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Career Decisions of Senior Athletic Training Students and Recent Graduates of Accredited Athletic Training Education Programs

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Context: Athletic training students and graduates are faced with many factors that direct them into or away from the athletic training profession as a final career choice.

Objective: The purpose of the study was to determine the career decisions made by athletic training students following graduation from an accredited professional athletic training education program (ATEP) and what work-related and ATEP program factors influenced their career decisions.

Design: A 42-question self-reporting web-based survey was used.

Setting: CAATE/CAAHEP-accredited ATEP programs.

Participants: Seventeen hundred and ninety-two seniors and recent graduates of CAATE/CAAHEP-accredited programs from May 2005 through June 2007.

Outcome Measures: Descriptive statistics were utilized to obtain frequency counts of the participants' responses.

Results: The majority of the participants (82.4%) chose to pursue a career as an athletic trainer (AT), while the remainder (17.6%), indicated they did not seek employment as an AT. The college/university setting was the most frequently selected by those employed (45.6%) and those seeking employment (35.6%) as an AT. All 8 ATEP factors (clinical experience hours, clinical experience variety, roles/functions of a clinical instructor [CI] or approved clinical instructor [ACI], preparation to enter the field, level of confidence, CI or ACI attitude toward work setting, CI or ACI demonstration of professionalism, and encouragement from faculty, CI or ACI) were found to be influential in the participants' decisions to pursue a career as an AT. Salary, number of work hours per week, found another profession more interesting, and uncertain or changing work schedule were the most influential factors reported for choosing to not pursue a career as an AT.

Conclusions: The decision to pursue a career as an AT is influenced by ATEP faculty, ACIs, and CIs.

Key Words: career choice, work factors, ATEP factors, professional socialization, Millennials

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Career Decisions of Senior Athletic Training Students and Recent Graduates of Accredited Athletic Training Education Programs

Peter Neibert, PhD, ATC, Christopher Huot, MA, ATC, CSCS and Patrick Sexton, EdD, ATC, CSCS

Athletic training education has evolved significantly since the first athletic training education programs (ATEP) were developed in the late 1960s. While the evolution of athletic training education has paralleled that of medical and health professional education models, athletic training has dealt with a number of important changes over the past decade. These changes have allowed the profession to grow, to improve, and to consolidate into one consistent route to eligibility for the Board of Certification (BOC) examination.¹ The number of candidates taking the BOC exam² has remained relatively steady throughout this reform, while the number of Commission on Accreditation of Athletic Training Education (CAATE) accredited ATEPs has risen dramatically from 132 at the end of 2000 to 364 in 2007 (Personal communication with L. Caruthers, CAATE March 2008) due in part to the termination of the internship route to BOC examination eligibility in January 2004. Although we do not know if these changes had a significant impact on the athletic training workforce, we do know there are currently more opportunities in varied work settings for athletic trainers than ever before.³ Anecdotally, athletic training faculty and program directors have noticed fewer students entering educational programs and into athletic training practice settings following graduation from accredited programs. The National Athletic Trainers' Association (NATA) responded to declining membership by recently implementing reduced membership dues for newly certified athletic trainers.³ Others⁴⁻⁶ have investigated similar concerns regarding the career choices of graduates in other allied health professions. In a recent study, Mensch and Mitchell⁷ identified several barriers to choosing a career in athletic training at one CAATE-accredited ATEP. The investigators found students indicated time commitment and interest in another career as main factors in determining why they chose not to pursue a career as an athletic trainer.⁷ Riter et al⁸ also investigated the presence of burnout in undergraduate athletic training students and a possible relationship to burnout as a professional. They demonstrated that students experienced burnout in their fourth or higher semester "from their clinical assignments and associated responsibilities of the ATEP"^(p57), as measured by their emotional exhaustion, personal accomplishments, and depersonalization.⁷ This literature indicates that Millennial students and ATEP graduates born after 1982 demonstrate the following characteristics: (a) feel special, (b) sheltered, (c) team oriented, (d) confident, (e) feel pressured, (f) achievement oriented, and (g) conventional.⁹ These characteristics may influence their decision to enter into or move away from athletic training as a final career choice.

