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Teaching Techniques of Athletic Training Educators During Instruction of Concussion Assessment Tools

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TEACHING TECHNIQUES OF ATHLETIC TRAINING EDUCATORS DURING INSTRUCTION OF CONCUSSION ASSESSMENT TOOLS

by

MICHELLE LIMA

(Under the Direction of Tamerah Hunt)

ABSTRACT

Context: Standards for concussion management in clinical practice are essential to best practices in health care. Even with the heightened awareness of concussion education in medical professionals over the past decade, there have been no studies to date to investigate the educational practices of instructors at CAATE-accredited institutions and how they teach concussion assessment tools.

Purpose: To evaluate the educational practices of instructors teaching the course on concussion assessment tools at CAATE-accredited institutions.

Design: Mixed-methods, exploratory study.

Methods: Nine instructors from CAATE-accredited Athletic Training Education Programs that varied in geographical and division completed a 34-item survey using Qualtrics (2015)©. A semi-structured interview based upon the responses on the survey was then completed using the phone or an online video chat. Quantitative data was analyzed using frequency tables and mode for the survey questions. Interview questions were analyzed using triangulation of themes.

Results: The most common credential participants marked was ‘ATC’ (100%). Survey responses indicated that the most common teaching methods were: ‘Laboratory’ (100%), ‘Didactic’

(77.8%), ‘Lecture’ (88.9%), and ‘PowerPoint’ (88.9%). Common concussion assessment tools taught in the classroom were: SCAT2/3, SAC, BESS (88.9% respectively); while in the laboratory the most common assessment tools were: SCAT2/3, BESS, and cranial nerve assessment (100% respectively). The semi-structured interview found four overarching themes with multiple subcategories. The four major themes were: (1) characteristics of instructors teaching the concussion assessment tools and education, (2) factors effecting how the instructors teach concussion assessment tools and concussion education, (3) the components incorporated into a concussion assessment per the instructor, and (4) barriers and future solutions to teaching concussion assessment tools.

Conclusion: This exploratory study shed light on the understanding that athletic training educators come from a variety of educational, clinical, and research backgrounds. The instructors’ foundational knowledge and experience level effects the teaching techniques they utilize and which teaching methods they employ in the classroom. Time is the number one barrier instructors find prevents them from doing more in the classroom for their students. Future studies should investigate athletic trainers’ knowledge of educational theory and teaching effectiveness.

INDEX WORDS: Education, Barriers, Knowledge, Didactic, Lecture, PowerPoint, Teaching methods

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by

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by

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DEDICATION

I would like to dedicate this completed Master's thesis to my family. My mother Sylvia and father Michael have never failed to inspire me in life and I would not be the person I am today without them. My sister Ariella keeps me grounded and is my rock, always pushing me to be the best version of myself. Lastly, my brothers Christopher and Daniel have always supported me, providing a stress-free moment when most needed. The love and support they provide for me from afar is more than I could ever ask for during this process.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Concussion

Concussion, also referred to as a mild traumatic brain injury (mTBI), has been the highlighted topic of interest for the general population, legislators, and the sports medicine community as a whole.[1–3] Prevalent in competitive and recreational sports, concussion is a major public health concern worldwide.[4] Concussions occur in males and females of all ages and all sports, but are most common in collision activities.[2] The Center for Disease Control (CDC) states concussion in the United States of America is considered to be at an 'epidemic level,' with an estimated 1.6-3.8 million traumatic brain injuries occurring annually.[5] Data collected from emergency department visits show a 62% increase in nonfatal traumatic brain injuries between 2001 and 2009.[6] As a result of the heightened attention and prevalence of this injury, many organizations are taking action to inform clinicians.

Medical organizations, such as the National Athletic Trainers' Association (NATA) and American Neurology Association (ANA), have produced numerous position or consensus statements.[1] According to the NATA's position statement on the management of sport concussion,[2] there are specific steps athletic trainers are recommended to follow and practice. Although there are education and prevention recommendations given to current practicing athletic trainers, only a broad description of what should be included in the evaluation process are provided, with no specific evaluation tools following a head injury.[2] The concussion diagnosis is made through both clinical evaluation and supported assessment tools, such as a brief evaluation tool (e.g., Standard Assessment of Concussion [SAC]) combined with motor

control and symptom assessment to support a physical and neurologic evaluation.[2] It is suggested to consult members of the sports medicine team regarding the best tools for the clinical setting.[2]

All 50 states and the District of Columbia[7] have passed concussion-management or head injury legislation with education as the cornerstone to prevention. These laws are most often created in regard to school-organized sport and recreational activities while some target a broader population such as youth, group or organizations that use property or facilities owned by a school district, state, or local parks and recreation departments.[7] The laws enacted by each state, although pertaining to concussion, vary in regard to who receives concussion information and how the information is obtained. Laws also vary in regard to athlete clearance and return to play following a concussion; most states include requirements that before returning to participation, an athlete must have written clearance from a physician or another licensed health professional.[8]

In order to successfully manage concussions in the clinical setting, athletic trainers must understand the education curriculum of their accredited programs to establish what is being taught and if that teaching is effective enough in establishing a foundation for proper management.[9] Although the NATA[2] provides a broad recommendation for which tools should be used in evaluating and managing a concussion, it gives freedom to the athletic training education programs to consult with their physician and determine the best assessment battery to use. This creates concern about the standardization of educational practices regarding concussion assessment tool administration across athletic training education programs. The goal is to maintain a standardized and objective process of administration. In line with the NATA's position statement, the 5th Edition of Education Competencies for athletic training curriculums

does not mention what tools to teach, what evaluations should be made, and only states broad terms of evaluation to focus on, such as "cognitive, neurologic, and motor-control assessment."[10]

Educational Theory

Focus must be given first to the educators themselves, including background and knowledge base. Although research on teaching was well established, Shulman in 1986, described three types of knowledge that helped educators and policymakers understand teaching more in depth: Content Knowledge, Curricular Knowledge, and Pedagogical Content Knowledge.[11] These three types of knowledge have since been used in various educational settings, further expanded upon by researchers, and placed into practice. Of the three, the focus remains on Content Knowledge and Pedagogical Content Knowledge (PCK), as they form the key components of current teaching standards, subject specific standards, and policy organization.[12]

Teaches need the knowledge base that would allow them to respond effectively as educators.[11,13] Shulman[11] described four sources of knowledge base: education in specific content, the materials and structure used, study in pedagogy, and the "wisdom of practice itself." Experience in not only the content, but also Pedagogical Knowledge that plays a major role in teaching. Differences can be seen in the way novice and experienced teachers plan, think and reflect on their teaching.[14] Experienced teachers know the characteristics, interests, and abilities (schemata) of the students which allows them to plan lessons according to experience rather than relying on the textbook.[14] They also have a wide range of experiences with teaching strategies that allow them to create variations in the lesson, while novice teachers cannot generally gauge where in the lesson something needs to be adjusted, cannot create variations, and rely heavily on the textbook and written materials.[14] Another difference is seen in regards to the teachers' focus

during instruction. Experienced teachers for example, focus more on the student's needs, while a novice teacher focuses on students on-task behavior and where their interest/attention is during the lesson.[14,15] Novice teachers rely on specific activities for lessons, from their limited background knowledge; experienced teachers rely on years of trial and error with many classes, thus allowing them a large bank of activities and resources. [14,16] Teaching experience is a key component to the development of the schemata and pedagogical content knowledge that eventually leads to a successful teacher.[14]

Athletic Training Education

Athletic Training Education Programs follow similar curriculum evaluation needs when comparing to medical schools in regards to concussion education. Emphasis on concussion awareness and evaluation is growing in the education of future health care professionals. Burke[9] found that there is a marked deficiency in concussion education in medical schools. These findings show the need for more concussion education as well as a gap in concussion management. Currently, it is strongly recommended that all concussed individuals seek medical attention.[17] Athletes must have physician clearance before return to play, but if the gap between assessments performed by athletic trainers and evaluations performed by physicians is inconsistent, the student-athletes' standard of health care may be affected.[17] Of the 14 responding Canadian medical schools in the Burke study, four provided concussion-specific education (29%), six offered head injury education that incorporated concussion component (43%), and four reported no concussion teaching in their curriculum.[9]

The Center for Disease Control and Prevention estimates that concussions account for up to 75% of the 1.5 million traumatic brain injuries in the United States each year.[17] As the Burke and Boggild studies[9,17] discovered, incomplete understanding of concussion management in

medical students and schools curriculum is worrisome as these individuals must be sought out for clearance of concussion before return to play. The gap between curriculum and clinical practice could also be seen in athletic training education students, as the education guidelines lack the specifications necessary for understanding. With little known about the education of concussion assessment tools in the ATEP programs, this gap between standardized concussion management practices and standardized administration of assessment tools could be larger than the literature is currently indicating. Future studies will need to look into the specifications of ATEP curricula and syllabi.

Student Learning Techniques

Methods such as cooperative learning, problem-based learning and others have been shown to foster athletic training student's learning.[18] Individual student learning is dependent upon many variables, including, but not limited to, sleep, nutrition, classroom environment, interest in topic, learning style and emotional state. The learning techniques discussed include Experiential Learning Theory, Standardized Patient (SP) Encounter, and Brain Based Learning. Experiential learning is used to represent hands-on or clinical environment learning. A SP encounter includes an individual who has been trained to portray signs and symptoms of either an injury or illness.[19] Brain-based learning, although it involves learning, is not a specific methodology but rather describes how the human brain actually learns.

Although little reference is made to athletic training educational theory or models, mastery learning is thought to similarly resemble current ATEPs. Mastery learning divides educational content into smaller, attainable units according to the importance and subject matter. By creating smaller sections, objectives are formulized to guide the instructional process.[20] Students are tested; those who pass continue to the next step while those who do not, repeat the

unit until reaching the satisfactory level.[20,21] This theory can also be called programmed instruction,[22] competency-based education,[23] skills-based curricula, or outcome-based education.[21]

Significance of the Study

Emphasis on concussion management practices in the clinical setting has been consistently reported in the literature.[2,24] Although guided by policies and recommendations created by NATA to follow a standardized approach to concussion management, there is little evidence regarding what is being taught in the educational setting on these concussion management practices and if they are standardized across programs. Additionally, few studies look at the actual educational practices of instructors at CAATE-accredited athletic training education programs.

According to athletic training education literature, there has been no specific educational theory or instructional model mentioned that informs teaching practices in ATEPs.[20] Although no concrete theory has been found to reflect the practices of athletic training education, Mastery Learning is seen in the literature in connection with ATEPs. The smaller organized sections create learning objectives which are used as a guide in the instructional process.[20] Mastery learning allows ATEPs to implement a student clinical education matrix that consists of checkoff lists for necessary tasked to be completed.[20] By utilizing this approach, instructors have the opportunity to evaluate learning outcomes and remains a teacher-centered classroom.[20]

The Commission on Accreditation of Athletic Training Education (CAATE) requires that athletic training education programs use the 5th edition of the Athletic Training Competencies to guide the program's structure. The Competencies set minimum requirements and standards that are typically exceeded in one form or another.[10,20] Programs are encouraged to implement

innovative, student-centered teaching and learning methods to connect the classroom, laboratory and clinical setting to provide the highest quality education.[10] Policies are based off of a specific approach to organize ATEPs but as these are minimum requirements, there are no exact specifications to follow. No two athletic training education programs are the same.[10,20] There is a growing need to adapt and evolve in order to propel the profession forward both organizationally and educationally.

Literature is available on the current concussion management practices in the clinical athletic training setting but not on the standardization of how concussion assessment tools are being taught in the ATEP classrooms. With limited information available on what concussion assessment tools are being taught in ATEPs, even less is known on how the administration of each test is being taught to the students. The need for such information is paramount to the athletic training profession in order to obtain a sound, objective assessment measure to base standardized concussion policies on.

Purpose Statement

Therefore, the purpose of this study is to evaluate the educational practices of instructors teaching the course on concussion assessment tools at CAATE accredited institutions. Specifically, to assess who is teaching the course on concussion assessment tools, what concussion assessment tool resources are being utilized, what teaching techniques are being employed, and how each assessment tool is being taught.

CHAPTER 2

METHODS

Participants

A convenience sample of CAATE-accredited institution instructors were asked to participate in this study. The instructors had taught a course on concussion assessment tools in the previous year. In order to recruit participants, an interest e-mail was sent to 28 athletic training education instructors. After initial interest letters were sent out, nine instructors from eight institutions and three divisions completed the survey and semi-structured interview. Web-based survey research has a desired response rate of between 25-30%. We had a 32% response rate for agreement to participate in the study. The nine participants are evenly distributed across the three NCAA Divisions.

The inclusion criteria included: (1) individuals teaching at a CAATE-accredited institution, (2) instructor teaching content regarding concussion assessment tools, (3) instructors who previously taught the concussion assessment tool no later than the 2014-2015 academic year, and (4) completion of the entire survey, followed by an online or phone interview. The Athletic Training Education programs selected represent a convenience sample of a variety of regions and sizes. In addition, the geographical locations provide a diverse sample from the following states: Delaware, Florida, Georgia, Maryland, New Jersey, Ohio, Pennsylvania, Tennessee, and Virginia. The exclusion criteria included: (1) instructors at non-CAATE-accredited institutions, (2) instructors from courses that did not include concussion assessment tools module, and (3) instructors where concussion assessment tools were not taught in connection with concussion assessment module/courses. All participants electronically signed an

informed consent form approved by Human Subjects Review Committee prior to completing both the survey and the semi-structured interview. Participation in the survey was entirely voluntary, with no reward or compensation for survey completion.

Instrumentation

The instrumentation used in this study consisted of a survey that was constructed to evaluate instructors and is unique to this study. Although several surveys exist on assessing concussion knowledge and curriculums in medical students[17,25] none target the current study's specific research goals.

