute performance values (numeric), as well as their ultimate impact scores (pass-fail). Data were analyzed via the STATISTIX statistical software package[7] (Analytical Software, Tallahassee, FL) for standard descriptive statistics, nonparametric analysis, parametric linear regression, and correlational analyses (Pearson product). The α level was set at $P < .05$.

Demographics

We included 269 first-time candidates for the June and November NATABOC examinations in this study: 121 (45%) male and 148 (55%) female subjects. All 10 NATA districts were represented in this sample. The sample was consistent with the distribution of all NATA members found at the collegiate setting by district (Table 1).[8]

Candidate route to certification was assessed, with approximately equal distribution between graduates of approved or accredited athletic training education programs and undergraduate internship programs (Table 2). Sixty-nine candidates (26.6%; not all candidates provided all information) pursued their athletic training education at public institutions, whereas 190 candidates (73.3%) were graduates of private institutions of higher education. The mean number of students in an athletic training class cohort group from the same institution was 8.2 students. The minimum number of students per class

Table 1. District Participation

District	No. of Participants	% Participants
1	18	7.2
2	43	17.2
3	19	7.6
4	70	28.0
5	26	10.4
6	5	2.0
7	7	2.8
8	21	8.4
9	22	8.8
10	18	7.2
Total respondents	249*	

*Not all participants provided this information.

Table 2. Athletic Training Preparation for Certification

Classification	*n*	%
Undergraduate curriculum	103	39.4
Graduate curriculum	17	6.5
Undergraduate internship	107	41.0
Graduate internship	24	9.1
Graduate and undergraduate internship	5	1.9
Undergraduate curriculum and graduate internship	1	.3
Undergraduate internship and graduate curriculum	4	1.5
Total respondents	261*	

*Not all participants provided this information.

was 1, and the maximum in a class was 40. The mode was 10 students per athletic training class. Twenty-eight percent (n = 73) of all endorsing athletic trainers had more than 15 years of athletic training experience; however, 34.2% (n = 89) of all endorsing athletic trainers had 5 or fewer years of experience.

One hundred and twenty-one (45%) of all candidates had previous athletic training experiences (PATEs) before formal education as an athletic trainer, and 67.9% (n = 182) claimed 1 or fewer years of previous allied health experience (other than athletic training). The majority (57.8%) of the candidates cited high school athletic training experience as the type of PATE in which they were involved. The most common previous allied health experiences (PAHEs) were physical therapy assistant (29%) and physical therapy volunteer (13.5%).

RESULTS

Clinical Experience Hours

The mean number of hours reported by all candidates was 1759 clinical experience hours, with a maximum of 4500. Most candidates, regardless of route of certification, declared 1400 to 2000 hours. When we analyzed the data critically, we found that students claiming approximately 400 hours above their categoric requirement (curriculum or internship) demonstrated a higher passing rate on the examination than those exceeding 400 clinical experience hours or those meeting the minimum requirements.

Forty-five percent of candidates acquired their clinical experience hours for certification in 3 years and 82.3% in 4 years or fewer. Of the 1893 clinical experiences claimed by the candidates, 47.52% occurred in high-risk sports. A total of 742 experiences (39.4%) were obtained while working with male athletes; 387 (20.5%), with female athletes. The majority of the clinical experiences (40.1%) were gained while working with both male and female athletes.

Approximately 71.2% of all sport experiences were gathered while working in a collegiate setting, whereas only 14% were acquired in the high school setting (Table 3). Most clinical experiences were gathered while working as an assistant to a certified athletic trainer, whereas 14.2% of students claimed to work primarily on their own. Approximately 16.9% of the clinical experiences involved responsibilities shared equally between students (Table 4).

We did not find total clinical experience hours to be predictive of scores on the NATABOC examination, nor on any individual section of the examination (Table 5). Clinical hours acquired in high-risk sports also were not found to be predictive of examination outcomes (Table 6), although significant findings were discovered for wrestling (P = .0464) on the written section and field hockey (P = .0260) on the oral/practical section of the examination. However, these findings were not considered predictive of examination scores because they accounted for only a small percentage of the variance in scores: 1.5% and 1.8%, respectively. Because of the longstanding belief that fall football experience helped to prepare students better clinically than any other sport experience, we specifically examined fall football. Clinical experience in fall football also was not predictive of outcomes on the examination (Table 7).

