ATHLETIC TRAINING EDUCATION JOURNAL

www.natajournals.org
ISSN: 1947-380X
DOI: 10.4085/1303196

LITERATURE REVIEW

Part I: Doctoral Education in Athletic Training. The Post-Professional Education Committee Doctoral Education Workgroup Report

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Context: The academic environment for athletic training is changing following the degree recommendations for professional education programs.

Objective: To provide historical context by presenting definitions and information on doctoral degree programs in other health professions.

Background: The National Athletic Trainers' Association called for a detailed analysis on doctoral education, and a workgroup was appointed by the Post-Professional Education Committee to fulfill this charge.

Synthesis: Expert panel consensus. Data were extracted from a search of 38 databases in the University of Washington library, limiting results to full-text articles published in English between the years 2006 and 2016. Various supporting sources, including professional organizations, accrediting-body Web sites, and the US Department of Labor database, were used for regulatory and professional practice data. Two historical references were used to clarify definitions and provide context.

Results: Many health professions began with apprenticeship or certificate models, professional growth led to progressive degree designations such that the majority have now adopted a professional doctorate educational model wherein the professional degree is the terminal degree for professional advancement. Some health professions use residency training as the graduate education equivalent for advanced-practice education, whereas others do not. Only nursing continues to offer professional education at the baccalaureate level.

Recommendation(s): There is a growing need for research to further understand best practices in doctoral education and the educational routes athletic trainers pursue. Collection and analysis of new data and examination of past and present doctoral education programs will facilitate recommendations for the future of doctoral education in athletic training.

Conclusion(s): Various postprofessional educational models exist among health professions, with different impacts on professional roles, clinical opportunities, student interest, research productivity, and faculty recruitment and retention. The recently created doctor of athletic training programs may be considered a hybrid model providing advanced training in both clinical and research skills.

Key Words: Clinical doctorate, graduate education, health professions

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Full Citation:
Seegmiller JG, Perrin DH, Huxel Bliven KC, Baker RT. Part I: doctoral education in athletic training. The Post-Professional Education Committee Doctoral Education Workgroup report. *Athl Train Educ J*. 2018;13(3):196–204.

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KEY POINTS

- The Post-Professional Education Committee appointed a workgroup to investigate doctoral education and recommend future directions for the profession. Most health professions have adopted postbaccalaureate clinical doctorate degree programs for entry to practice.
- Young professions often begin with apprenticeship models, which then mature and develop distinct bodies of knowledge that are taught in academic programs to prepare new clinicians.
- Educational progression and degree designations vary among health professions, but most adopted postbaccalaureate clinical doctorate degree programs for entry to practice.
- Perceived advantages of clinical doctorates include increased practice opportunities, professional standing, and increased curricular space. Perceived disadvantages include reduced research productivity, degree creep, increased student debt burden.
- Athletic training faculty, clinicians, employers, and academic administrators are 4 key stakeholders whose feedback can help shape doctoral education for athletic training.

INTRODUCTION

This is the first of 2 papers to address the National Athletic Trainers' Association's (NATA's) mandate to conduct a detailed analysis specifically focused on doctoral education (postprofessional education) in athletic training. The purpose of this paper is to provide a historical context to educate readers by presenting definitions and information on doctoral degree programs in other health professions. Definitions and foci of the advanced-practice clinical doctorate as defined in this paper are preliminary and may be modified once empirical data are obtained. Advantages and concerns of the clinical doctorate are discussed in the context of clinical practice and academic setting using other health professions' experiences.

CONTEXT

On June 25, 2012, the NATA Board of Directors (BOD) approved a document entitled "Future Directions in Athletic Training Education" presented to the BOD by the NATA Executive Committee for Education.[1] Whereas the initial document included 14 recommendations, a 15th recommendation specific to doctoral education was also approved by the BOD. This recommendation read:

> *The NATA, with the support of the Strategic Alliance, should conduct a detailed analysis specifically focused on doctoral education (post-professional education) in athletic training.*

In the summer of 2014, the Post-Professional Education Committee (PPEC) appointed a workgroup of NATA members with experience in graduate education and curriculum to investigate doctoral education. The final workgroup consisted of 12 members (Table 1) charged with examining the current landscape of doctoral education in athletic training and making recommendations for future directions.