A 34-item online survey was developed through literature review, expert review, and pilot testing. The online survey was administered using Qualtrics, © (2015) software. An individualized survey link was e-mailed to each instructor, allowing only one submission. Each survey and response was coded with a letter and number prior to being sent to participants, while still allowing the primary investigator to keep track of completed surveys. Reminder emails were sent to those instructors who had not completed the survey approximately 2 weeks after the initial email. A follow-up online (Skype or Google Hangout) or phone interview was completed using the coding system to track survey responses to interview responses. The interview questions consisted of approximately 15 questions with additional probing questions dependent upon the survey responses. All interviews were recorded using two devices; one for audio and one for video.

The survey included sections on: demographics and instructor educational background information, course structure/curriculum, concussion assessment tools and guidelines being utilized in the classroom, and how these items were being taught. Responses were measured using multiple-choice, check all that apply, and Likert-scale questions. A follow-up qualitative

interview required the participant to provide additional information regarding teaching techniques and applications of educational theory (Appendix D).

All survey items were reviewed and assessed for understanding, clarity, and relevance to the research question. Face validity was established for the survey using the three researchers with experience in the content. For those items not unanimously agreed upon, edits were made. As those edits were completed, agreement between research members was determined for all question items. The survey was then pilot tested using instructors at Georgia Southern University who currently teach or previously taught the course. This step was to ensure clarity and understanding by participants, as well as to ensure the validity of the survey.

Procedures

An initial recruitment e-mail briefly explaining the study was sent to 28 athletic training education instructors to gain interest. The use of program directors, when the instructor was unknown, was utilized as no database exists to access which instructors teach courses specific to concussion assessment tools. The program directors read and forwarded the e-mail, when necessary, to any prospective instructor.

Following IRB approval and interest, participants were enrolled in the study by completing the passive consent form prior to the online survey. Using Qualtric (2015), the 34-item survey was administered via an online email link to the instructors. The online survey took approximately 5-8 minutes. Within two weeks of survey completion, the researcher contacted the participant to schedule the interview and to complete a secondary informed consent specifically for the audio recording of the interview. Completion of the follow-up interview was conducted online or by phone and took approximately 30-45 minutes. The primary researcher took notes and recorded the discussions using two devices.

Pilot Study

A pilot study was conducted to allow the primary investigator to gain practice in interviewing participants and data collection of all responses. It was also used to address the basics of triangulation of themes relating to educational practices of instructors teaching concussion assessment tools. Procedure was followed according to the methods, including recording devices and modes of contact with participants. The primary investigator surveyed and interviewed two participants who met all inclusion criteria. Both participants were faculty members whose credentials included 'ATC' and 'PhD' at their respective institutions with over 20 years of clinical and educational experience in athletic training. Two common themes were: (1) factors affecting how instructors taught concussion assessment tools and (2) what methods were utilized in the classroom. Participant 1 in the pilot study utilized PowerPoint in a lecture setting and attempted to touch upon all of the student learning styles by adding scenarios, visuals, and laboratory exercises. In regard to what assessment tools Participant 2 utilized, they emphasized how "using different tools and measures as far as how you're going to present it will hopefully reach all of them." Both participants described similarities in how these items affect the teaching of concussion assessment tools to athletic training students.

After the pilot testing, the survey and interview questions were altered to reflect the areas of necessary change. These changes included adding examples of the definition of expert in the survey and adding more probing questions during the interview to gain in-depth understanding of teaching techniques. The semi-structured interview was changed and enhanced to gain a well-rounded understanding of common factors affecting instructors teaching methods and resources utilized to teach the concussion assessment tools.

Data Analysis

This study design is considered mixed-methods as it incorporated both descriptive quantitative and qualitative analyses. Of the 34-item survey participants received, all nine participants answered every question.

Statistical Analysis

Quantitative data from the survey response were analyzed using descriptive methods. Statistical Package for Social Sciences (SPSS) software was used to run frequencies and descriptive data on participants (SPSS,Inc, Chicago, IL). Frequency tables described the most common responses and outliers, if present, were reported.

Qualitative Data Analysis

Qualitative data was collected based on the responses to the survey and interview questions. Triangulation was utilized to provide credibility and trustworthiness of the data. After the primary investigator transcribes the interviews, four researchers including the primary investigator reviewed the answers to discover common themes. The responses were analyzed for themes associated with teaching techniques used by the instructors. Researchers independently analyzed the transcriptions, then used peer debriefing to discuss the common results. Any commonalities were combined into themes.

CHAPTER 3

RESULTS

Quantitative Results

The most common credential participants marked was 'ATC' (100%), followed by 'PhD in Other' (44.4%). Some participants selected multiple credentials. The third most common credential was 'EdD' (n=2). One participant indicated they held credentials in the following: EMT, MAT (Masters' in Teaching), and Other (Masters' degree). Educational training was indicated via four options, with the potential to mark multiple choices. The leading resource used to obtain educational training by the participants was 'Symposiums' (88.9%) followed by 'Workshops' (77.8%), and 'Masters' Courses' (66.7%) respectively. The least commonly selected educational training was 'Degree in education' (55.6%). By the number of responses (n=26), it is evident that instructors are gaining their educational training from not only one source, but multiple opportunities. Participant demographics are below in Table 1.

Table 1. Participants Demographics

	Number	Percent
NATA District		
District 2	3	33.3%
District 3	2	22.2%
District 4	1	11.1%
District 9	3	33.3%
Type of Program		
Bachelors'	8	88.9%
Entry-Level Masters'	1	11.1%
Years in the Clinical Setting		
1-5 Years	3	33.3%
6-10 Years	3	33.3%
10-15 Years	3	33.3%
Years in the Educational Setting		
1-5 Years	1	11.1%

6-10 Years	5	55.6%
10-15 Years	2	22.2%
Over 20 Years	1	11.1%
Actively Providing Patient Care		
Yes	4	44.4%
No	5	55.6%
Position Title		
Faculty	8	88.9%
Other	1	11.1%
Year Students are Enrolled in Program		
Freshman	1	11.1%
Sophomore	5	55.6%
Junior	2	22.2%
First Year Masters' Student	1	11.1%
Course Structure		
One Lecture Course	2	22.2%
Lecture/Laboratory Split Course	5	55.6%
Separate Lecture and Lab Course Credits	2	22.2%
Instructors Role in the Course		
Laboratory Instructor	1	11.1%
Both Lecture and Lab Instructor	7	77.8%
Other	1	11.1%
Years Instructor Taught the Course		
1-2 Years	2	22.2%
3-5 Years	1	11.1%
Over 5 Years	6	66.7%
Minutes Spent on Concussion Assessment Tools		
50-150 Minutes	3	33.3%
151-450 Minutes	6	66.7%

Qualitative Results

Through the semi-structured questions presented to participants during the interview, four overarching themes with multiple subcategories were agreed upon through triangulation with the research team. Tables 2-7 represent the supporting themes of this study.

Of the nine participants, 4 were males and 5 were females. The male participants in this study were given the following pseudonyms: Harry, Patrick, Chris, and Nick, while the female participants were given the pseudonyms Sarah, Betsy, Heather, Marie, and Cindy. These

pseudonyms were given to protect their identity. Participants were instructed to respond to the questions on the survey honestly and to the best of their knowledge.

Although all participants came from different educational backgrounds, all had similar responses in how they reached their current level of knowledge and what they thought was necessary to gain additional knowledge. Common responses under the first major theme were that instructors' foundational knowledge came from both clinical and education/research experiences (See Table 2). Another component of this theme was how participants described what an expert would be considered in their own words. The variations in answers can be presumably linked to each participant's background experiences, which is supported in the quotes below. As described by the participants, an expert was someone currently engrossed in the literature, research, and/or day-to-day clinical setting performing the tests. It was also evident that preceptors in the athletic training education program were integral parts of student learning. Each faculty member at various institutions utilized the preceptor as an extension of their academic program, although the preceptor's involvement varied.

Table 2. Characteristics of Instructors Teaching the Concussion Assessment Tools and Education

How did the Instructor Gain their Knowledge Background	
Sarah	"…when I first got here, I was really kind of thrown into the testing right away and that wasn't my area of expertise so I really had to read up on the position statement, read up on the consensus statement…keeping up-to-date on current research…"
Harry	"...my familiarity with over 35 years of experience in the profession certainly has helped; and well I think in this day and age, the thing that I'm able to draw on is you know, 15 -20 years of clinical experience. Part of that was early in my career, then kind of a combination where I was educator/clinician, and now I'm really an educator, administrator, researcher.
Betsy	"mostly through doing the clinical examine and by staying up to date with the literature…like digging deeper."
Cindy	"before I taught full-time I worked at the university for 7 years working with the sports teams…so just having to stay on top of your own concussion management…I feel like we can do that in our sleep."
Definition of Expert	

Patrick	"that's someone who spends their day-to-day clinical practice in the evaluation, reading; the individual that is competent in multiple platforms, in multiple exam tools; I think is the expert."
Heather	"I would say that an expert is comfortable with the content and is able to think clinically through multiple facets and measures…and make the best diagnosis, the best care plan without having to go into reference materials; they serve as their own reference material."
Nick	"I think it's someone that has a handle on the literature and has also been using it in their clinical practice; it also should probably be someone who has done some of the research on it.
Instructor Perception of Own Knowledge	
Patrick	"And so, I think for me, in terms of teaching it, if you haven't implemented it or haven't spent time with it and utilized it clinically, then it's much tougher to convey reliance in that and it's much tougher to explain to your students 'this is a tool you should utilize,' if you can't really justify that."
Marie	"You know be honest, a lot of my understanding of some tests isn't going to be great because I haven't gone through training even on all of those…"
Heather	"a lot of it is my own comfort level…you have a tendency to fall back on what you're comfortable with"
Preceptors Role in Teaching of Concussion Assessment Tools	
Patrick	"Often times we have such a good relationship with our preceptors, they know what…what's kind of coming down the pipe."
Marie	"We give them a little bit of money but in most cases a preceptor is serving out of a professional desire to serve our profession, but at the end of the day they get paid to do a job; And at the end of the day, they have to do a job as a function of the administrative support."
Cindy	"research has also shown, because I just finished my doctorate (laughs) that students have to have a positive experience in their program, in order to have academic success; so they really need that hands on experience with their preceptor, they need mentorship with their preceptor; umm I tell my preceptors all the time, I'm not just sucking up to them, our program would not survive without preceptors…really good preceptors; their role is vital. I don't think our students would get a great experience without them."
Nick	"I think they're vital because we can say whatever we want, but when they go out in the field that's the gold standard."

When asked about teaching methods in the classroom setting, participants all selected multiple methods, opting for a combination. All participants (n=9) selected at minimum one method, with 100% of participants incorporating 'Laboratory' into their teaching. Participants in this study selected 'Didactic' (77.8%) as a common teaching method. Didactic is defined as a way to convey information and to teach to someone involving lecture and textbook instruction

rather than demonstration and laboratory study.[26] Students in an athletic training program will be exposed to this type of teaching where the information is coming directly from the instructor as seen by a large percentage of instructors utilizing 'Lecture' (88.9%). Those selecting lecture typically utilized 'PowerPoint' (88.9%) to convey the information. All methods selected are referenced in Table 3.

Teaching methods identify the different methods used to help students learn the desired content and be able to develop achievable goals in the future. Participants had various reasons for choosing their teaching methods (Table 3 and the thematic evidence in Table 4). Two contributing themes included presentation style of the instructor and student learning styles. Teaching techniques utilized included: standardization of the instruction of material, utilization of PowerPoint, and instructors experiential learning.

Table 3. Teaching Methods Utilized in the Classroom

Teaching Methods	**N**	**Percent of Cases**
Didactic	7	77.8%
Lecture	8	88.9%
Laboratory	9	100.0%
Problem Based Scenarios	5	55.6%
Simulations	5	55.6%
Case Studies	5	55.6%
PowerPoint	8	88.9%
Videos	4	44.4%
Games	2	22.2%
Pamphlet and Handouts	3	33.3%
Creator Instructions	5	55.6%
Textbook	4	44.4%

Table 4. Factors Affecting How Instructors Teach Concussion Assessment Tools

Two Main Contributing Themes included Presentation Style and Student Learning Style	
Harry	"…whereas if I do a combination of different presentations styles or models, I'm going to be able to connect to another small portion.. and my hope is by doing different types of presentation styles and models and connecting to all 17

	at some point, I'm going to make connections."
Patrick	"I'm never going to be the smartest guy in the room; so I realize that a lot of my experiential learning…the lecture works for me because I can fill in those gaps."
Marie	"I kind of feel like this is like the question 'What's the gold standard for a concussion assessment?' and I think that because as an educator I have different strengths and learners…I think we're whole-brain learners and I don't think we should get hung on 'this is not your learning style'…I think that you go with what your strengths are and the students are and you look at where they are developmentally."
Nick	"I think it's this idea of let's flip this and make this student-run"
Nick	"I'm very socratic. I'm very let's talk this through, let's have a discussion about this; I feel like I've gone you know 180 degree turn since I first started…when I first started in athletic training education, it was 'you need to know these facts or someone's going to die, you're going to kill someone' so I need to be very autocratic…and now graduate students it's completely different, it's much more socratic, it's much more discussion…"
Teaching Techniques Utilized were Standardized Instruction, PowerPoint, and Experiential Learning	
Patrick	"And we hope through reading the position statements, we expose them, and also having that taught from clinical instructors or preceptors and even in the classroom, just gets them more familiar. So, that when they are on their own as practitioners, when they are in graduate school, they're well-prepared."
Heather	"[Teaching] critical thinking…especially when they're first learning evaluation have a very linear thought process…So by using the simulations and the case studies and having them actually perform a full evaluation..."
Nick	"We're hoping that it allows them to think critically once they get out there because we've used several different methods and we haven't spoon fed them with a PowerPoint."