Table 3. Location of Clinical Experiences

Site	No. of Experiences	% Experiences
College/university	1338	71.2
High school	264	14.0
Training room/clinic	114	6.0
Clinic/hospital/youth leagues	86	4.6
Other	28	1.4
Club	20	1.0
Professional events	13	.7
Amateur events	12	.6
Recreation	3	.1
Total experiences	1878*	

*Not all participants provided this information.

Table 4. Clinical Experience Autonomy

Level of Autonomy	No. of Experiences	% Experiences
Worked under ATC direction	706	37.7
Worked equally with another student	317	16.9
Worked alone	267	14.2
Worked equally with ATC	255	13.6
Worked under student direction	126	6.7
Worked with another student under ATC	42	2.2
Worked alone and sometimes under ATC	40	2.1
Other categories	121	6.6
Total reported experiences	1874	

Table 5. Total Clinical Experience Hours as Predictor of Examination Outcomes

Examination Section	*P*	F	r^2	SD
Written	.9057	.01	.0001	15.221
Oral/practical	.0746	3.21	.0125	5.831
Written simulation	.6848	.17	.0006	301.596

Table 6. High-Risk Sport Experience Hours as Predictor of Examination Outcomes

Category	*P*	F	r^2	SD
Written	.3418	.91	.0034	15.438
Oral/practical	.3650	.82	.0031	5.981
Written simulation	.4749	.51	.0019	297.446

Table 7. Fall Football Experience Hours as Predictor of Examination Outcomes

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

Examination Passing Rates

We noted that 30.9% (n = 82) passed and 69.1% (n = 183) failed at least 1 part of the examination. Fifty-one percent (n = 135) of all candidates passed the written section; 62.4% (n = 164) of all candidates passed the oral/practical section of the examination; and 59.6% (n = 158) of all candidates passed the written simulation section of the examination.

Previous Allied Health and Athletic Training Experiences

Although there was a relationship between the number of years of PAHE and the score on the written examination (P = .0031), PAHE accounted for only 3.3% of the variance in scores. PAHE had no impact on the outcomes on either the oral/practical or written simulation sections (Table 8). We noted that, of the 155 subjects claiming PAHE, only 39 candidates had received professional education (nontechnical training) to allow them to participate in their PAHE. Years of PATE in high school had no impact on the ability to predict the scores on any of the 3 parts of the examination (Table 9).

Age

There also was a relationship between candidates' ages and the scores on the oral/practical section (P = .0405). Due to the size of the correlations, only a small amount of the variance in scores could be attributed to the effects of age (Table 10); therefore, age was not considered predictive of outcome on that section of the examination. Age did not affect any other section of the NATABOC examination.

DISCUSSION

Little scientific investigation exists regarding the guidelines and policies that dictate the clinical preparation of entry-level athletic training professionals. Past works have examined the relationships between college grade point average and American College Testing scores,[9] route to certification,[10] and learning styles[11] and the outcomes on the NATABOC examination. We found, on examining the ability of clinical experience hours to predict the outcomes on the NATABOC examination, that neither the number of clinical experience hours nor the sport experiences influenced the candidates' outcomes on the NATABOC examination. These findings are consistent with previous work conducted by Draper.[11] Because ours was the first study to examine the abilities of clinical experiences, the hours acquired in those experiences, and other experiential influences to predict the outcomes on the NATABOC examination, the information herein should be considered relevant, but not definitive, in the evaluation of the current guidelines, policies, and practices of athletic training clinical education.

Table 8. Previous Allied Health Experience as Predictor of Examination Outcomes

Examination Section	*P*	F	r^2	SD
Written	.0031*	8.93	.0330	15.206
Oral/practical	.9600	0	.0000	6.001
Written simulation	.9048	0.01	.0001	298.294

* $P \leq .05$.

Table 9. Previous Athletic Training Experience as Predictor of Examination Outcomes

Examination Section	*P*	F	r^2	SD
Written	.6219	.24	.0009	15.456
Oral/practical	.4212	.65	.0025	5.992
Written simulation	.7220	.13	.0005	298.230

Table 10. Age as Predictor of Examination Outcomes

Examination Section	*P*	F	r^2	SD
Written	.3318	.95	.0037	15.382
Oral/practical	.0405*	4.24	.0167	5.926
Written simulation	.9106	.01	−.0039	303.687

* $P \leq .05$.