Discussions to address the issue began in September 2014. The workgroup quickly identified the need to define common terms related to doctoral education to facilitate an understanding of the differences among various degrees. The workgroup subsequently assisted the PPEC with developing a list of definitions with specific attention to postprofessional education terminology (Table 2).

The Strategic Alliance's decision to adopt master's-level professional education is likely to yield an influx of athletic trainers seeking a new avenue for an advanced-practice degree, often referred to as a *clinical doctorate*. We felt it was especially pertinent to explore best practices and issues related to doctoral education as a foundation for our work. With this objective in mind, full-text articles published in English between the years 2006 and 2016 were extracted from

Table 1. Post-Professional Education Committee (PPEC), Doctoral Education Workgroup

Roles and Members
PPEC chair
Charles Swanik, PhD, ATC, FNATA University of Delaware
Workgroup cochairs
David H. Perrin, PhD, ATC, FNATA University of Utah
Jeffrey G. Seegmiller, EdD, ATC University of Idaho
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National Athletic Trainers' Association staff liaison
Sidney Fuller National Athletic Trainers' Association

Table 2. Educational Definitions Developed by the National Athletic Trainers' Association (NATA) Post-Professional Education Committee (PPEC) and Doctoral Education Workgroup 2015

Category	Term	Definition
Professional education	Professional preparation	The education and training of students to become eligible for BOC certification occurs through an athletic training degree program (bachelor's or master's level) accredited by the CAATE. Students engage in rigorous classroom study and clinical education in a variety of practice settings such as high schools, colleges/universities, hospitals, emergency rooms, physician offices, and health care clinics over the course of the degree program. Students enrolled in their final semester are eligible to apply for the BOC exam.
	Professional master's degree programs	A professional master's degree program is designed to introduce students to and train them for a profession and prepare them to sit for a board certifying exam to enter the profession. These programs are intended to introduce students to the knowledge and skills necessary to be minimally proficient to enter the profession, and may include research, scholarship, or advanced skills.
	Professional doctorate	A degree program designed to introduce students to and train them for a profession and prepare them to sit for a board certifying exam to enter a profession. Athletic training does not currently offer a professional doctorate. These degrees are intended to introduce students to the skills necessary to be minimally proficient to enter the profession, and are not intended to create proficiency in research, scholarship, or advanced skills.
Certificate	Certificate of completion (COC)	A COC is a certificate program that provides structured, systematic educational and training experiences, generally less in-depth and shorter in duration than a degree program or specialty certification. Certificate programs can provide knowledge, skills, attitudes, and performance behaviors designed to meet specific educational and employment objectives. A certificate indicates completion of the program based on the provider's criteria, but is not usually an objective, independent measure of competence against national standards.
	Certificate of added qualification (CAQ)	A CAQ is a certificate demonstrating completion of an educational training program and passing an examination, or series of examinations, to demonstrate employment-based proficiency and ensure attainment of specific knowledge and skills in an area. A CAQ is not a credential, and does not grant the holder the right to practice beyond that which the professional credential affords.
	Certification	A voluntary process by which a practitioner's education, experience, knowledge, and skills are confirmed by one's profession as meeting a defined standard. The standards and processes for certification are established by a professional, nongovernmental agency. In the field of athletic training, the BOC administers a certification exam at the professional preparation level and indicates an individual has completed education in athletic training and can demonstrate an appropriate level of knowledge and skill in athletic training.
	Specialty certification	A voluntary postprofession process by which an athletic trainer demonstrates that he or she has met defined standards beyond those required for professional-level certification. The standards and processes for certification are established by a professional nongovernmental agency. The proposed BATS would be responsible for overseeing the specialty practice petitioning and recognition process. The first step towards development of a specialty certification in athletic training is the identification of a recognized area of specialty practice within the profession. Only after a recognized area of specialty practice has been identified is it possible to complete an appropriate role delineation study for clinicians within the defined specialty. A petition is then developed and submitted to the BATS for evaluation. If approved, a valid credentialing examination is established that culminates in a specialty certification credential.