Of the tools taught in the classroom, no one tool was utilized in every participant (Table 5). Balance Error Scoring System (BESS), Standardized Assessment of Concussion (SAC), and Standardized Concussion Assessment Tool 2/3 (SCAT) were utilized by 88.9%. Those who taught Immediate Post-Assessment Concussion Tool (ImPACT) in the classroom (66.7%) also taught the Post-Concussion Symptom Score (PCSS) (66.7%) that is typically associated with the online assessment program and are not taught as separate entities. Participants selected 'Other' (66.7%) with increased frequency, as three participants wrote in "VOMS" (Vestibular/Ocular Motor Screening) as one of the assessments they teach in the classroom, one indicated "CNS

Vital Signs," while another taught "saccades assessment/training." In the laboratory, 100% of participants taught the SCAT2/3, BESS, and cranial nerve/neurological assessment in their courses.

The most common return to play guidelines utilized in the classroom are the NATA Position Statement: Management of Sport Concussion, 2014 and the 4th Consensus Statement on Concussion in Sports, Zurich 2012 (43.8% respectively). One participant selected 'Other' for return to play guidelines and indicated that they taught the "institutional guidelines" used at their university. Table 6 addresses how instructors determined what assessment tools were taught in both the classroom and laboratory setting. A third major theme discovered was what concussion assessment tools and evaluation techniques instructors taught to the students. All participants began with the basics of anatomy, biomechanics, and injury evaluation.

Table 5. Assessment Tools Taught in the Classroom and Laboratory

	N	Percent of Cases
Assessment Tools Taught in the Classroom		
ImPACT	6	66.7%
SCAT2/3	8	88.9%
SAC	8	88.9%
BESS	8	88.9%
SOT	1	11.1%
GSC	5	55.6%
PCSS	6	66.7%
Cranial Nerve	7	77.8%
Other	6	66.7%
Assessment Tools Taught in the Laboratory		
SCAT2/3	9	100.0%
SAC	8	88.9%
BESS	9	100.0%
SOT	1	11.1%
GSC	5	55.6%
PCSS	6	66.7%
Cranial Nerve	9	100.0%
Other	4	44.4%

Table 6. The Components Incorporated into a Concussion Assessment

What Does the Concussion Assessment Entail	
Sarah	"I think going through a scenario and having them actually do the SCAT3 themselves, actually do the cranial nerves themselves… the SAC, the graded symptom checklist; those are definitely ones that we're doing in repetition."
Betsy	"we use alternatives…I think the concept is the same, that…and I think what they learn from can be applied."
Patrick	"I love Rhomberg. I know that clinically it's not as conclusive as maybe balance error (BESS) is but I love Rhomberg because we can walk through that in a classroom and lecture about it and talk through all the pieces and the next day we go to lab and we can implement them…"
Chris	"We really have to get through the basics of symptoms, symptom checklists, understanding the pathology as it were; and then know everything in the evaluation spectrum to assess the injury"
Marie	"like getting them to think about the anatomy, the biomechanics, the physiology, so they can begin to make those choices clinically I think is probably where I've just started to lean because you know, it all changes to frequently."
Environmental Limitations	
Sarah	"so I think I'm able to incorporate a little more realistic return to play opportunity and you know what we're looking at in a realistic manner; you know umm tools that I would be using because I am low on my resources. I think they need to realize that one day they're going to be really low on resources. Umm and they have to you know work with what you have;"
Marie	"I like to look at what they're going to see in this region; that you know is a rural, low income. When you look at the population, it's tough to look at health outcomes because there isn't the access and a lot of these students will end up in that setting"
Cindy	"In class, I try to give them everything because of the different settings they're going to be in. they may use one over the other"

Barriers affecting instructors when teaching concussion assessment tools vary by institution, but the most common response was time. Time played a major role in what instructors taught in their classroom and influenced how they taught the content to athletic training students. Other factors identified by participants during the interview included (Table 7): lack of enough clinical experiences/practice, lack of enough time, resources or lack of resources available to instructor; and solutions to these barriers to allow for more effective teaching.

Table 7. Barriers and Future Solutions to Teaching Concussion Assessment Tools

Lack of Clinical Experience

Sarah	"the students are not able to see as much of that process because it's kind of being taken by someone else that's doing their testing" [in regard to the CARE study]
Betsy	"It makes it difficult for students to observe it because it's not happening in their normal umm setting. We…we try to encourage them to send a student with the athlete so that they can observe that but it doesn't always happen" [in regard to the CARE study]
Cindy	"So I think that's it, giving the students more practice with it in class so they feel more comfortable administering it on their own."
Nick	"I think we need to spend a little more time giving the students more time practicing the assessment tools. I don't know if we do that in the…in the lab portion of the course enough."
Lack of Enough Time	
Betsy	I just think you can't do it all…there's not enough time to do it all."
Patrick	"time is certainly one; but I also think comfort level [and] familiarity with these things"
Cindy	"I would think time. I have to make sure I hit all the body parts in 15 weeks."
Resources Available	
Chris	"you have to constantly stay on top of the newer content that is there as to avoid being outdated"
Marie	"Like access; Like it would be great if I had at least a version of every single one of these tests to teach the students on, but you know if I'm choosing where I'm spending my resources, would it necessarily be there? So I guess if I had all the money in the world, I would do it."
Nick	"the amount of information that's out there and being able to find the good evidence from the bad evidence; I think it's being able to filter all of that information"
Solutions to Barriers	
Patrick	"It would be more of a stand-alone course… the head, neck and spine; or at least we would devote you know, 8 weeks, as opposed to four or six to this topic."
Heather	"So having those standardized patients would really be an invaluable part of the education process that we just don't have the means for right now."
Marie	"standardized patient rooms with recording; our school of health sciences will get to the point where we will train standardized patients [and] then we can simulate but at this point, that's just not a resource."
Nick	"I like for us to be a little more proactive on how we [give more practice time] in the laboratory setting."

CHAPTER 4

DISCUSSION

This exploratory study is the first study in athletic training education to delve into the educational practices regarding concussion assessment tools in the classroom. This study supported four major themes: (1) characteristics of instructors teaching the concussion assessment tools, (2) factors affecting how the instructors teach concussion assessment tools, (3) the components incorporated into a concussion assessment per the instructor, and (4) barriers and future solutions to teaching concussion assessment tools.

Theme 1: Characteristics of the Instructor Teaching the Course on Concussion Assessment Tools and Concussion Education

The first major theme that emerged distinguished differences between the instructors' foundational knowledge being effected by clinical and educational/research experiences. According to McCaughtry, differences exist between expert and novice teachers, experienced and inexperienced, those teaching in and out of their areas of expertise, and teachers with and without formal education training.[27] Within general education, previous experience is heavily relied upon in athletic training professional education, as instructors use examples from their own clinical practice to make connections in the classroom to content specific information.[27] Experienced teachers know the characteristics, interests, and abilities of the students which allows them to plan lessons according to experience rather than relying on the textbook.[14] Experienced teachers also have a wide range of experiences with teaching strategies that allow for the creation of variations in the lesson, while novice teachers cannot generally gauge where

lessons need to be adjusted, cannot create variations, and rely heavily on the textbook and written materials.[14] Harry explained in the interview that he had 35 years of experience with 15-20 years of clinical experience providing his foundational knowledge. Harry's extensive background in the athletic training clinical and educational setting allows him to better understand not only himself as an instructor but the content specifically. Cindy agreed with the use of clinical experience to support her background knowledge. She based her teaching on the stories she could draw upon when speaking about certain concussion assessment tools or evaluation steps.

A sub-theme included how an instructor defined an "expert." Those with more experience in total years in the clinical setting versus a heavy background in the educational/research setting, tended to have a more clinical definition of an expert when asked during the interview. The participants related their descriptions of an expert to what their backgrounds were grounded in. Those with more experience versus a novice instructor, possess detailed content knowledge, making their knowledge more accurate and allowing them to see the "big picture" of curriculum.[27–29] The experiences of an instructor contribute to the development process and the knowledge integration that takes place over time.[30] Instructors take what they learn year after year to incorporate different teaching techniques and examples based off of their experiences. On the one side, Patrick has a Masters' in Teaching and 10-15 years of clinical experience. He described an expert as someone with the hands-on knowledge of the assessment tools who has been doing the evaluations for a long time. He stated,

- "*that it's someone who spends their day-to-day clinical practice in the evaluation, reading; the individual that is competent in multiple platforms, in multiple exam tools, I think is the expert.*"

Betsy has a PhD in human movement science, with an emphasis in biomechanics and works in an institution who is a participant in the CARE study. Betsy's current work environment has strict guidelines to follow and her experience in research, sets her perception of what an expert would be considered. Betsy's description falls in line with her daily work procedures. This participant describes an expert as someone who is,

- *"…well versed in the strengths and weaknesses of the exam…familiar with the clinometric, its sensitivity and specificity, reliability, and performance over time."*

Another sub-theme was the instructors' perception of their own knowledge. A teachers' self-efficacy beliefs contribute to their teaching style, openness to new ideas, and development of new teaching attitudes.[31–33] Self-efficacy is defined by Bandura as one's belief in their ability to succeed.[34] An instructor may feel less inclined to change or create additions to lessons when they are comfortable in their process. Beginning instructors are less able to plan and predict when a lesson may need to be altered.[14] The inability of a novice instructor to read the students and change lessons forces them to rely heavily on textbooks and written materials which creates discomfort with items where the knowledge level is limited.[35] This can be seen in both Marie and Heather's responses when asked what they believed influenced their teaching. The participants described how they stayed within their comfort level, as the more comfortable they were with items, the more confidence they had in teaching the items.

- *"You know be honest, a lot of my understanding of some tests isn't going to be great because I haven't gone through training even on all of those…" (Marie)*

- *"a lot of it is my own comfort level…you have a tendency to fall back on what you're comfortable with" (Heather)*

The last sub-theme within characteristics of the instructor, was how the preceptor plays a vital role in the clinical education of athletic training students. Burke et al. and Boggild et al.[9,17]described the presence of incomplete understanding of concussion management in medical students and medical education curriculum. They suggested that this trend is worrisome as these individuals must be sought out for clearance to make return to play decisions.[9,17] As previously mentioned, education of concussion assessment has not been evaluated and therefore little is known. According to the Competencies set forth for athletic training education, programs are encouraged to implement innovative, student-centered teaching and learning methods to connect the classroom, laboratory and clinical setting to provide the highest quality education.[10] Some educators are utilizing their preceptors when making this connection. Cindy explained during the interview how significant it was to have good preceptors working as an extension of the academic program.

- *"I tell my preceptors all the time, I'm not just sucking up to them, our program would not survive without preceptors…really good preceptors; their role is vital. I don't think our students would get a great experience without them."*

The Standards for the Accreditation of Professional Athletic Training Programs (Standards) and CAATE Competencies: 5th Edition, set guidelines for educators to follow in terms of content to be taught, but does not set standards for the educators themselves.[10,36] Little focus in the curriculum of athletic training education is placed on the educational teaching/learning philosophies.[20] As seen in the first theme, previous experience and foundational knowledge plays a key role in determining the characteristics of an instructor teaching concussion assessment tools. Sub-themes within the first theme include: how these participants described what an "expert" was considered in their own words; instructors'

perception of their own knowledge; and what the preceptors' role is in relation to athletic training study education. Descriptions of the term "expert" varied based on participants' previous experience with the clinical versus research setting. Instructors' perception of their own knowledge affected their comfort level with teaching different assessment tools other than the ones they found greater experience with. Lastly, preceptors played a vital role in educating athletic training students and functioned as an extension of the academic instructor but also placed emphasis on their own separate experiences.

Theme 2: Factors Affecting How the Instructors Teach Concussion Assessment Tools and Concussion Education

The second major theme of this study evolved into participants describing various factors that affect their presentation of content. Specific presentation styles and student learning styles were the most common contributing factors. According to Graham's study on novice versus experienced physical education teachers, experienced teachers tended to spend more time developing tasks based on their observations of the students' needs.[14] Experienced teachers predict concepts and skills that students will have difficulty understanding, foresee common misconceptions, predict motivational concerns, understand students prior knowledge and skill level, are better at organizing lessons, and rely less on the course materials.[15,27] Livingston and Borko,[37] found that experts taught in ways similar to improvisational acting; extensive behind-the-scenes prepping connected content knowledge and curriculum, knowledge about students, and knowledge about how to teach within a classroom to achieve an adept, interactive, and fluid performance.[30] Participants overwhelming indicated that they utilize the laboratory (100%) and didactic (77.8%) methods when teaching concussion assessment tool content. These methods are

used as the basis of information delivery in the athletic training course. Harry described how his presentation style of concussion content changes depending on the student learning styles in his classroom as he is trying to make connections with each student at some point during the lesson.

A sub-theme that emerged included commonly utilized teaching techniques such as: standardized instruction of material, PowerPoint, and experiential learning. Borko and Livingston[16] believed that experienced instructors relied on a rich bank of activities that had been tested over the years with many classes. Experienced instructors "perform" teaching in a way that focuses on classroom interactions and is highly responsive to student performance interactions and the discussions that occur from them.[30]This can be related to the teaching techniques employed by the study participants, those with and without extensive experience as seen by the responses; participants relied on lecture and PowerPoint (88.9% respectively) to present their content to students. Simulations, case studies, and problem-based scenarios (55.6% respectively) were utilized by participants when class timing and student level of understanding permitted. The experiential learning described by participants represents the hands-on, clinical experience instructors utilize in teaching athletic training students.[38] Sarah and Heather explained how they utilize all three of these sub-theme components.