The purpose of this study was threefold: first, to determine if graduates from professional ATEPs enter the field of athletic training; second, if graduates are not entering athletic training, what profession are they pursuing; and third, what factors did the graduates report as influential in making their career decision.

METHODS

Participants

The participants for this study included students and graduates of CAATE and Commission on Accreditation of Allied Health Education programs (CAAHEP) from May 2005 through June 2007. Participants had either taken or had registered for the BOC examination and were invited via electronic mail to participate in this study. Invitations were sent by the BOC to 7,395 potential participants. In an effort to collect data on subjects who did not take or register for the BOC examination, the researchers also sent invitations via electronic mail to 343 Athletic Training Education Program (ATEP) directors asking them to forward the invitation to their recent graduates and to their senior students who they knew had not taken nor registered for the BOC examination.

A total of 1792 subjects agreed to participate in the study. However due to incomplete or inconsistent responses, 139 subjects were removed from the study leaving a response rate of 22.4%, or 1653 valid responses. The valid responses included students who graduated from accredited undergraduate professional (N=1375 or 83.2%) and graduate professional (N=278 or 16.8%) athletic training education programs from May of 2005 to May 2007. The participants included male (N=507) and female (N=1146) students from institutions that sponsored National Collegiate Athletic Association (NCAA) Division I (N=864), NCAA Division II (N=265), NCAA Division III (N=391), NCAA Division I & II (N=65), NCAA Division I & III (N=3), and National Association of Intercollegiate Athletics (NAIA) (N=65) intercollegiate athletic programs.

Instrumentation

A web-based self-reporting survey instrument was developed using Zoomerang®, Inc. software program (MarketTools, Inc., San Francisco). To determine content and face validity, the instrument was given to a panel of five athletic trainers, each of whom had at least 15 years of experience in athletic training education. Feedback was collected from the panel and used to make minor grammatical and content changes to the instrument. The instrument was then pilot tested by nine undergraduate athletic training students at the co-investigator's institution. The pilot test was used to determine the clarity of survey items, completion difficulty, and completion time.

The instrument was subdivided into four sections: 1) demographics; 2) athletic training education program information; 3) professional/career information; and 4) athletic training professional preparation. Survey questions included forced choice, Likert-type, and short answer responses categorized to fit employment and degree categories. Demographic questions included the participants' level in the ATEP, gender, year of graduation or expected graduation, if they took or planned to

take the BOC examination within the next six months, and if they were currently BOC certified. The next section focused on the participant's ATEP information. This section determined the academic calendar and number of quarters or semesters required to complete the ATEP, the ATEP admissions process, the average number of clinical experience hours completed at the sophomore, junior, or senior level, and the work settings used to complete the formal observational or assigned clinical experiences. The professional/career section collected information regarding their employment status, the employment setting they were currently in or seeking, and if they had been accepted to or completed a degree, certification, and/or professional program in addition to athletic training. The final section consisted of questions regarding the influence of ATEP factors on their decision to pursue a career in athletic training or pursue a career outside of athletic training. Participants rated the degree of influence of each variable using a four-point Likert-type scale ranging from most influential (4), influential (3), somewhat influential (2), not influential (1), and a not applicable option was provided. In addition, the above Likert type scale was used to measure the degree of influence of various athletic training work factors as it related to the participant's decision to not pursue a career in athletic training. All data was analyzed using the Statistical Package for the Social Sciences® (SPSS Inc., Chicago, IL) for Windows version 16.0.