Table 2. Continued

Category	Term	Definition
Postprofessional education	Graduate assistantship (GA)	A GA is usually a competitive postbaccalaureate position in a higher education institution that is associated with an academic degree program at the master's or doctoral levels. A GA typically provides financial support in the form of salary, tuition remission, and/or medical benefits, in exchange for services (eg, clinical, research, teaching, administration).
	Internship	An internship can be a professional or postprofessional clinical education experience that prepares an individual to practice athletic training proficiently, based upon the unique job demands of a specific employment setting (employment-based proficiency). Internships are generally developed to expose the individual to an employment setting where he or she may not have had previous significant experience. They may also help someone transition into a new employment setting. Internships are not designed to create clinical specialists, but are instead designed to familiarize the intern with the knowledge, skills, and abilities needed for clinical practice within a specific employment setting (professional sports, clinical, industrial, hospital, high school, etc).
	Master's degree program	There are a variety of different types of master's degree programs, but generally this is an academic degree intended to provide advanced knowledge and/or skills in a specific field of study with greater depth and/or breadth than that of a baccalaureate degree. Graduates are expected to acquire higher-level critical thinking skills and mastery of knowledge, theory, and/or professional practice in a specific academic discipline. A master's degree program in academia may or may not be associated with professional credentials.
	Accredited master's degree programs	Accreditation is a voluntary, external evaluation process requested by academic institutions. It is carried out by peer review through a nongovernmental independent body (CAATE). The accreditation process ensures program quality and accountability. By asking for accreditation, the sponsoring organization of the accredited degree program (eg, college/university) agrees to be assessed against standards and guidelines established by CAATE. The sponsoring organization of an accredited degree program must comply with these standards and guidelines.
	Residency program	The purpose of postprofessional residency programs in athletic training is to provide advanced preparation of athletic training practitioners through a planned program of clinical and didactic education in specialized content areas using an evidence-based approach to enhance the quality of patient care, optimize patient outcomes, and improve patients' health-related quality of life. After several years of studying models of residency education and training in other health professions, the Executive Committee for Education announced the development and release of the NATA Post-Professional Athletic Training Residency Accreditation Standards and Guidelines in March of 2010. Residency programs may now seek accreditation by CAATE.
	Fellowship program	A fellowship is a postprofessional training program in a highly specialized area of athletic training that requires formal training beyond the successful completion of a residency program. The fellow engages in an intense course of clinical study and a related research component that builds upon a clinical specialty first developed through a residency. The intent is to further focus the clinician's area of specialization. Currently, the PPEC is taking the leadership role in conceptualizing the development of fellowships in athletic training.

Table 2. Continued

Category	Term	Definition
	Academic doctoral degree program	The academic doctoral degree (eg, PhD, EdD) is the highest degree awarded by universities, and is usually the credential necessary for appointment in academia, typically as a tenure-track faculty member (eg, assistant, associate, or full professor) or as a research scientist. The purpose of attaining an academic doctoral degree is to acquire greater depth of knowledge, advanced theoretical understanding, and technical expertise to become an independent scholar, for both research and instruction, as is evidenced by the completion of a dissertation or original peer-reviewed scholarly publication(s). Preparing for a career in higher education (commonly referred to as "the academy") requires careful planning to determine which program and primary scholarly advisor aligns with a student's area of research interest. Establishing clear goals for one's scholarly research agenda and future professional role is important as a person investigates the focus of different academic programs and dissertation advisors.
	Postprofessional clinical doctorate	A degree program designed for students already established in their profession who seek advanced knowledge, skills, and research inquiry to increase depth of knowledge. Currently, a postprofessional clinical DAT is for a credentialed athletic trainer who seeks advanced coursework and applied research, and may require a research project or dissertation directly related to the clinical practice of athletic training. The purpose of attaining a postprofessional clinical doctoral degree is to become a clinical scholar with advanced knowledge and skills needed for the delivery of patient care at the highest levels. Individuals with a clinical doctorate would be expected to provide leadership and innovation in the advanced practice and instruction of athletic training.
	Postdoctoral fellowship	A postdoctoral research fellowship is a directed, highly individualized training program designed to prepare the participant to function as an independent investigator and research scholar. The purpose of postdoctoral fellowship programs is to develop highly specialized expertise in the scientific research process, including hypothesis generation and formulation; study design; protocol development; grantsmanship; study coordination; data collection, analysis, and interpretation; technical skills development; presentation of results; and manuscript preparation and publication.