Demographics

The sample used in this study appeared to be a representative group of all first-time candidates for the 1993 NATABOC examination. Although this sample represented only 22.24% of all first-time candidates for the June and November 1993 examinations, the approximate distribution by sex was the same as the distribution of students graduating from undergraduate curriculum programs described by the NATA Professional Education Committee for the same year (45% men and 55% women).[12] Further, with the level of significance set at $P < .05$, the risk of making a type 1 error was lessened.

Participation by district also was similar to the 1993 statistics for NATA student membership. The participation from subjects in Districts 2 and 4 was slightly higher than the national distribution and that from Districts 7, 9, and 10 was slightly lower.[8] Fifteen candidates did not indicate a specific district on their surveys. These minor discrepancies may not be important because not all student members in each district of the NATA were candidates for the 1993 examination and not all student members of the NATA become candidates for the NATABOC examination.

Previous Athletic Training and Allied Health Experiences

Of all candidates responding, 45% claimed PATE, with 81.8% of those subjects having 1 year or less of previous experience in athletic training (before formal athletic training education). This finding was important when we examined the hypotheses relating PATE to the outcomes on the examinations. However, because the actual number of candidates claiming previous experience in athletic training was low, the findings related to this information should be considered inconclusive and should be reevaluated in future studies for relevance to the examination outcomes.

There was a relationship between PAHE and the outcomes only on the written section of the examination (P = .0031), but these experiences were not predictive of examination outcomes. Some individuals who claimed PAHE may have been

able to draw upon their past experiences in allied health to transform athletic training situations and experiences into an understanding of the situational responses and knowledge base required.[13] This transformation may have facilitated the learning of new skills and knowledge. Further, preparation for other allied health credentialing examinations also may have prepared those with PAHE to pass the written section. The written section of the examination is very similar to the types of licensing or credentialing examinations all allied health professionals are required to take. Therefore, those individuals with PAHE in a professional discipline should not be viewed as true entry-level professionals. They had previous opportunities to practice within similar allied health situations and understand the politics, language, and social dynamics germane to becoming successful in that allied health society.[14]

Age

We found a relationship between the candidates' ages and their outcomes on the oral/practical section of the examination. Older candidates may have been able to take the concrete information learned in 1 situation and apply it more effectively to other nonexact situations than could younger candidates. This ability to transform information quickly or expertly may allow the older subjects to remain calmer in the stressful situation of the oral/practical examination. Older candidates may have encountered more "real-life" stressful situations, which would have prepared them to better tolerate the stress of this section of the examination.

Clinical Experience Hours

Total number of clinical experience hours gathered by an entry-level athletic trainer had no ability to predict the outcome on the NATABOC examination. When students work and learn at their optimal level, they acquire more knowledge and develop the new skills in a relatively short period of time.[15] This finding may lead one to believe that gaining excessive clinical experience hours may yield no greater benefit for an entry-level professional than will less time. It has been documented[16] that the number of hours accumulated by a student athletic trainer has little influence on examination performance. Perhaps, as indicated by others,[10] athletic training educators should evaluate the quality of the experiences gathered by their students rather than the quantity of those experiences. This is not to say that there should be no specific requirement for clinical experience hours. However, perhaps less emphasis should be placed on the number of hours needed, and more emphasis should be placed on achieving the knowledge, skills, and abilities delineated in the Athletic Training Competencies. One way this may be achieved is by providing students with experiences in a variety of environments and with different types of populations that would be consistent with the mission of the NATA. Also, ensuring that education occurs both formally and informally at all clinical sites would be important.

Similarly, there was no basis to support the criterion that requires students to gain clinical experience hours in high-risk sports because high-risk sport experience hours were not predictive of outcomes on the NATABOC examination. Fall football experience, which has been viewed traditionally as a good opportunity for students to learn the clinical skills required of an athletic trainer, also was not found to be predictive of examination outcomes. This unusual phenomenon may be attributed to the fact that most football programs have at least 1 or 2 full-time certified athletic trainers on site to manage all health-related issues. Those certified athletic trainers are responsible for the health care of the athletes involved in this high-risk sport, which presents many injuries and unusual health situations. Due to the high public profile of football, certified athletic trainers may not feel comfortable allowing or be permitted to allow students to perform essential entry-level skills. This situation may be magnified further if both the certified athletic trainer and team physician are always available to intervene in the health care of the athletes.