- *"Since we are a part of the DOD CARE [study], it's very structured. We are all using the same tests that are being used in our athletic training room so that they're seeing the test that they're going to use…that you know are at the highest level, that are up-to-date" (Sarah)*

- *"So I use the PowerPoints as a frame for my lecture, but if at any point in the PowerPoint sparks my memory of something, from my years of clinical practice, or as a student then we go off on a story tangent" (Heather)*

Theme two identified factors affecting how concussion assessment tools are taught to athletic training students. The two contributing factors included instructor presentation styles and

students learning styles. Berliner[39] stated that the development of in-depth representations of subject content is a strong determinant for distinguishing between experts and non-experts.[30] Sub-themes included: standardized material, utilization of PowerPoint, and experiential learning.

Theme 3: The Components Incorporated into a Concussion Assessment per the Instructor

The third emerging theme described what instructors felt were important components of a concussion assessment as well as tools and evaluation paradigm. According to the literature, competent instructors make various decisions based on predictions of probable effects of the actions on students accomplishing the task requested of them.[14,35] The planning by instructors are anticipatory and based largely on beliefs acquired from previous experience.[35] Experienced instructors do not plan in step-by-step details but rather systematic thoughts about outcomes serve more as a rationalization for teaching.[36 (p296)]

The concussion evaluation tools taught in the classroom are based on multiple factors as described by previous themes. Under this theme, participants described components they utilized while also describing what encouraged them to choose these items. In the classroom, participants utilized concussion assessment tools that were easily administered and hands-on, such as SCAT2/3, SAC, and BESS (88.9% respectively). Marie described how she would start her students with the anatomy, biomechanics, and physiology so that they could begin making clinical choices based on the foundation. She stated how it (concussion) is changing frequently so she wants them to understand the basics first, in case the concussion assessment tools change.

Under the third theme, a sub-theme is evident in how environmental limitations can negatively affect the resources available to instructors. Individual student learning is dependent upon dozens of variables, including but not limited to the classroom environment, interest in

topic, and learning style.[18] Environment can also refer to geographical location, policies involved at the respective institution, and the status of program finances.

- *"I think they need to realize that one day they're going to be really low on resources and they have to you know work with what you have;" (Sarah)*
- *"I like to look at what they're going to see in this region; that you know is a rural, low income. When you look at the population, it's tough to look at health outcomes because there isn't the access and a lot of these students will end up in that setting" (Marie)*

Theme three describes what components are included in the concussion assessment. This is important because although instructors are incorporating many common concussion assessment tools (BESS, SAC, BESS, etc.) they are also placing emphasis on the foundation of a clinical exam. The importance is placed on the basics, as the concussion topic is constantly changing. Unfortunately, it was commonly discussed that environmental limitations and geographical locations limit access to resources and what is taught by instructors.

Theme 4: Barriers and Future Solutions to Teaching Concussion Assessment Tools and Concussion Education

The last major theme analyzed in this study touches upon the barriers instructors face, such as time. Time is one of the major barriers to effective teaching.[40,41] Time is the number one common barrier described by participants of not utilizing a method, teaching an assessment tool, or not going further in-depth with the content.

- *"I just think you can't do it all…there's not enough time to do it all." (Betsy)*

Other contributing factors include lack of resources and lack of clinical experience/practice for athletic training students.

- *"Like access; Like it would be great if I had at least a version of every single one of these tests to teach the students on, but you know if I'm choosing where I'm spending my resources,*

would it necessarily be there? So I guess if I had all the money in the world, I would do it." (Marie)

As stated in a study by DaRosa[40] on barriers to teaching in the medical school setting, faculty members tend not to focus their teaching on how the clinical practice can be applied to various settings, which reduces the students ability to transfer learning from setting/patient population to another. This can be seen in Betsy's response to how students at her institution may be lacking that clinical, hands-on experience.

- *"the students are not able to see as much of that process because it's kind of being taken by someone else that's doing their testing" [in regard to the CARE study]"*

Conclusion

This study helped explain the educational practices of instructors teaching the course with concussion assessment tools at CAATE-accredited institutions. Four overarching themes included: (1) characteristics of instructors teaching the concussion assessment tools, (2) factors affecting how the instructors teach concussion assessment tools, (3) the components incorporated into a concussion assessment per the instructor, and (4) barriers and future solutions to teaching concussion assessment tools. The findings of this study provided an initial understanding that athletic training educators come from a variety of educational, clinical, and research backgrounds; that instructors' foundational knowledge effects the teaching techniques they utilize; and which teaching methods they employ in the classroom.

No glaring differences were seen between the three separate sport divisions (DI-III), although assumptions can be made about those institutions who are participants in the CARE study. The participants with strict research backgrounds and who participated in the CARE study have a stronger view and opinion on the standardization of concussion assessment material, the reliance on written material, and greater access to resources. Although these findings cannot be

generalized to all athletic training educators across CAATE-accredited institutions, this study gives a foundation for future research to build upon.

Future research should continue to focus on novice-expert differences in instructors, specifically in athletic training educators. Emphasis should also be placed on investigating athletic trainers' knowledge of educational theory and teaching effectiveness. Research on athletic training educators should also include athletic training educational theories and models with focus on the relationship between Content Knowledge, Curricular Knowledge, and Content Pedagogical Knowledge.

APPENDIX A

Research Questions

The following research questions were asked prior to conducting the study:

1. Who is teaching the course on concussion assessment tools?
2. What concussion assessment tool resources are being utilized?
3. What teaching techniques are being employed in the classroom?
4. How are each concussion assessment tool being taught?

Inclusion Criteria

- Individuals teaching at a CAATE accredited institution
- Instructor teaching content regarding concussion assessment tools
- Instructors who previously taught the concussion assessment tool no later than the 2014-2015 academic year
- Completion of the entire online survey, followed by an online or phone interview

Exclusion Criteria

- Instructors at non-CAATE accredited institutions
- Course does not include concussion assessment tools module
- Concussion assessment tools not taught in connection with concussion assessment module/courses

Limitations

The limitations for this study include:

- Selection bias due to the convenience sample

- Reporting bias that could cause participant to with-hold information that they believe will shed poorly on their program
- Only one fully-transitioned master's program was used

Delimitations

The delimitations of this study include:

- This study limited to District 2-4 and 9 within NATA
- The study was limited to programs currently not transitioning to entry-level masters

Assumptions

The following are assumptions made by researchers:

- Participants answered each survey question honestly
- Participants answered each interview question to the best of their ability, being open about their thoughts and feelings regarding their teaching

Definitions

The following operational definitions will be used in this paper:

- Concussion:
  - Concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces."[3]
- Self-efficacy:
  - a person's belief or perception in their ability to plan and accomplish specific tasks or behaviors; characterized by one's work performance.[42]
  - Instructor self-efficacy can be further defined as the ability to successfully teach and challenge students in the topic at hand.[43]
- Teaching Strategy:

  - Also considered an educational theory or instructional model[20]

- Teaching Method:
  - Defined as ways to convey content and knowledge to students
  - Examples utilized in this study include: didactic, lecture, laboratory, problem-based scenarios, simulations, case studies, PowerPoint, videos, games, pamphlets and handouts, creator instructions, and textbooks

APPPENDIX B

REVIEW OF LITERATURE

BACKGROUND

Concussion

Concussion, also referred to as a mild traumatic brain injury (mTBI), has been the highlighted topic of interest for the general population, legislators, and the sports medicine community as a whole.[1–3] Prevalent in competitive and recreational sports, concussions are a major public health concern worldwide. [4] Concussions occur in males and females of all ages and all sports, but are most common in collision activities.[2] The Center for Disease Control (CDC) states concussion in the United States of America is considered to be at an 'epidemic level,' with an estimated 1.6-3.8 million traumatic brain injuries occurring annually.[5] Data collected from emergency department visits show a 62% increase in nonfatal traumatic brain injuries between 2001 and 2009.[6]

Updated by the Concussion in Sport Group in 2012, "Concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces."[3] Concussion can be caused by either a direct blow to the head, face, neck or any part of the body that causes forces to travel to the head.[3] Impairments are typically rapid and short-lived neurologic issues that resolve spontaneously.[3] Symptoms however can occur minutes to hours later, not being detected on immediate post-injury evaluation.[3] The signs and symptoms detected reflect functional neurologic disturbances rather than structural changes, as no abnormalities are seen on standard neuroimaging studies.[3] The clinical symptoms may or may not result in loss of consciousness with resolution typically following a progressive recovery process.[3] Recovery, in some cases, can be prolonged past the typical course, lasting months and effecting mood,

memory and concentration.[44] With concussion often occurring in children and young adults, such as athletes, there is the potential to cause substantial quality of life years lost at home, school, work, and sports.[44,45,46,47] Quality of life years lost refers to the time those with a concussion have the potential to lose by not participating in these events due to symptoms.

Legislation

All 50 states and the District of Columbia[7] have passed concussion-management or head injury legislation and medical associations, such as the National Athletic Trainers' Association (NATA) and American Neurology Association (ANA), have produced numerous position or consensus statements.[1] These laws are most often applied to school-affiliated sport and recreational activities.[7] Some laws however, target a broader population such as youth, group or organizations that use property or facilities owned by a school district, state, or local parks and recreation departments.[7] The laws enacted by each state, although pertaining to concussion, vary in regard to who receives concussion information and how the information is obtained.

Almost all states (48) provided information regarding signs and symptoms, however only 15 states provide information on the prevalence of concussions.[7] Forty-six states excluding Colorado, Connecticut, Mississippi, and New Hampshire, require information be provided directly to athletes.[7] Mississippi requires only parents to receive and sign a copy of concussion policies, while New Hampshire school districts are simply encouraged to provide concussion information.[7] Further, Colorado and Connecticut only require coaches to be provided with concussion education.[7] The Wyoming state superintendent for education is required by law to assist in developing "model protocols for addressing risks associated with concussions" but individual school districts are not required to adopt these policies.[7] Although the four previously

mentioned states are not required by law to provide information directly to student-athletes, information is provided in varying degrees, with no consistent format.

The implementation of these laws and policies vary by state. Forty-four states provide information on short-term consequences, 42 provide long-term consequences, and only 24 have return to school guidelines.[7] Signature of information is typically the acceptable form of consent and judge of understanding. This as well varies by state in both what information is signed and who is allowed to sign the information.[7] Forty-four states require the parent to sign a form regarding general concussion information and of those, 40 also require the athlete's signature.[7] Eighteen states however provide concussion information on the forms that are required to be signed and returned.[7] This method, although complying with the signature requirements on state's policies, questions the concussion information retention of both parents and athletes.

The National Collegiate Athletic Association (NCAA) has adopted a similar concussion education policy with the addition of the athlete taking full responsibility in reporting concussion related symptoms to their sports medicine provider by signing a form.[7,24] There is lack of stress emphasized on the severity and detrimental consequences of a concussion. Despite the advancement and implementation of guidelines for safe concussion management, the understanding, diagnosis, and management of concussive injuries remains a challenge for health care professionals working with adolescents and collegiate-aged individuals.[24]

Information regarding the concussion educational content requirements vary by each state with little guidance given for what these policies should entail.[7] Thirteen state laws require return to play guidelines while 45 states actually provide guidelines.[7] The number of states that exceed their policy requirements shows the ever-growing trend toward the attempt at properly educating all those involved. Increased laws, concussion education programs, and parent accountability is a

major step forward for concussion awareness. These laws have the potential to play key roles in reducing the public health burden on concussion from sport.[7]

Athletic Training

The standard of care in athletic training is defined as a person's "legal duty to provide health care services consistent with what other health care practitioners of the same training, education, and credentialing would provide under the circumstances."[48] Concussion management has medical and legal implications, and the inherent threat of lawsuits is increasing for sports medicine professionals.[2] As licensed medical professionals, athletic trainers (ATs) receive comprehensive didactic and clinical training in concussion management. They are typically the first to identify and evaluate injured persons and are integral in the post-injury management and return to play decision-making process.[2] Previous lawsuits against ATs and team physicians have involved the premature clearing of patients and the withholding of patients from play after concussion.[48–50] This is why it is important for clinicians to manage these injuries in a systematic manner, using objective assessments.[2]

CONCUSSION ASSESSMENT

Baseline Assessment

In 1989, Barth et al. laid the groundwork for using a baseline testing strategy to evaluate the neurocognitive effects of sports-related concussion and to assist in the return-to-participation decision.[51,52] Over the last few decades, baseline assessment has been termed "essential"[53] and a key part of concussion-management protocols. In an effort to reduce false-negatives and remain objective, clinicians should perform pre-participation baseline neurological testing, as well as post-injury assessments as a basis for comparison.[54] Baseline testing has increased the ability to detect impairments by objectively tracking an athletes pre- and post-injury cognitive status.[55]

There is a need for individualized testing as all athletes may perform differently on all assessment domains, regardless of normative values available.

Multifaceted Approach

The multifaceted approach to evaluating and managing concussions has been recommended since 2002.[56] This approach is more than 90% sensitive in identifying concussion, however when any of these measures are used alone, the sensitivity often drops to less than 60%.[57] No simple tests can be performed on the brain to determine the severity of a closed head injury, thus the complexity of concussion injuries requires clinicians to use a variety of tools to establish the necessary information.[58] The different tests should evaluate symptoms, balance, cognitive and neuropsychological assessments.[1]

CONCUSSION ASSESSMENT TOOLS

Self-Report Symptomology

Symptomology is extremely subjective because it requires the individual to self-report not only the symptoms they are experiencing but also report the severity of each symptom.[59] The goal of various scales is to gauge where the individual is at the point of injury, compared to hours and days later to show improvement and ultimately recovery of symptoms. Signs and symptoms that are present immediately after injury may resolve soon after injury, even when the pathophysiological changes are still occurring to the brain and are life-threatening.[59] Due to the subjective nature of the signs and symptom reported and the limited scientific evidence to support the connection between symptom and physical changes in the brain, it leaves clinicians in a difficult position when evaluating an individual.