Abbreviations: BATS, Board of Athletic Training Specialties; BOC, Board of Certification; CAATE, Commission on Accreditation of Athletic Training Education; DAT, doctor of athletic training; EdD, doctor of education; PhD, doctor of philosophy.

a search of 38 databases in the University of Washington library with the search term *health profession graduate education* and yielded 456 results. Results were further narrowed by applicability to the identified questions of interest and discarding those that were editorial in nature. Two historical articles were used to provide context for educational progression among specific professions because contemporary sources were lacking. Data were also extracted from pertinent professional organizations, accrediting-body Web sites, professional texts, and the US Department of Labor database.

HISTORY OF DOCTORAL EDUCATION

Health professions have adopted a variety of degree pathways and designations to provide professional and postprofessional training. For most, such as audiology, dental surgery, osteopathy, podiatric medicine, physical therapy, medicine, optometry, and pharmacy, professional training is completed through postbaccalaureate doctoral degree programs designed to prepare students to enter professional practice. Occupational therapy offers both master's and doctoral degree options to enter professional practice. Athletic training and nursing continue to prepare professionals before the doctoral level (ie, associate's degree in nursing, bachelor's degree, master's degree).[2–6] Interestingly, some health professions, such as medicine and pharmacy, began as apprenticeship programs, which were then formalized as bachelor's degree programs before professional preparation was elevated to doctoral-level education. Optometrists are unique in that they started out as jewelers and craftsman making glasses with apprenticeship training, which then transitioned directly to a professional doctorate. Dentistry and podiatry likewise followed the apprenticeship to professional doctorate degree progression. Other professions, such as physical therapy, occupational therapy, and audiology, followed the pattern of certificate, bachelor's degree, master's degree, and professional doctorate, some progressing along that continuum more rapidly than others.[4–16]

Health professions also demonstrate variations in graduate education models for postprofessional training. Postprofessional graduate education may include advanced theoretical and applied training (eg, doctor of science in physical therapy), focused theoretical research training (eg, doctor of philosophy [PhD]), or hybrid models providing advanced training in both clinical and research skills (doctor of athletic training [DAT]). Some doctoral degree programs, such as the doctor of nursing practice program, provide a new skill set tantamount to new professional training that advances the role and independent scope of practice within a profession. Trends indicate that health professions as a whole have shifted from the academic model of bachelor's and master's to a professional doctorate education model.[4–7]

A recent investigation of health profession programs revealed that two-thirds ($n = 10$) of surveyed health professions follow the medical model, using postbaccalaureate entry-to-practice professional training provided at the doctoral level. A few professions ($n = 4$) reserved doctoral training for postprofessional training designed to advance knowledge in clinical or research practice. Of these professions, only occupational therapy provided a route for both entry-level and advanced-practice preparation at the doctoral level.[8] The Accreditation Council for Occupational Therapy Education (ACOTE) recently mandated the entry-level degree in occupational therapy move to the doctoral level by July 1, 2027. The ACOTE will accredit only the professional occupational therapy doctorate after that date.[9]