Procedures

The initial invitation to participate in this study was sent via electronic mail by the BOC due to data privacy. A follow-up invitation was sent two weeks later. The invitation included a brief description of the study, estimated survey completion time, and the URL address to access the Zoomerang® web-based survey. In addition, a letter was sent to all directors of CAATE-accredited programs that included a description of the target population, purpose of the study, and instructions on how to forward the invitation to participate to their alumni and students who they knew did not take or register for the BOC examination between May 2005 and June 2007. The introductory page of the survey provided details of the study, assurance of anonymity, information regarding IRB approval, instructions on how to complete the survey, and informed consent.

Data Analysis

The nature of the research questions and the data obtained required the use of descriptive and frequency statistics. Open-ended short answer responses were categorized by the researchers and appropriately coded. Frequency counts were used to determine if subjects intended to obtain or maintain their BOC certification. Further analyses split the responses into two groups: those who were employed as an athletic trainer (AT) or sought employment as an AT and those who were not seeking employment as an AT. Within each group, frequency counts were used to determine (1) the number of participants seeking work or employment in various athletic training and non-athletic training work settings, (2) to determine to what degree their decision to pursue or not pursue a career using their ATC credential was influenced by eight ATEP program factors, and (3) to determine what degree their decision to not pursue a career using their AT credential was influenced

by nine work-related factors. Descriptive measures were used to determine the influence of ATEP and work-related factors in the career decision process.

RESULTS

The participants' decisions to pursue or not pursue a career as an AT are depicted in Table 1. From this data it is clear that the majority of the participants (82.4%) chose to pursue a career as an AT, while the remainder (17.6%), indicated they were not seeking employment as an AT.

The work settings or desired work settings of participants employed or seeking employment using their AT credential is presented in Tables 2 and 3, respectively. The college/university setting was selected most frequently by those employed (45.6%) and those seeking employment (35.6%) as an AT. The second and third most selected setting for those employed as an AT was the high school-clinic/outreach (20.1%) and high school full-time (14.2%) setting. For those seeking employment using their AT credential, the second and third most desired setting selected was the high school full-time (20.5%) and high school-clinic/outreach (16.1%) settings.

The chosen professional areas reported by the participants who were not seeking employment as an AT are displayed in Table 4. Twenty-nine percent reported they were employed or seeking employment as a registered/licensed physical therapist, and 16% reported they were employed or seeking employment as a physician assistant.

Table 5 indicates the participants' responses to the influence of nine work-related factors on their decisions not to pursue a career using their ATC credential. The participants reported salary (80.8%), followed by number of hours per week (75.3%), found another profession more interesting (71.5%), and an uncertain or changing work schedule (70.8%) as the most influential, influential, or somewhat influential work-related factors having any influence on their decision not to pursue athletic training as a career.

As indicated above, the data from the survey anchors for most influential, influential, and somewhat influential were combined for reporting purposes in order to provide an indication for whether a

Table 1. Participants' Decisions to Pursue or Not Pursue a Career as an Athletic Trainer (N=1653)

Response	n	%
Yes Currently employed as an AT	1070	64.7
Yes Seeking employment as an AT	292	17.7
No Not employed nor seeking employment as an AT	291	17.6

Table 2. Work Settings of Participants Employed Using Their Athletic Trainer Credential (N=1070)^a

Work Setting	n	%
College/university (including junior college)	488	45.6
High School (clinic/outreach)	215	20.1
High School (full-time)	152	14.2
Sports Medicine Clinic (not with physician)	42	3.9
Professional Sports	36	3.4
Physician's Office (orthopedic)	29	2.7
Health/Fitness (personal training/sports enhancement)	13	1.2
Industrial	12	1.1
Hospital	11	1.0
Corporate	3	0.3
Physician's Office (general practice)	1	0.1
Other (write-in)	68	6.4

^aWork settings may include graduate assistantships, internships, part-time, full-time, and season employment.

factor had any influence on the participant's career decision. The participants who planned to pursue a career as an AT reported the following ATEP factors as influential: level of confidence you have in your skills and abilities as an AT (98.2%); the degree to which you feel your education has prepared you to enter the field of AT (97.5%); and clinical experience variety you received during your education (95.1%). As a group, participants who chose to pursue a career other than AT indicated the amount of clinical experience required (41.6%), level of confidence you have in your own skills and abilities as an AT (42.3%), and clinical instructor (CI) or approved clinical instructor (ACI) attitude toward their work setting (41.6%) as factors that influenced their decisions. Responses to the perceived influence of eight ATEP factors on their decision to pursue or not pursue a career using their ATC credential are displayed in Table 6.