Although most variations of a concussion assessment battery (multiple assessment tools combined) use a form of symptom scale, these scales do not meet the scientific criteria normally

associated with the term, which would mean that there are specific measurement components such as reliability, validity, sensitivity and specificity which these scales do not typically contain.[54] Despite the lack of objective measures, symptom scales detect the need for further evaluation of the injury by identifying an issue and should be used according in the multifaceted approach, as to aid in the concussion diagnosis and never as a stand-alone assessment tool.

A commonly used scale is the Graded Symptom Checklist (GSC). It contains 17 symptoms that are graded 0-6 with a total score ranging from 0-102.[60] The higher the number, the more severe the symptoms. The GSC provided the most sensitive measure of abnormalities at the time of injury where sensitivity was found to be .89.[60] Another commonly used scale is the Post-Concussion Symptom Scale (PCSS). The PCSS is a graded symptom scale with 22 items, marked on a 7-point Likert scale, 0-6 depending on severity of symptom.[61] The PCSS is typically used in conjunction with the computer-based neuropsychological exam Immediate Post-Concussion Assessment Tool (ImPACT).[61,62] The PCSS is used at baseline and post-injury intervals to create a more objective progression of injury symptom recovery.

Postural Stability

The most common symptoms associated with concussion are headaches, dizziness, and balance problems.[3,63] These three are related, therefore examining balance dysfunction after concussion could provide an objective measure for assessment and recovery.[64] In concussed individuals the main incapacitating symptoms reported were balance dysfunction (30%) and dizziness (75.6%).[65,66] Balance disturbances have been noted to return to normal within 72 hours post-injury, with potential for prolonged deficits lasting more than 7 days.[63,67] Balance disturbance is defined as the inability to stand with an upright posture without deviating outside the limits of the base of support.[63]

After concussion, vestibular system issues are considered most likely to be responsible for balance deficits.[63] Two causes for vestibular function deficits include: (1) damage to peripheral receptors or (2) inhibited sensory integration in response to structural damage of the central processing structures.[63] Vestibular dysfunction is a considerable detriment to activities of daily living and athletics as it can place the athlete at greater risk for additional injury through falls or collisions.[64]

Balance Error Scoring System. The Balance Error Scoring System (BESS) is the most commonly used sideline postural assessment tool because it is inexpensive, easily administered and still sensitive to detecting a concussion at the time of injury.[68] The BESS consists of three stances (double leg, single leg and tandem stance) on two different surfaces (firm and foam) for a duration of 20 seconds with their eyes closed for each trial. The errors are identified as the following: the hands coming off of the iliac crest, opening the eyes, stepping or falling, moving the hip into greater than 30 degrees of abduction, lifting the forefoot or heel off the surface, and remaining out of the test position for longer than 5 seconds.[68] The larger the number, the poorer the balance of the individual.

The BESS is emerging as the gold standard in non-laboratory settings because of the reliability and specificity measurements, as well as the cost-effective nature of the assessment tool to be easily administered on the sideline.[64,69] Individuals with concussions when evaluated for balance, were found to have low sensitivity values but high specificity values ranging from 0.91 to 0.96 across days 1-7 post-injury.[64] The reliability of the BESS ranges from moderate (<0.75) to good (>0.75) while other studies report clinically unacceptable levels.[69] Despite research to support the belief that there is a practice effect with repetitive use of the BESS, even

after 90 days, it may be best to use as a prescreening test on the sideline to aid other assessment tools, such as the GSC and neurocognitive tests, in diagnosing a concussion.[68]

Sensory Organization Test. The Sensory Organization Test (SOT) is a laboratory assessment tool used to measure postural control in an individual.[70] By using dual-force plates, the SOT can assess the function of the visual, somatosensory and vestibular sensory systems by having the individual participate in six different conditions for three trials. Balance is assessed by moving the walls and floor in reference to the individuals sway while their eyes are either opened or closed.[70] A higher score indicates a better ability to balance.

The SOT has been shown to be a valid and reliable assessment tool as well as have high sensitivity in identifying the probability that an injured participant will continue to be classified as "abnormal" on each outcome measure.[70,71] Two studies[72,73] have shown a moderate to high reliability in healthy young (0.64) and older (0.49) adults.[64] Although highly sensitive in diagnosing a deficit, no reliability or validity data currently supports the use of SOT for evaluating concussed individuals.[64] Evidence does exist however that the SOT has the ability to detect performance deficits in concussed individuals lasting as long as 4-7 days post-injury.[74,75] Inconsistent evidence currently exists in the literature to support the use of the SOT for evaluating concussed individuals. It is also an expensive assessment tool that is not easily accessible, especially when alternative cost effective assessment tools are most often needed and available for use.

Neuropsychological Assessment Batteries

Immediate Post-Concussion Assessment and Cognitive Test. As the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT) is not a sideline assessment tool, it cannot aid in the immediate evaluation and identification of a concussion. It can however assess

the delayed neurocognitive deficits seen within 24-72 hours post-concussion.[76] The ease of the objective measures of ImPACT has gained popularity with sports medicine professionals.[77] ImPACT also allows for serial assessment and monitoring of concussion recovery.[78]

ImPACT assesses various cognitive processes including visual and verbal memory, attention, working memory, processing speed, reaction time, impulse control, and response inhibition.[77] The six subtests are Word Memory, Design Memory, X's and O's, Symbol Match, Color Match, and Three Letters.[77] Five composite scores typically used as validity and reliability measures include verbal memory, visual memory, processing speed, reaction time, and impulse control.[61,77]

Reliability of the ImPACT composite scores demonstrated an intraclass correlation coefficient (ICC) value ranging from 0.23 to 0.46 for verbal memory, 0.32 to 0.65 for visual memory, 0.38 to 0.75 for processing speed, 0.39 to 0.68 for reaction time, and 0.15 to 0.54 for impulse control.[79,80] ImPACT demonstrated 82% sensitivity when administered within 72 hours post-concussion.[57,62] According to Shatz[62] the combined sensitivity of ImPACT and the PCSS is 91.9% and the specificity is 89.4%.

Automated Neuropsychological Assessment Metrics. The Automated Neuropsychological Assessment Metrics (ANAM) is another computerized concussion assessment battery used to assess function and assess mental processing capabilities[55,64]. The simple reaction time component showed the greatest specificity at 0.974-1.0.[55] The sensitivity however was must lower at 0.35-0.60. [55]

Neurocognitive Sideline Assessment

When a rapid assessment of concussion is necessary, as during competition, a brief concussion-evaluation tool should be used in conjunction with a motor-control evaluation and

symptom assessment to support the physical and neurologic clinical evaluation.[2] The purpose of the sideline assessment is to rule out a more serious brain injury and to begin individualized management by identifying potential deficits and impairments.[81] Various tools used on the sideline include: the Standard Assessment of Concussion (SAC), Standard Concussion Assessment Tool (SCAT), and the King Devik.

Standard Assessment of Concussion. The Standard Assessment of Concussion (SAC) tool, developed to be used on the field in conjunction with other concussion evaluation methods, is a brief, 5-minute questionnaire that can be administered by someone without neuropsychological training and that assess the athlete's orientation, immediate memory, concentration, and delayed recall.[82] Orientation questions relate to date, day, time, and year. The Immediate Memory Score assesses the athlete's ability to recall five words (non-related) that are read to them on three consecutive trials. One point is given for each correct word for a total maximum score of 15 over the three trials.[83] The Concentration component consists of a series of numbers to be recited backwards in varying degrees of difficulty.[84] The Delayed Recall portion asks for the five words recalled as the last component of the test at the end for a max score of 5.[54,84]

Various studies have found there to be acceptable reliability and validity measures for SAC.[64,81,85] Based on a large population of normal controls and concussed athletes, the maximum level of sensitivity for SAC are assessed using a score of 25 as a cutoff.[86] Barr and McCrea[85] originally found SAC scores at retesting to classify injured and non-injured participants with a level of 94% sensitivity and 76% specificity. The SAC is considered to be highly sensitive at time of injury (Se=0.80) but decreases in sensitivity by postgame (or event).[60]

Standard Concussion Assessment Tool. Traditionally, the Standard Assessment of Concussion (SAC) tool is used as part of the Sport Concussion Assessment Tool (SCAT). The SCAT was developed at the 2004 Concussion in Sports Group consensus meeting in Prague, to provide a sideline assessment tool that evaluated concussion via symptoms, memory, attention and concentration.[87] The SCAT was the first tool to combine the multifaceted evaluation process into one tool.[81] Since its original development and edition, two studies have published normative data for college athletes[84] while only one study performed by Valovich[81] established representative data on adolescents.

Since the original SCAT created at the 2004 meeting in Prague, it has been revised during both the 2008 and 2012 meetings in Zurich. Components of the most widely used SCAT2/3 include the Glasgow Coma Scale (GCS), Maddocks Score, a symptom scale, a modified Balance Error Scoring System (BESS) and the SAC. Both the GCS and Maddocks Score were typically not performed at baselines as they are more relevant post-injury to assess consciousness.[83]

The Concussion in Sport Group suggests that important information can be gathered in a streamlined manner through the use of the multimodal SCAT3.[3] It is acknowledged however, that further validity studies need to be performed to answer this specific issue.[3]

King-Devik. The King Devick (K-D) is a vision-based test of rapid number naming with varying degrees of difficulty to be used as a sideline assessment tool.[88] It takes less than one minute to assess the individual.[83] Using three test cards, saccadic eye movements, or fast eye movement to a fixed target, are being measured.[83] Not only numbering but language and concentration are also captured by using the K-D test, which have been shown to reflect suboptimal brain function.[89–91] K-D scores typically remain the same or improve slightly with repeated measures in uninjured individuals.[90,91]

When compared with SAC, Immediate Memory scores were worse among patients with a worse K-D time score (P=0.005).[88] In a study of 204 concussion patients, a parallel improvement was seen between the K-D test and ImPACT composite scores (<.0001).[78] While the K-D test has been proven to be effective as a sideline assessment tool during acute concussion,[90,91] longitudinal data regarding recovery period is unavailable.[78] Research to validate the test against other, more recognized assessment tools is lacking.[78]

INSTRUCTOR EDUCATION

As Aristotle stated in *Metaphysics*, "…What distinguishes the man who knows from the ignorant man is an ability to teach, and this is why we hold that art and not experience has the character of genuine knowledge…"[92,93] Aristotle points out a significant connection between knowing and teaching. Although there is a long-standing need for educators, they are faced with a lack of professional respect; as the generic saying goes "those that can, do, while those that cannot, teach." This saying, although not supported, places a demeaning connotation on the profession that is hard to forget. The difficulty with the professionalization of teaching is that there are very few evaluation tools that thoroughly test educators content knowledge and pedagogical knowledge.[11,92]

Focus must be given first to the educator themselves; What is their background? What is their knowledge base? Before one can understand how this relates to the teaching of students, the basis for instructor education must be made known. Shulman in 1986, established three types of knowledge that helped educators and policymakers understand teaching more in depth: Content Knowledge, Curricular Knowledge, and Content Pedagogical Knowledge.[11] These three types of knowledge have since been used in educational settings, further expanded upon by researchers, and placed into practice. Of the three, the focus remains on Content Knowledge and

Pedagogical Content Knowledge (PCK), as they form the key components of current teaching standards, subject specific standards, and policy organization.[12] Before looking at what factors contribute to teaching difficulties, first the knowledge of teaching must be known.

Content Knowledge

Content Knowledge includes the knowledge of the subject and all of its organizing components.[94] There is more to teaching specific subject matter than simply knowing the facts and concepts; but rather one must know the 'why' of something, why something is warranted, and the justification of how to support or deny an argument.[92,94] According to Rink[13] in relation to content knowledge in K-12 physical education programs, focus would be on teaching students cognitive content, or using movement experiences to teach these disciplines. Rink[13] also discussed how as the emphasis on physical activity is increasing, cognitive learning will become less, unless teachers can do a better job of using those active experiences to teach the content.

Teachers need the knowledge base that would allow them to respond effectively as educators.[11,13] Shulman (1987)[11] described four sources of knowledge base: education in specific content, the materials and structure used, study in pedagogy, and the "wisdom of practice itself." Education in the specific fields is created by both the literature in content areas, and the historical nature of knowledge in the area of study.[11] Materials and structures being used include: the standard curriculum, tests, faculty roles, governmental influences, and finances. An instructor must be familiar with this component as they must "know the territory" of teaching, content and pedagogy.[11] The study of pedagogy means understanding the literature on empirical research areas of teaching and learning, as well as the foundations of education.[11] Although policymakers see empirical research aspects as finite characteristics, foundations of education and empirical research touch upon mastery learning and teacher expectations that reach the core of content and

pedagogical knowledge.[11] Lastly, the background of teachers is key to how they teach, what they know, and how they relate content specific information to the students. The difficulty with instructor background experience is how to effectively evaluate individuals experience.[11] Evaluating each experience and how it relates to a level of pedagogy knowledge is difficult to assess.

Pedagogical Content Knowledge

Teaching starts with the teacher's understanding of the content to be learned and how it is going to be taught.[11] Shulman originally defined Pedagogical Content Knowledge (PCK) as "…the most useful ways of representing and formulating the subject that make it comprehensible to others…also includes an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning…"[94,95] The key is that educators use metaphors, diagrams, and explanations to connect students learning and the subject matter.[94] By utilizing these various methods while teaching, specific content is not only understood well enough for the instructor to convey the subject matter to student's but also it is obvious the instructor understands the pedagogical aspect of teaching as well. The content being taught must be comprehensible to the students in order to have a successful class.[11]

Another factor in pedagogical content knowledge is to gauge and understand the students content knowledge and potential conceptions/misconceptions about the specific content.[94] The two factors are not separated as distinct characteristics that must be individually met to succeed as an instructor. The two factors, providing descriptive representations of content and understanding student's perceptions of content, are key to effective teaching. Again the way

teachers portray information and students accept information can be depend on experience factors and background knowledge.