Further, during many football experiences, students rarely are asked to make critical decisions, using higher-order thinking to arrive at logical conclusions or actions to resolve a situation. The students surveyed indicated that, during football experiences, they often worked as assistants to the certified athletic trainer(s) (Table 4) and were responsible for the more technical aspects of the athletes' care. These findings substantiate the fact that students are exposed to many skilled professional activities during a football experience; however, students are rarely able to participate fully in the activities required of the certified athletic trainer. Perhaps, instead of emphasizing high-risk sport experiences like football, high responsibility experiences should be required of our student athletic trainers. Perhaps we should allow students to receive more progressively structured clinical experiences where they must assume greater responsibilities that require them to integrate cognitive and psychomotor skills while working under the supervision of a certified athletic trainer.

Examination Passing Rates

Another concern was that the overall passing rates on the NATABOC examination were low compared with other allied health professional examination outcomes. When examining the first-time Board passing rates in nursing (85.2%[16]), occupational therapy (94.58%[17]), physician assistant (95%[18]), physical therapy (85.44% [personal communication, M. Lane, 1998]), and physical therapy assistant (77.18% [personal communication, M. Lane, 1998]), the NATABOC examination passing rates were low. Our 1993 findings were similar to the overall first-time passing rates on the 1997–1998 NATABOC examinations (32%).[19] If athletic training education prepares students for entry-level practice, the content of the examination should evaluate the content of what is taught during the student's education. The content of the NATABOC examination is determined by the current Role Delineation Study,[5] whereas the content required in athletic training educational programs is determined by the Competencies in Athletic Training. If there is a low correlation between what is being taught in athletic training education and what is being tested on the NATABOC examination, further analysis of the current relationship between athletic training education and certification should be done.

However, low passing rates may not be as surprising a finding as first indicated. In athletic training today, the educational and the certification bodies function autonomously from the NATA in the form of the CAAHEP JRC-AT and the NATABOC. This autonomy was initiated in hopes of gaining credibility as a profession with a variety of educational and accrediting bodies, such as the American Medical Association and the National Commission for Certifying Agencies. This

autonomy benefited the profession by allowing each group unique missions and goals. The mission of the JRC-AT is to establish, maintain, and promote appropriate standards of quality for educational programs in athletic training. The NATABOC is responsible for ensuring that the public is protected by credentialing only those professionals who have met the entry-level qualifications appropriate for a practicing professional. This diversity in responsibility may have manifested itself in the students' outcomes on the examination. Today, the Education Council, on which members of both the NATABOC and the JRC-AT sit, is working to develop a cohesive plan for the preparation and evaluation of entry-level athletic trainers. Still, this collaborative effort may not change the ultimate outcomes of the examination passing rates. The NATABOC examination, unlike other allied health professional examinations, requires candidates to pass 3 very different examinations. Many of the other professional examinations require the passing of only a written (multiple choice) examination.

The locations of the candidates' clinical experiences provided particularly relevant information. More than 70% of the subjects' clinical experiences were gained in the college "traditional" athletic training environment, and only 14% were gathered in the high school setting, with far fewer in the clinical setting. These findings do not support the information supplied by the Professional Education Committee, and now the JRC-AT, with regard to the locations where the current athletic training curriculum graduates are being employed. Approximately 71% of the athletic training curriculum students graduating in the past 2 years were employed in high school positions.[12] Recently, guidelines have been developed by the Education Council and supported by the JRC-AT to encourage students to receive a wide variety of clinical experiences beyond the traditional athletic training settings in the colleges and universities. These varied clinical experiences will better prepare future athletic trainers to care for the full spectrum of individuals in the physically active population and will advance the mission of the profession.[11,20]

Limitations of This Study

Our study was limited by a variety of factors, including a small sample of all participants taking the examination that year, inaccuracies in the self-reporting system, outside influences on the self-reporting system, and the lack of evidence that the volunteer sample group was similar to the population of all candidates taking the certification examination in 1993. With regard to inaccuracies or influences in the self-reporting system, all clinical experience hours continue to be self-reported and require the endorsement and notarization of a statement supporting each candidate's self-report by the supervising athletic trainer.