DISCUSSION

The purpose of this study was to first determine if graduates from professional ATEPs enter the field of athletic training; second, if graduates are not entering athletic training, what profession are they pursuing; and third, what factors did the graduates report as influential in making their career decision. Our results indicate that the majority, 82.3%, of the respondents were employed or seeking employment using their ATC credential. Both work factors and ATEP factors were influential in the career decision making process.

Table 3. Desired Work Settings of Participants Seeking Employment Using Their Athletic Trainer Credential (N=292)

Work Setting	n	%
College/university (including junior college)	104	35.6
High School (full-time)	60	20.5
High School (clinic/outreach)	47	16.1
Sports Medicine Clinic (not with physician)	24	8.2
Professional Sports	12	4.1
Health/Fitness (personal training/sports enhancement)	12	4.1
Physician's Office (orthopedic)	6	2.1
Hospital	5	1.7
Corporate	2	0.7
Physician's Office (general practice)	2	0.7
Industrial	1	0.3
No Response	1	0.3
Other (write-in)	16	5.5

Table 4. Professional Areas of Participants Not Employed nor Seeking Employment as an Athletic Trainer (N=291)

Professional Areas	n	%
PT (registered/licensed physical therapist)	83	28.5
PA (physician assistant)	46	15.8
I am not working in, nor plan to pursue a position in a health care setting	28	9.6
MD (medical doctor)	16	5.5
Medical Sales	14	4.8
DC (doctor of chiropractic)	13	4.5
Unsure	13	4.5
RN (registered nurse)	9	3.1
CSCS (NSCA certified strength & conditioning specialist)	7	2.4
DO (doctor of osteopathy)	6	2.1
MT (registered/licensed massage therapist)	6	2.1
K-12 Education	6	2.1
Personal Trainer (other or no certification)	6	2.1
Other ^a	38	13.0

^aAreas with fewer than 5 responses were placed in the other category. These include EMT, PTA, certified personal trainer or performance enhancement specialist (NSCA, NASM), CNA, and LPN.

Table 5. Influence of Work Factors on Participant's Decision to Not Pursue a Career Using Their Athletic Training Credential (N=291)

Response^a	n	%	Question Mean (95% CI)
Number of hours per week			2.80 (2.66-2.93)
Most Influential	91	31.3	
Influential	80	27.5	
Somewhat Influential	48	16.5	
Not Influential	49	16.8	
Not Applicable	23	7.9	
Uncertain or changing work schedule			2.86 (2.45-2.72)
Most Influential	74	25.4	
Influential	77	26.5	
Somewhat Influential	55	18.9	
Not Influential	66	22.7	
Not Applicable	19	16.5	
Salary			2.94 (2.81-3.06)
Most Influential	107	36.8	
Influential	80	27.5	
Somewhat Influential	48	16.5	
Not Influential	38	13.1	
Not Applicable	18	6.2	
Used athletic training in preparation for other professional program			2.33 (2.18-2.48)
Most Influential	58	19.9	
Influential	47	16.2	
Somewhat Influential	53	18.2	
Not Influential	83	28.5	
Not Applicable	50	17.2	
Limited opportunities in desired work setting			2.17 (2.04-2.31)
Most Influential	43	14.8	
Influential	56	19.2	
Somewhat Influential	60	20.6	
Not Influential	97	33.3	
Not Applicable	35	12.0	
Limited opportunities in desired geographical region			1.84 (1.71-1.97)
Most Influential	29	10.0	
Influential	31	10.7	
Somewhat Influential	59	20.3	
Not Influential	130	44.7	
Not Applicable	42	14.4	
Found another profession more interesting			2.70 (2.56-2.83)
Most Influential	85	29.2	
Influential	66	22.7	
Somewhat Influential	57	19.6	
Not Influential	54	18.6	
Not Applicable	29	10.0	
Insufficient respect as a health care provider			2.30 (2.16-2.44)
Most Influential	56	19.2	
Influential	62	21.3	
Somewhat Influential	50	17.2	
Not Influential	95	32.6	
Not Applicable	28	9.6	
Limited job functions (scope of practice)			2.26 (2.12-2.40)
Most Influential	53	18.2	
Influential	55	18.9	
Somewhat Influential	65	22.3	
Not Influential	92	31.6	
Not Applicable	26	8.9	