Experienced-Novice Teacher

The ease at which one combines the two factors of pedagogical content knowledge and teaching to full understanding, is also effected by whether an instructor is novice or more experienced. Experience in not only the content, but also pedagogy knowledge that plays a major role in teaching. Differences can be seen in the way novice and experienced teachers plan, think and reflect on their teaching.[14] Experienced teachers know the characteristics, interests, and abilities (schemata) of the students which allows them to plan lessons according to experience rather than relying on the textbook.[14] They also have a wide range of experiences with teaching strategies that allowed them to create variations in the lesson, while novice teachers cannot generally gauge where in the lesson something needs to be adjusted, cannot create variations, and rely heavily on the textbook and written materials.[14]

The experience of a teacher can also cause pre-determined attitudes and blocks in openness when trying to teach students specific skills or concepts. Although a novice instructor may know the skill, for example kicking a ball, they may not know the key terms, descriptive imagery, and demonstrations needed to teach the skill, leading to frustration on both the teacher and student, as the content is not being conveyed properly. The teacher knows the content, but does not understand how to effectively convey it.

Another difference is seen in where the teachers focus is directed during instruction. Experienced teachers for example, focus more on the student's needs, while a novice teacher focuses on students on-task behavior and where their interest/attention is during the lesson.[14,15] Novice teachers relay on specific activities for lessons, from their limited background

knowledge; experienced teachers rely on years of trial and error with many classes, thus allowing them a large bank of activities and resources. [14,16] Teaching experience is a key component to the development of the schemata and pedagogical content knowledge that eventually leads to a successful teacher.[14]

Barriers

Despite knowing that there is a need for teachers to know both content and pedagogical knowledge, little is done to rectify the situation. Students are tested on content, but if there is no evaluation of the delivery specific to the discipline area, how are students effectively learning everything that is required of them? Similar to asking a teacher to know every single aspect of the content area, students are expected to learn and retain just as much. Rink discussed how sometimes less is more when it comes to the amount of content taught; "…the process of adding content without taking any away leads to teaching to lower cognitive levels – students who can identify an island but don't know what an island is…"[13] Discipline courses are geared towards various majors, rather than each specific major. This leads to most teacher preparation content being eliminated from the course and the textbook, as generic information is needed to hit the various students majors.[13] The knowledge base students receive becomes further removed from their needs; the expectation is that students will move onto graduate school or further education where they will receive that specific content knowledge, pedagogy education.[13] The problem with this curriculum design is that educators are not receiving the knowledge base that is key to successful teaching. They are moving past the core concepts of teaching, hoping to brush upon it at some point in their careers. In a physical education study performed by Rikli[96], it was mentioned that a key contribution to the fragmentation of the field is the faculty member whose interest and base of knowledge was not in physical activity. These instructors do not have the

personal or professional experience to relate the content to specific job settings, forcing the content to be taught at a lower cognitive level.[13,96]

ATHLETIC TRAINING STUDENT EDUCATION

Athletic training students differ from other students in various fields. These students need a multitude of experiences, both clinically and in the academic experience, to help them grow into their positions as respected healthcare professionals.[97] Athletic training educators are faced with the difficulty of educating students both in the classroom and clinical setting equally and effectively.[38] Both are extremely different, allowing students to obtain didactic and practical experiences.[98] In order to teach effectively, the learning styles of students must be taken into account. Unfortunately, little information is available on how students learn best in this environment, with limited research on athletic training students compared to other allied health professions, such as nursing.[99]

According to athletic training education literature, there has been no specific mention of an educational theory or instructional model followed in current practices.[20] It is important to determine if there truly was an initial instructional model athletic training education practices were based off of as Harrelson[100] states, "without some theory or model to provide a structure for learning…learning in the clinical setting may well be left to chance…learning haphazardly…"[20] Without specific models to follow and a growing need to adapt and evolve, the athletic training profession must be able to propel itself forward both organizationally and educationally.

Learning Methods

Methods such as cooperative learning, problem-based learning and others have been shown to foster athletic training student's learning.[18] Individual student learning is dependent upon dozens of variables, including but not limited to the amount of sleep, nutrition, classroom

environment, interest in topic, learning style and emotional state. The learning techniques discussed include Experiential Learning Theory, Standardized Patient Encounter, and Brain Based Learning.

Experiential Learning Theory. Experiential learning is used to represent hands-on or clinical environment learning.[38] Developed by David Kolb, an American educational theorist, experiential learning explained that a person learns from life experiences by continuing through a learning cycle in which they must adapt to different situations put in front of them.[101] He believed that "experiencing something alone is not enough and that learners must use the experience to create the knowledge."[38] Kolb classified learners into one of two groups: concrete-abstract or active-reflective. Concrete-abstract describes the learner taking hold of the experience through either thinking or feeling the situation.[38] The active-reflective group describes how the learner makes meaning out of the experience that just occurred.[101] Individuals can process this meaning by doing while the learning event is occurring or watching the learning experience.[38] These two groups can easily be seen throughout athletic training classrooms, as one group must first thoroughly think through a situation before reacting versus the second group of students who must put their hands on someone and begin doing to understand the scenario.

From these groups, Kolb identified four learning styles: Divergers, Assimilators, Accomodators, and Convergers. Divergers are imaginative, creative and in touch with their emotional feelings; Assimilators do well with theories and abstract ideas; Convergers focus on the practical application of ideas and; Accomodators are risk takers who enjoy hands-on activities where they can solve problems by trial and error.[38,102] Learning styles, as important as they are to educators, can change over time and be influenced by other factors such as, personality, educational interests, professional career choice, current job role and even current

task.[38] This further emphasizes the need for differing instructional methods dependent on the type of learning experience.[38]

Thon[101] studied 429 students from 88 Commission on Accreditation of Athletic Training Education (CAATE) accredited undergraduate institutions and 69 students from 21 CAATE-accredited professional graduate programs. Using the Student Learning Style Questionnaire (LSQ), based off of Kolb's experiential learning theory, the data results showed 74.83% of undergraduate students and 68.12% of graduate students preferred the Diverger style of learning.[101] Strengths include time management, multitasking, dedication, and creativity, all necessary characteristics of an athletic trainer.[101] Knowing students' learning styles can be an invaluable tool in effectively teaching future healthcare professionals.

Standardized Patient Encounters. One way athletic training students are gaining clinical skills are through safe, controlled, and well-planned standardized patient (SP) encounters. A SP encounter includes an individual who has been trained to portray signs and symptoms of either an injury or illness.[19] This differs from basic simulations/scenarios typically occurring in the athletic training education setting. A simulation is defined as a clinical situation where an untrained mock patient, usually a peer student or instructor, portrays an injury or illness but has no previous training or consistency.[97] SP encounters are used in other healthcare professional education programs to teach and evaluate not only clinical skills but communication effectiveness as well.[97]

Brain-Based Learning Principle. Brain-based learning, although it involves learning, is not a specific methodology but rather describes how the human brain actually learns.[18] More and more, these theories are being applied into the classroom setting. Caution must be taken when considering how far one can take physiological learning into the educational setting.[103–105] The

following are brain-based learning concepts: building upon current knowledge base, teaching within context, teaching for transfer, making the lessons personal and including emotion, using kinesthetic learning, balance challenge and stress, and lastly, creating an engaging learning environment.[18] Many athletic training educators most likely incorporate these concepts into their every-day lessons without even noticing it.[18]

Teaching Technique

As previously mentioned, brain-based learning occurs naturally in some athletic training settings but for others, it could be difficult to break away from the traditional lecture format.[18] Much of the teaching strategies focus on teacher-center approaches, while many of the previously mentioned student learning styles focus on the need for student-centered approaches. The instructor's role in brain-based learning is that of a facilitator of learning, not simply a dispenser of knowledge.[18] The idea of the instructor as a facilitator is becoming more popular as it puts more responsibility into the hands of the students on how they learn. The lag between educator and student can lead to frustration, poor dissemination of information, and less than satisfactory athletic training education student outcomes.

Although the lag between student learning strategies and instructor teaching techniques can cause poor dissemination of information, this can be further exemplified by an instructors' self-efficacy. An instructors' self-efficacy can be determined using multiple internal and external factors. Self-efficacy can be characterized to their ability to motivate, intrinsic factors, job satisfaction, and student-achievement.[42,43]

Effectiveness. Self-efficacy defined by Bandura, is a person's belief or perception in their ability to plan and accomplish specific tasks or behaviors.[34,42] It can be characterized by one's work performance; those who work harder, are more persistent, and experience less stress

are classified as having strong self-efficacy. Instructor self-efficacy can be further defined as the ability to successfully teach and challenge students in the topic at hand.[43] Instructional behaviors are heavily connected to their well-being and job satisfaction as previously mentioned.

The internal or intrinsic factors according to Ryan and Deci[106] include: the need for autonomy (freedom to make decisions), need for mastering tasks, and the need for feeling connected in the workplace. These internal factors are extremely important to the subjective evaluation of one's own self, although they are directly affected by outside factors.[42] Two studies[107,108] found a positive relationship between instructor's intrinsic need satisfaction, their level of engagement, and emotional exhaustion, showing positive emotions led to perceived success. Intrinsic motivation is only one theoretical approach to instructor self-efficacy.

Another factor greatly attributing to instructor self-efficacy, is job satisfaction and student achievement which typically are associated with one another. Instructors with high self-efficacy are more likely to implement didactic innovations and adequate teaching strategies that encourage students' autonomy and responsibility in their own learning.[42,109] It is also shown to keep students focused and motivated in the classroom.[109] With student motivation comes increased self-esteem, strong self-determination, and a more positive outlook towards school. This connection promotes a well-developed commitment to the profession and satisfying feeling of connecting to peers as it meets instructor intrinsic needs.[109]

Instructors must establish within themselves characteristics and techniques they wish to employ in the classroom based on their intrinsic needs, student learning strategies, and the tasks at hand. Neglecting one of the contributing factors to a positive student outcome and learning environment can be detrimental to the success of not only the student but instructor as well. Although effectiveness is not specifically a teaching strategy, it can be considered a theoretical

concept largely contributing to the following teaching techniques used in the modern-day classroom.

Mastery Learning. Although little is referenced in terms of athletic training educational theory or models, mastery learning is thought to similarly resemble current athletic training education programs. Mastery learning divides educational content into smaller, attainable units according to the important components of a specific subject matter.[20] The smaller sections create learning objectives which then are used as a guide in the instructional process.[20] Students are tested, with the expectation of performing at a pre-determined level.[21] Those who pass continue to the next object, while those who do not repeat the unit until reaching that satisfactory level.[20] This strategy can also be called programmed instruction[22], competency-based education,[23] skills-based curricula, or outcomes-based education[21].

Mastery learning models are based on the idea that given the correct instruction and appropriate time to learn the material, that all students can achieve the pre-determined level for each objective.[21,110] A teacher-centered approach, mastery learning gives the teacher authority to determine the objectives for learning, give the lesson, and direct the desired pace of the instruction.[110] This technique is easily quantifiable in student assessment and course evaluation, therefore it is widely accepted as a form of teaching. Starkey,[111] a former Chair of the NATA Education Council, stated that the "clinical education model should be based on a set of measurable, standardized, and referenced learning objectives."

Mimicked in the creation of athletic training education programs, mastery learning provides a student clinical education matrix that consists of a list of checkoffs for what the student must complete following instruction and evaluation from the instructor.[20] Checklists are typical of athletic training education programs as ways to ensure all students are proficient in the

expected topic. Using a student matrix allows independent material learning, allows evaluation of learning outcomes, and remains teacher-centered.[20] Mastery learning, modified mastery learning, and competency-based education models all ensure that students are provided with the same information, in the same way and follow the same evaluation process.[20]

Athletic Training Curriculum

Athletic training began in 1950, with educational programs not established until the late 1960s.[20] Four programs existed in 1969, jumping to sixty-two by 1982.[112] In the 1970s, the NATA Professional Education Committee defined behavioral objectives, learning outcomes based on course work, and competency checklist for the clinical skills.[112,113] The 1980s and 1990s, saw the addition of comprehensive academic majors with guidelines to program accreditation by the Committee on Allied Health Education and Accreditation (CAHEA).[20] In 2004, the internship route was replaced by the now standing certification requirement.[112]

In order to be considered an accredited institution, each program must meet the Standards for the Accreditation of Professional Athletic Training Programs (*Standards*).[36] Not only are the *Standards*[36] used to develop, evaluate and analyze athletic training programs but also to maintain their accreditation. As the *Standards* are meant for establishing program minimums, the Commission on Accreditation of Athletic Training Education (CAATE) is designed to develop, maintain, and promote appropriate minimum education standards. In other words, the guideline used to nurture current knowledge, skills and abilities of athletic training professionals.[36] CAATE requires that athletic training education programs use the Athletic Training Competencies: 5th Edition to guide the program's structure. The Competencies[10] set minimum requirements and standards that are typically exceeded in one form or another.[20] Programs are encouraged to implement innovative, student-centered teaching and learning methods to connect

the classroom, laboratory and clinical setting to provide the highest quality education.[10] No two athletic training education programs are the same, although standardization is a goal of the Competencies.[10,20]

The *Standards*[36] provide descriptions for various topics such as program personnel, program delivery, health and safety, financial resources, program description and requirements, and many more. Each section allows program directors to reference necessary components of a successful program; from the need for blood-borne pathogen training to how many faculty members is necessary.[36] Failure to follow these guidelines result in CAATE taking actions on the program. For example, the program is placed on probation, suspension, or even loses accreditation.