CONCLUSIONS

Although our data were gathered in 1993, outcomes on the NATABOC examination have changed little. The only major revision in the NATABOC examination since 1993 was in the format of the oral/practical section; the oral component of the examination has been eliminated. However, the passing rate on the practical section of the examination has not changed greatly. Further studies should be done in the areas of clinical education to continue to guide the future of athletic training education. Qualitative studies would be especially helpful in determining the extent to which entry-level professionals have acquired the competencies delineated by the JRC-AT.

Further recommendations include the development of more variety in clinical education sites and experiences, as well as improvement in the level and appropriateness of the independent learning and responsibilities required of students during their clinical experiences under the direction of a certified athletic trainer. This information also would allow the NATABOC to determine whether the completion of the clinical experience requirements has any measurable impact on students' outcomes on the national examination. Our study should serve as a scientific baseline from which further study of, recommendations for, and modifications of certification criteria and clinical education guidelines may be made.

REFERENCES

1. NATA Subcommittee on Certification Meeting Minutes. August 12–13, 1969, New York, NY.
2. NATA Professional Advancement Committee Subcommittee on Certification by Examination Meeting Minutes. August 12–13, 1969, New York, NY.
3. NATA Board of Certification. *Criteria for Certification.* NATA Board of Certification; 1969.
4. NATABOC, Inc. *Credentialing Information for Entry Level Eligibility Requirements, Continuing Education Policies, and Disciplinary Procedures.* Raleigh, NC: NATABOC, Inc; 1995.
5. NATABOC, Inc. *Role Delineation Study of the NATABOC, Inc Certification Examination.* Philadelphia, PA: FA Davis; 1992.
6. Columbia Assessment Services, Inc. *1992 Report on the NATABOC, Inc Certification Examination.* Raleigh, NC: Columbia Assessment Services, Inc; 1992.
7. *Statistix* [computer program]. Version 4.0. Tallahassee, FL: Analytical Software; 1992.
8. Membership snapshot: the college setting. *NATA News.* April 1993:20.
9. Harrelson GL, Gallaspy JB, Knight HV, Leaver-Dunn D. Predictors of success on the NATABOC certification examination. *J Athl Train.* 1997;32:323–327.
10. Starkey C, Henderson J. Performance on the athletic training certification examination based on candidates' roles to eligibility. *J Athl Train.* 1995;30:59–62.
11. Draper DO. Students' learning styles compared with their performance on the NATA certification exam. *Athl Train, JNATA.* 1989;24:234–235,275.
12. Undergraduate placement. *JRC-AT/NATA-PEC Newsletter.* December 1997, 10–11.
13. Lave J. *Cognition in Practice: Mind, Mathematics, and Culture in Everyday Life.* New York, NY: Cambridge University Press; 1988.
14. Lave J, Wenger E. *Situated Learning: Legitimate Peripheral Participation.* New York, NY: Cambridge University Press; 1991.
15. Fischer KW, Pipp SL. Processes of cognitive development: optimal level and skill acquisition. In: Sternberg RJ, ed. *Mechanisms of Cognitive Development.* New York, NY: WH Freeman & Company; 1984:45–80.
16. National Council of State Boards of Nursing, Inc [National Council NCLEX Examination Web site]. Available at: http://www.ncsbn.org/research/nclexstats/nclex.asp. Accessed April 1, 1998.
17. National Board of Certification in Occupational Therapy, Inc. Program director report 24216. Bethesda, MD: National Board of Certification in Occupational Therapy, Inc; November 1998:1–5.
18. National Commission on Certification of Physician Assistants. Fall 1998 Physician Assistant National Certifying Examination results. Alexandria, VA: National Commission on Certification of Physician Assistants; January 1999:1–3.
19. NATABOC, Inc. *Certification Update.* Omaha, NE: NATABOC, Inc; Summer 1998:4–5.
20. Denegar CR. Clinical education in athletic training: behind the times and threatening the future. *J Athl Train.* 1997;32:299.