Despite multiple professions undergoing educational transitions, few studies have assessed the impact of these changes. Perceived benefits of adopting entry-to-practice doctoral education include increased practice opportunities, professional standing, depth and breadth of learning, and curricular space.[17–19] A potential consequence of professional doctorates is reduced research productivity, because few professions transitioning their educational model require the completion of original research as part of the degree program.[8]

Physical therapy has already experienced a shortage of qualified research faculty and decreased scholarly production, which may have resulted from this educational change.[17,20,21] Other concerns related to entry-to-practice doctoral education include decreased motivation of students to pursue advanced-practice clinical or research training and decreased student preparation for effectively practicing in the rapidly changing health care market.[22,23] Nursing differs from the other health professions because doctoral education has been reserved for postprofessional training to provide practitioners with the opportunity to specialize, practice independently, improve patient outcomes, and conduct translational research.[19,23–25]

Given the lessons learned from other professions, it's imperative that athletic training make informed decisions regarding the models used for professional and postprofessional education. It has been proposed that the profession reserve the master's degree for professional training and support doctoral education for advanced postprofessional training.[8]

The DAT degree has been described as a route to prepare athletic trainers with advanced clinical knowledge, patient care expertise, and the skill set for clinical innovation, while also preparing graduates with the skills necessary to contribute to world-class teams of research scientists conducting meaningful applied and translational research. The goal of these programs is to prepare graduates able to practice as master clinicians, educate the next generation of clinicians and scholars, and provide leadership in the profession to influence organizational administration and public policy.[2,5,8,17,18,22,26–29]

The PhD and doctor of education (EdD) degree programs in athletic training have been described as routes to prepare research scientists and faculty focused on a specific area of expertise within the educational or biomedical research spectrum (basic, translational, and/or clinical research) or focus on professional issues using a robust mode of qualitative and/or quantitative inquiry. Historically, the intent of these programs has been for graduates to be immersed in research, work with master clinicians to design and conduct translational research and have the training to lead grant-funded and interdisciplinary research projects while also preparing for future faculty roles.[26–29]

Athletic training must define and clarify the profession's educational progression or risk "degree ataxia," with similar

Table 3. Universities Offering Doctoral Programs in Athletic Training in 2005, 2016, and 2017

University Name	Doctoral Programs 2005[23]	Doctoral Programs 2016[24]	CAATE–Accredited Doctoral Program 2017[25]
A.T. Still University		X (DAT)	
Brigham Young University		X (PhD)	
Indiana State University	X (PhD)		X (DAT)
Ohio State University		X (PhD)	
Ohio University		X (PhD)	
Old Dominion University		X (PhD)	
Oregon State University	X (PhD)		
Rocky Mountain University of Health Professions		X (DSc)	
Temple University	X (PhD)	X (PhD)	
University of Connecticut		X (PhD)	
University of Delaware		X (PhD)	
University of Florida	X (PhD)		
University of Hawaii, Manoa		X (PhD)	
University of Idaho		X (DAT, PhD)	
University of Kentucky	X (PhD)	X (PhD)	
University of North Carolina at Chapel Hill	X (PhD)	X (PhD)	
University of North Carolina at Greensboro	X (PhD)	X (EdD, PhD)	
University of Oregon	X (PhD)		
University of Pittsburgh	X (PhD)		
University of Toledo	X (PhD)	X (PhD)	
University of Virginia	X (PhD)	X (PhD)	
Virginia Commonwealth University	X (PhD)	X (PhD)	

Abbreviations: CAATE, Commission on Accreditation of Athletic Training Education; DAT, doctor of athletic training; DSc, doctor of science; EdD, doctor of education; PhD, doctor of philosophy.

adverse consequences to those found in the physical therapy literature: reduced research training among doctoral students, increased shortage of qualified faculty, decreased specialized training for professionals, and diminished scholarly production and knowledge generation.[5,7,8]

HISTORY OF DOCTORAL EDUCATION IN ATHLETIC TRAINING

For many years, athletic trainers interested in careers as scholars or curriculum directors pursued doctoral education in disciplines related to athletic training, rather than specifically within athletic training. Examples of such disciplines included, but were not limited to, rehabilitation sciences, kinesiology, exercise physiology, biomechanics, and education. Athletic trainers who completed these programs were often trained to conduct laboratory-based research related to the prevention and rehabilitation of injuries. Other programs, related to curriculum and instruction, were designed to prepare athletic trainers to conduct research examining academic program development and leadership, clinical education, assessment of learning outcomes, or similar topics.