Upon successful completion of a CAATE – accredited athletic training education program that follows the Competencies[10] and *Standards*[36] a student is eligible to sit for the Board of Certification (BOC) exam. The Athletic Trainer Role Delineation: 6th Edition[114] identifies critical content areas and specific tasks required of an individual to perform the minimum requirements of a certified athletic trainer. Within the five domains of athletic training (injury/illness prevention, clinical evaluation and diagnosis, immediate and emergency care, treatment and rehabilitation, and organizational and professional health and well-being), there are over 25 tasks that break up the necessary knowledge components.[114] Programs are expected to structure their courses to touch upon various components of Competencies, *Standards*, and Role Delineation, while students are expected to know all tasks of the Role delineation prior to sitting for the BOC exam.

Concussion Education Standards

The word “concussion” is referenced once, while” traumatic brain injury” is mentioned twice in the Athletic Training Competencies: 5th Edition.[10] Under the “Immediate Emergent Management” section, the competency related to concussion stated, “identify the signs, symptoms, interventions and, when appropriate, the return-to-participation criteria for…brain injury including concussion, subdural and epidural hematomas, second impact syndrome and skull fracture…”[10] Little is provided in terms of specific management methods, assessment tools, and/or useful resources to use as guides. Athletic Training Programs must follow the Competencies, but are encouraged to use them as a minimum and go above and beyond these guidelines.

CONCLUSION

Concussions are at an ‘epidemic level’with an estimated 1.6-3.8 million traumatic brain injuries occurring annually.[5] Concussion is prevalent in not only high school and collegiate aged athletes who participate in sports but also adolescents and the recreationally active. Athletic trainers are typically the first to identify and evaluate injured persons and are integral in the post-injury management and return to play decision-making process.[2] The importance of early detection and assessment cannot be stressed enough. The multifaceted approach to evaluating and managing concussions is more than 90% sensitive in identifying concussion.[57] This multifaceted approach includes assessment of symptoms, balance and postural control, neurological deficits and neurocognitive function.

Symptomology is assessed by using grading scales such as the Graded Symptom Checklist (GSC) or the Post-Concussion Symptom Scale (PCSS). Balance is measured using the Balance Error Scoring System (BESS) and the SOT. Neuropsychological assessments typically used in the clinical setting include the Immediate Post-Concussion Assessment and Cognitive

Test (ImPACT) and the Automated Neuropsychological Assessment Metric (ANAM). Lastly, neurocognitive function, typically assessed on the sideline or immediately post-injury are the Standard Assessment of Concussion (SAC), Standardized Concussion Assessment Tool (SCAT), and/or King-Devick assessment tools.

In order to properly assess a concussion using the tools mentioned above, athletic training education programs must ensure that all future health care professionals in their classroom are proficient. Unfortunately, little information is available on how students learn best in this environment, with limited research on athletic training students compared to other allied health professions, such as nursing.[99] Not only is little evidence available on the learning styles of athletic training students but according to athletic training education literature, there has been no specific educational theory or instructional model mentioned to follow.[20]

As previously mentioned, no definitive teaching technique or curriculum model is standardized across athletic training education programs. One type of student learning technique is called experiential learning which is used to represent hands-on or clinical environment learning.[38] The second is learning through standardized patient (SP) encounters. The last is Brain-based learning or how the human brain physiologically learns.[18] Instructor teaching techniques have also limited literature available. Instructor effectiveness in the classroom is the base for any teaching style, as it is directly related to the instructors ability to plan and complete tasks.[42,43] Mastery learning is seen in the literature in connection with athletic training education programs. The smaller sections create learning objectives which then are used as a guide in the instructional process.[20]

Although research on teaching was well establish, Shulman in 1986, described three types of knowledge that helped educators and policymakers understand teaching more in depth:

Content Knowledge, Curricular Knowledge, and Pedagogical Content Knowledge.[11] These three types of knowledge have since been used in various educational settings, further expanded upon by researchers, and placed into practice. Teaches need the knowledge base that would allow them to respond effectively as educators.[11,13] Shulman[11] described four sources of knowledge base: education in specific content, the materials and structure used, study in pedagogy, and the "wisdom of practice itself." Teaching experience is a key component to the development of the schemata and pedagogical content knowledge that eventually leads to a successful teacher.[14]

The Athletic Training Education Competencies[10] set minimum requirements and standards that programs are encouraged to exceed by implementing innovative, student-centered teaching and learning methods to connect the classroom, laboratory and clinical setting to provide the highest quality education.[20] With that being said, no two athletic training education programs are the same, although standardization of education is the aim of the Competencies, *Standards*, and Role Delineation.[10,20]

Future research should continue to focus on the evaluation of athletic training educators' knowledge on educational theory and teaching effectiveness. Emphasis should be placed on novice-expert differences in instructors, specifically in athletic training educators is needed. Research on athletic training educators should also include focus on the relationship between Content Knowledge, Curricular Knowledge, and Content Pedagogical Knowledge in the athletic training education setting.

APPPENDIX C

GEORGIA SOUTHERN UNIVERSITY INSTITUTIONAL REVIEW BOARD

PROPOSAL NARRATIVE

Personnel. The research team will consist of: Michelle Lima, ATC – Graduate Student/Primary Investigator, Dr. Tamerah Hunt, PhD – Georgia Southern University Faculty/Co-Investigator (Chair) who has previous experience using college-age students with similar qualitative studies, Dr. Jody Langdon, PhD – Georgia Southern University/Co-Investigator who is well-versed in qualitative methodologies, and Dr. Jessica Mutchler, PhD, ATC who works directly with athletic training education program students.

Purpose. The purpose of this research study is to evaluate the teaching techniques of athletic training education program instructors who teach or have taught specifically on concussion assessment tools and guidelines. The following qualitative research questions include: What concussion assessment tool resources are being utilized? What teaching techniques are being employed? How are each of the assessment tools being taught?

Literature Review.

Concussion, also referred to as mild traumatic brain injuries (mTBI), has been the highlighted topic of interest for the general population, legislators, and the sports medicine community as a whole.[1–3] Prevalent in competitive and recreational sports, concussion is a major public health concern worldwide.[4] Concussions occur in males and females of all ages and all sports, but are most common in collision activities.[2] The Center for Disease Control (CDC) states concussion in the United States of America is considered to be at an 'epidemic level,' with an estimated 1.6-3.8 million traumatic brain injuries occurring annually.[5] Data collected from emergency department visits show a 62% increase in nonfatal traumatic brain injuries between 2001 and 2009.[6]

According to the National Athletic Trainers' Association Position Statement: Management of Sport Concussion,[2] there are specific steps athletic trainers are recommended to follow and clinically practice. There are education and prevention recommendations given to current practicing athletic trainers, but only a broad description of what should be included in the evaluation process, with no specific evaluation tools following a head injury.[2] A concussion diagnosis involves one or more of the following: clinical symptoms, physical signs, behavioral changes, cognitive impairments, and sleep disturbances.[10] It is recommended that any athlete suspected of having sustained a concussion should be kept out of participation and evaluated by either a physician or designate.[2] The concussion diagnosis is made through both clinical evaluation and supported assessment tools, such as a brief evaluation tool (eg, Standard Assessment of Concussion [SAC]) combined with motor control and symptom assessment to support a physical and neurologic evaluation.[2]

In order to successfully manage concussions in the clinical setting, athletic trainers must first look at the education curriculum of their accredited programs to establish what is being taught and if that teaching is effective enough in establishing a foundation for proper management.[9] Although the NATA[2] provides a broad recommendation for what is to be used in evaluating and managing a concussion, it gives freedom to the athletic training education

programs to consult with their physician and determine the best assessment battery to use. If protocols are varying across current practicing athletic trainers, are athletic training education programs (ATEP) emphasizing certain assessment tools more than others? The goal is to maintain as standardized and objective of a process as possible. The 5th Edition of Education Competencies for athletic training curriculums does not mention what tools to teach, what evaluations should be made, but rather states broad terms of evaluation to focus on, such as "cognitive, neurologic, and motor-control assessment."[10]

ATEPs follow similar curriculum evaluation needs as medical schools on concussion. Emphasis is growing in the education of future health professionals. Burke[9] found that there is a marked deficiency in concussion education in medical schools. This not only shows the need for more concussion education but a gap in concussion management. Currently it is strongly recommended that all concussed individuals should seek medical attention.[17] Athletic trainers must have physician clearance before RTP, but if the gap between assessment performed by athletic trainers and evaluation performed by physicians is inconsistent, the student-athlete can be caught in the cross-fire.[17] Of the 14 responding Canadian medical schools four provided concussion-specific education (29%), six offered head injury education that incorporated concussion component (43%), and four reported no concussion teaching in their curriculum.[9]

Immediate care of such injuries is of utmost concern. As both studies[9,17] discovered, incomplete understanding of concussion management in medical students and schools curriculum is worrisome as these individuals must be sought out for clearance of concussion before return to play. The gap between curriculum and clinical practice could also be seen in athletic training education students, as the education guidelines lack the specifications necessary for understanding. With little known about the education of concussion assessment tools in the ATEP programs, this gap between standardized concussion management practices and standardized administration of assessment tools could be larger than the literature is currently showing.

Emphasis on concussion management practices in the clinical setting has been seen in the literature.[115] Although guided by policies and recommendation to follow a standardized approach to concussion management, there is evidence lacking on what is being taught in the education of these concussion management practices. Few studies look at the actual educational practices of instructors at CAATE accredited athletic training education programs. According to athletic training education literature, there has been no specific educational theory or instructional model mentioned.[20]

The Commission on Accreditation of Athletic Training Education (CAATE) requires that athletic training education programs use the Athletic Training Competencies: 5th Edition to guide the program's structure. The Competencies[10] set minimum requirements and standards that are typically exceeded in one form or another.[20] Programs are encouraged to implement innovative, student-centered teaching and learning methods to connect the classroom, laboratory and clinical setting to provide the highest quality education.[10] Policies are based off of standardization but athletic training education programs are lacking this standardization. No two athletic training education programs are the same, although standardization is a goal of the Competencies.[10,20]

Outcome. There will be no direct benefit for the participants. However, the results of this study will serve as an initial collection of information regarding athletic training educators teaching techniques when it comes to concussion assessment tools. The results can also benefit future sports medicine professions and the community by attempting to lay groundwork for

standardized educational practices of concussion assessment tools used in current concussion assessment protocols.

Describe your subjects. The current study will include approximately 10 instructors from 7 institutions. The inclusion criteria of the predetermined participants include: (1) individuals teaching at a CAATE accredited institution, (2) instructor teaching content regarding concussion assessment tools, (3) instructors who previously taught the concussion assessment tool no later than the 2014-2015 academic year, and (4) completion of the entire survey, followed by a phone interview. The athletic training education programs selected represent a convenience sample of various regional and institution-size differences. The geographical locations will provide a diverse sample from the following states: Georgia, South Carolina, New Jersey, Ohio, Virginia. The exclusion criteria will include: (1) instructors at non-CAATE accredited institutions, (2) course does not include concussion assessment tools module, and (3) concussion assessment tools not taught in connection with concussion assessment module/courses.

Recruitment and Incentives: An initial recruitment e-mail briefly explaining the study will be sent to 14 athletic training education instructors to gain interest. Participant email addresses will be obtained by visiting each institutions website and department page. If still unsure of which instructor teaches the course on concussion assessment tools, the program director will be contacted and asked to provide the email address of the appropriate instructor. There will be no incentives or rewards for participation in this study.

Research Procedures and Timeline: Following IRB approval and interest obtained, the online survey will be administered. Using Qualtric 2015, the 32-item survey will be administered via an online email link to the instructors. By completing the online survey, the participant is agreeing to their participation in the survey. Qualtric 2015, will send reminder emails to instructors to ensure participation. The online survey should take approximately 5-8 minutes.

Within two weeks of survey completion, the researcher will complete an online informed consent form prior to the follow-up interview questions. Interviews using Skye or face-to-face contact should take approximately 30-45 minutes. The Skype interview will take place in a committee member's office, behind a locked door to ensure confidentiality of the participant and his or her responses. A face-to-face interview will be administered in a quiet room in a public location (eg. Library) to be determined by the participant. The researcher will take notes and record the discussions using two devices. The two devices include an iPad to record both video and sound for non-verbal gestures, and a audio recording device to record the verbal responses. This recording will allow the researcher to review and accurately transcribe the interviews at a later date. After the interview is completed and the transcriptions have been written, the participants will read and verify the transcriptions of their responses from the interview with the investigator.

Data Analysis: A qualitative design using both a descriptive survey and interview questions is the preferred methodology for this study. After the primary investigator transcribes the interviews and participants have verified their responses, three researchers will analyze the transcribed notes. The responses will be analyzed using constant comparison for themes associated with teaching techniques used by the instructors. Researchers will independently analyze the transcriptions first, then use peer debriefing to discuss the common results.

Participants will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Participant's responses will be coded using both a letter and number. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions. The data will be stored in a password protected computer available to the primary investigator for a minimum of three years.

Special Conditions:

Risk: There is a minimal risk involved with participation is this study. If at any time the participant feels uncomfortable due to questions regarding their personal teaching techniques or effectiveness as an instructor, they may ask to stop withdraw from the study without question.

INFORMED CONSENT TO ACT AS A SUBJECT IN AN EXPERIMENTAL STUDY: SURVEY

1. My name is Michelle Lima, ATC, LAT. I am a Master's candidate at Georgia Southern University pursuing my degree in Kinesiology.

2. **Purpose of the Study:** The purpose of this research study is to evaluate the teaching techniques of athletic training education program instructors who teach or have taught specifically on concussion assessment tools and guidelines.