While students continued to pursue tangential options for doctoral training, programs began to emerge that more specifically targeted athletic trainers with content and research foci congruent with the athletic training discipline. The development of these types of doctoral programs in athletic training was cited in the 2005 textbook *Research Methods in Athletic Training*, in which 12 examples of universities offering programs from which athletic trainers were obtaining doctoral degrees were listed.[30(p9)] However, of these academic doctoral programs, very few directly articulated athletic training as the primary focus. Rather, the primary factor distinguishing doctoral programs as targeting athletic trainers was the presence of faculty mentors who were athletic trainers with terminal academic degrees. In 2016, the NATA listed 17 universities offering doctoral programs for athletic trainers on its Web site,[31] but with the advent of the Commission on the Accreditation on Athletic Training Education as the accrediting body for educational programs, only 1 doctoral program was accredited and listed at the time of this writing (Table 3).[32] Although only 1 accredited doctoral program in athletic training was listed in 2017, the 16 universities listed in 2016 continue to offer doctoral degrees, some with more than 1 type of doctoral program (eg, PhD, EdD, DAT, doctor of science in athletic training). Furthermore, some institutions offered similar programs but have not sought accreditation or formal recognition for their programs and have had no formal external review of their curriculum. It seemed likely, but was unclear, if the programs listed in 2016 that were not listed on the CAATE Web site still offer academic doctoral programs for athletic trainers. Furthermore, it is unknown if any institutions have transitioned to a clinical degree program (eg, DAT) or if they have plans to seek accreditation.

Identifying a comprehensive list of academic doctoral programs for athletic trainers is not an easy undertaking, and the influence of accreditation on program success and enrollment is unknown. It is hoped that more will be learned from scholars in the field who have achieved a terminal degree through future stakeholder surveys. Doctoral education in athletic training may be an untapped area of emphasis for individuals seeking a career as an athletic training scholar or researcher. However, it is difficult to fully assess and make recommendations for doctoral education in the profession when so little is known about the current state of doctoral education for athletic trainers.

FUTURE DIRECTIONS: DOCTORAL EDUCATION IN ATHLETIC TRAINING RESEARCH

The Doctoral Education Workgroup was also tasked with gathering data from which recommendations on the future of doctoral education in athletic training could be made. Our analysis showed 4 key stakeholders who would provide necessary feedback to inform future educational recommendations: (1) athletic training faculty, (2) athletic training clinicians, (3) academic administrators, and (4) employers of athletic trainers. We determined that a survey could provide the necessary data, provided that it allowed for comparison among stakeholder groups and included questions regarding curriculum and instruction, characteristics or traits of graduates from a postprofessional clinical doctorate in athletic training program, influence on patient care, postgraduation employment opportunities, and benefits to the athletic training profession.

This preliminary literature analysis was used to develop stakeholder surveys to further explore this topic. Members of the PPEC Doctoral Education Workgroup will present a companion piece[33] with data collected from the 4 stakeholder groups to examine the perceived viability of the athletic training clinical doctorate in both the clinical and academic settings and will also provide recommendations for program development.

SUMMARY

Various educational pathways exist among health professions, with different goals, outcomes, and impacts. The majority of health professions have adopted the clinical doctorate as their professional degree, but others continue to reserve doctoral education for postprofessional training.

The formation of this workgroup and future products from the group represent a concerted effort from the NATA with the support of the Strategic Alliance to conduct a detailed analysis focused specifically on doctoral education (postprofessional education) in athletic training. It is the workgroup's goal to provide information necessary to inform the future directions of postprofessional education in athletic training.

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