3. **Procedures:** Participation in this research will include completion of this signed informed consent form, a 32-item online survey and a follow-up interview over Skype or face-to-face. By completing the online survey, the participant is agreeing to their participation in the survey. The online survey should take approximately 5-8 minutes. Once the survey response is received, the follow-up interview will be scheduled and take approximately 30-45 minutes. Prior to completing the interview, you will be asked to electronically sign an informed consent form to participate in the scheduled interview. After the interview is completed and the transcriptions have been written, the participants will perform member checks to verify the transcriptions.

4. **Discomforts and Risks:** There is a minimal risk involved with participation is this study. If at any time you feel uncomfortable or wish to withdraw from the study, you may do so without question

5. **Benefits:** There are no direct benefits to the participants, however, the results can benefit future educators in the athletic training education setting. The results can help identify the current teaching strategies. This study also benefits the future sports medicine field and the community by attempting to lay groundwork for standardized educational practices of concussion assessment tools used in current concussion assessment protocols.

6. **Statement of Confidentiality:** You will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Participant's responses will be coded using both a letter and number. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions. The data will be stored in a password protected computer available to the primary investigator for a minimum of three years.

7. **Right to Ask Questions:** Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-5465.

8. **Voluntary Participation:** Participation in this study is completely voluntary and you may withdraw at any point by telling the primary investigator.

9. **Penalty:** There is no penalty for deciding not to participate in the study and you may decide at any time that you do not want to participate further and may withdraw without penalty or retribution.

10. **All information will be treated confidentially. There is one exception to confidentiality that we need to make you aware of. In certain research studies, it is our ethical responsibility to**

report situations of child or elder abuse, child or elder neglect, or any life-threatening situation to appropriate authorities. However, we are not seeking this type of information in our study nor will you be asked questions about these issues.

11. You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H16414.

Title of Project: Teaching Techniques of Athletic Training Educators during Instruction of Concussion Assessment Tools

Principal Investigator:
Michelle Lima; 590 Herty Dr. Statesboro, GA 30458; (201) 757-2277; ml04781@georgiasouthern.edu

Other Investigators:
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Faculty Advisor:
Tamerah Hunt; PO Box 8026 Statesboro, GA 30458; (912) 478-8620; thunt@georgiasouthern.edu

_____ _____
Participant Signature Date

I, the undersigned, verify that the above informed consent procedure has been followed.

_____ _____
Investigator Signature Date

INFORMED CONSENT TO ACT AS A SUBJECT IN AN EXPERIMENTAL STUDY: INTERVIEW

1. My name is Michelle Lima, ATC, LAT. I am a Master's candidate at Georgia Southern University pursuing my degree in Kinesiology.

2. **Purpose of the Study:** The purpose of this research study is to evaluate the teaching techniques of athletic training education program instructors who teach or have taught specifically on concussion assessment tools and guidelines.

3. **Procedures:** At this point in your participation of the study, you have completed the 32-item online survey and agreed to schedule an interview. By electronically checking the box below on this informed consent form, you are agreeing to participate in the scheduled interview. The interview will take place over Skype or face-to-face and take approximately 30-45 minutes. After the interview is completed and the transcriptions have been written, the participants will perform member checks to verify the transcriptions.

4. **Discomforts and Risks:** There is a minimal risk involved with participation is this study. If at any time you feel uncomfortable or wish to withdraw from the study, you may do so without question

5. **Benefits:** There are no direct benefits to the participants, however, the results can benefit future educators in the athletic training education setting. The results can help identify the current teaching strategies. This study also benefits the future sports medicine field and the community by attempting to lay groundwork for standardized educational practices of concussion assessment tools used in current concussion assessment protocols.

6. **Statement of Confidentiality:** You will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Participant's responses will be coded using both a letter and number. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions. The data will be stored in a password protected computer available to the primary investigator for a minimum of three years.

7. **Right to Ask Questions:** Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-5465.

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10. **All information will be treated confidentially. There is one exception to confidentiality that we need to make you aware of. In certain research studies, it is our ethical responsibility to report situations of child or elder abuse, child or elder neglect, or any life-threatening**

situation to appropriate authorities. However, we are not seeking this type of information in our study nor will you be asked questions about these issues.

11. You must be 18 years of age or older to consent to participate in this research study. By checking the box below, you are consenting to the above terms and participation in this research study.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H16414.

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Faculty Advisor:
Tamerah Hunt; PO Box 8026 Statesboro, GA 30458; (912) 478-8620; thunt@georgiasouthern.edu

(A check box will be inserted here.) By clicking on the box you, the participant, are agreeing to participate in this research study.

APPPENDIX D

SURVEY INSTRUMENT

Athletic Training Educators' Teaching Techniques of Concussion Assessment Tools

Section 1: Educational Background

1. Gender
    1. Male OR Female
2. What NATA district does your institution belong to?
    1. _____
3. What type of program is your ATEP considered?
    1. Bachelors'
    2. Entry-Level Master's
    3. Transitioning program from Bachelors' to Masters'
    4. Other. Please specify_____
4. How many years have you worked in the clinical setting as an athletic trainer?
    1. 1-5
    2. 6-10
    3. 10-15
    4. 15-20
    5. Over 20 years
5. How many years have you worked in the educational/teaching setting?
    1. 1-5
    2. 6-10
    3. 10-15
    4. 15-20
    5. Over 20 years
6. Are you currently practicing athletic training (actively providing patient care)?
    1. Yes OR No
7. What is your position at your respective institution?
    1. Faculty
    2. Staff/Adjunct
    3. Split appointment
    4. Other. Please specify _____
8. What certifications or credentials do you hold? Please check all that apply.
    1. ATC
    2. PT
    3. EMT
    4. Teaching (MAT)
    5. Medical degree
    6. PhD in education (EdD)
    7. PhD in other
    8. Other. Please specify _____
9. Have you been involved in any formal education training? Please check all that apply.
    1. Workshops
    2. Symposiums
    3. Master's courses
    4. Degree in education

Section 2: Course Structure

10. What year are students enrolled in during the course on concussion assessment tools?
    1. Freshman
    2. Sophomore
    3. Junior
    4. Senior
    5. First year Masters' student
    6. Second Year Masters' student
    7. Other. Please Specify_____
11. How is the course on concussion assessment tools structured? (For example: a course strictly lecture includes one instructor in a classroom; lecture/lab breakout sessions throughout the

lecture material in a different classroom perhaps; and separate credits includes different instructors, course days, and times)

1. One lecture course
2. Lecture/lab course
3. Separate lecture and laboratory course credits
4. Other. Please specify _____

12. What is your role in the course on concussion assessment tools?
    1. Lecture instructor
    2. Laboratory instructor
    3. Both A and B
    4. Other. Please specify _____
13. What is the duration of the course on concussion assessment tools? (For example: the amount of classes/minutes devoted to concussion assessment tool material)
    1. 50
    2. 75
    3. 120
    4. 160
    5. 200 minutes
    6. Other Please specify_____
14. How many times a year do you teach the course on concussion assessment tools?
    1. 1
    2. 2
    3. 3
    4. 4
    5. Other. Please specify _____
15. How many years have you been teaching the course on concussion assessment tools?
    1. 1-2
    2. 3-4
    3. Over 5
16. How many minutes are spent on concussion assessment tools and how to administer them?
    1. 50-150 minutes
    2. 151-450 minutes
    3. Over 451 minutes
17. On average, what grades do your students receive on the concussion assessment exam/practical?
    1. A
    2. B
    3. C
    4. D
    5. Fail

Section 3: Concussion Assessment Tools

Please indicate below the amount of knowledge and experience you have with the following items. How would you rate your expertise in these areas?

1	2	3	4	5
No Expertise	A little Expertise	Moderate Expertise	Quite a Bit of Expertise	A Great Deal of Expertise

18. NATA Position Statement: Management of Sport Concussion, 2004	1	2	3	4	5
19. NATA Position Statement: Management of Sport Concussion, 2014	1	2	3	4	5
20. 3rd Consensus Statement on Concussion in Sports, Zurich 2008	1	2	3	4	5
21. 4th Consensus Statement on Concussion in Sports, Zurich 2012	1	2	3	4	5
22. Administration of computerized testing platform (ImPACT, ANAM)	1	2	3	4	5
23. Administration of the Standard Assessment of Concussion (SAC)	1	2	3	4	5
24. Administration of the Standard Concussion Assessment Tool (SCAT)	1	2	3	4	5
25. Administration of the Balance Error Scoring System (BESS)	1	2	3	4	5
26. Administration of the King-Devick test	1	2	3	4	5

27. Administration of the Sensory Organization Test (SOT) 1 2 3 4 5
28. Administration of Graded Symptom Checklist (GSC) 1 2 3 4 5
29. Administration of Post-Concussion Symptom Scale (PCSS) 1 2 3 4 5
30. Cranial Nerve Assessment 1 2 3 4 5

31. What concussion assessment tools do you teach in the classroom? Please check all that apply.
    1. Immediate Post-Assessment Concussion Tool (ImPACT)
    2. Sport Concussion Assessment Tool (SCAT2/3)
    3. Standardized Assessment of Concussion (SAC)
    4. Balance Error Scoring System (BESS)
    5. Sensory Organization Tool (SOT)
    6. Graded Symptom Checklist (GSC)
    7. Post-Concussion Symptom Score (PCSS)
    8. Cranial Nerve/Neurological Assessment
    9. Other_____
32. What concussion assessment tools do you teach in the laboratory? Please check all that apply.
    1. Immediate Post-Assessment Concussion Tool (ImPACT)
    2. Sport Concussion Assessment Tool (SCAT2/3)
    3. Standardized Assessment of Concussion (SAC)
    4. Balance Error Scoring System (BESS)
    5. Sensory Organization Tool (SOT)
    6. Graded Symptom Checklist (GSC)
    7. Post-Concussion Symptom Score (PCSS)
    8. Other_____
    9. Does not apply. Does not have a laboratory course/section.
33. What primary return-to-play guideline do you teach in the classroom? Please check all that apply.
    1. Zurich guidelines, 2008
    2. Zurich guidelines, 2012
    3. NATA Position Statement, 2004
    4. NATA Position Statement, 2014
    5. Other. Please specify _____
34. What methods are you utilizing to teach in the course on concussion assessment tools? Please check all that apply.

1. Didactic (Learning responsibility on teacher to provide all facets of information)
2. Lecture format
3. Laboratory setting
4. Problem-Based (scenario)
5. Simulations
6. Case Studies
7. PowerPoint
8. Videos
9. Games (Jeopardy, Quizlet, etc)
10. Pamphlet/Hand-outs
11. Specific assessment tool instructions
12. Textbook. Please specify which one _____

INTERVIEW INSTRUMENT

Athletic Training Educators' Teaching Techniques of Concussion Assessment Tools

1. Can you clarify for me how many days a week the course is held?
    1. Would you say this is how the course was always structured?
2. Do you believe this allows you enough time to discuss each assessment tool in depth?
    1. Do you think you would want to spend more time on this section?
        i. If yes, is there something preventing you from spending more time on these items?
3. Can you explain what part of the evaluation process and concussion assessment tools was taught in the lecture portion specifically of this course? The lab section specifically?
    1. What would you say is the role of the preceptor when it comes to concussion assessment tool education?
4. In relation to question 19 on your survey responses, in your own words, please describe why you feel like you have [a specific level of expertise]?
    1. Why would you say that?
5. How would you describe in your own words what you would consider an expert?
    1. At what level do you think an instructor should rate themselves in order to teach? Or level you feel an instructor should be at?
6. How do you obtain the information needed to gain both your level of knowledge expertise and the highest level of knowledge expertise (sections)?
    1. How does the position statement relate to the assessment tools you are teaching in the classroom?
    2. What makes you more comfortable with [specific tools versus others]?
7. How would you describe your teaching techniques for the items where your level of knowledge experience expertise is lower than other items?
    1. How long on average would you prep for this module?
    2. Does this require more EBP articles, workshops?
8. Why did you choose to teach those specific assessment tools in the classroom?
9. Why did you choose the specific methods of teaching in your classroom?
    1. How would you describe the usage of [tool]?
    2. Where in your lecture and laboratory setting would you incorporate each method?
        i. Can you explain why you chose these specific methods over others?
    3. How do you think the students will better think on their own by you, the instructor, utilizing these different methods?
10. How do you describe the instructions of [tool] to your students?
    1. Can you be more specific in where these instructors are coming from?
        i. Where are the directions for administration of assessment tools coming from?
            1. Are these manufacturer instructions, like in the case of ImPACT/SAC/BESS? Or are these more related to EBP articles, or textbooks?
11. Have you considered using evidence-based practice articles to support the concussion assessment tool education module?

    1. If yes, which ones?
    2. If no, can you please explain why?
12. How would you describe the effect of [not] working clinically regularly on teaching concussion assessment tools?
    1. Can you be more specific in how those tools may be taught differently?
13. What do you believe the most effective teaching strategy you, or other educators, utilize for concussion assessment tool education is?
    1. What would you say your teaching style is in your own words?
    2. How do you incorporate this into your classes every year?
14. How would you describe your teaching methods from year to year?
    1. Is there change based on the student cohort, current EBP, or current events?
15. Do you feel like you are teaching a standardized approach to concussion management, in terms of assessment tools? If not, why? If yes, please explain this process.?
    1. More specifically, do you try to use the same instructions/clinical instructions/ experience examples for each class you teach?
    2. Or would you say the current event at the time of the class, drive your personalized touch to the examples?
16. If you could change anything about the concussion education course, what would it be and why?
17. What challenges, if any, do you think instructors face when teaching concussion assessment tools?
18. Is there anything else you would like to share?
    1. Any additional comments?

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