^aIndicates a participant's response to the question, "Are you currently working or seeking employment in a position using your credential as an Athletic Trainer?" The degree of influence was rated on a 4-point Likert scale, ranging from most influential (4) to not influential (1).

Table 6. Influence of Athletic Training Education Program (ATEP) Factors on Participant’s Decision to Pursue a Career Using Their Athletic Training Credential

Response	Yes ^a (n=1362)		Mean (95% CI)	No ^a (n=291)		Mean (95% CI)
	n	%		n	%	
Amount of clinical experience hours required			2.64 (2.59-2.69)			1.91 (1.77-2.05)
Most Influential	260	19.1		34	11.7	
Influential	543	39.9		42	14.4	
Somewhat Influential	323	23.7		45	15.5	
Not Influential	209	15.3		133	45.7	
No Response	27	2.0		37	12.7	
Clinical experience variety you received during your education			3.14 (3.10-3.18)			1.57 (1.45-1.69)
Most Influential	486	35.7		18	6.2	
Influential	630	46.3		26	8.9	
Somewhat Influential	178	13.1		37	12.7	
Not Influential	60	4.4		169	58.1	
No Response	8	0.6		41	14.1	
Roles and functions of the CI or ACI during my clinical experience			3.01 (2.96-3.05)			1.82 (1.69-1.95)
Most Influential	415	30.5		25	8.6	
Influential	607	44.5		42	14.4	
Somewhat Influential	239	17.5		49	16.8	
Not Influential	82	6.0		138	47.4	
No Response	19	1.4		37	12.7	
The degree to which you feel your education has prepared you to enter the field of athletic training			3.24 (3.20-3.28)			1.73 (1.61-1.86)
Most Influential	552	40.5		26	8.9	
Influential	613	45.0		33	11.3	
Somewhat Influential	164	12.0		47	16.2	
Not Influential	29	2.1		155	53.3	
No Response	4	0.3		30	10.3	
Level of confidence you have in your own skills and abilities as an athletic trainer			3.21 (3.17-3.24)			1.78 (1.67-1.90)
Most Influential	467	34.3		18	6.2	
Influential	727	53.4		47	16.2	
Somewhat Influential	143	10.5		58	19.9	
Not Influential	21	1.5		13	47.8	
No Response	4	0.3		29	10.0	
CI or ACI attitude toward their work setting			2.99 (2.94-3.03)			1.91 (1.77-2.04)
Most Influential	410	30.1		31	10.7	
Influential	593	43.5		48	16.5	
Somewhat Influential	250	18.4		42	14.4	
Not Influential	88	6.5		133	45.7	
No Response	21	1.5		37	12.7	
Demonstration of CI or ACI professionalism			3.00 (2.96-3.05)			1.73 (1.60-1.86)
Most Influential	410	30.1		29	10.0	
Influential	611	44.9		30	10.3	
Somewhat Influential	231	17.0		40	13.7	
Not Influential	87	6.4		158	54.3	
No Response	23	1.7		34	11.7	
Encouragement or direction from the ATEP faculty, CI or ACI			3.17 (3.13-3.22)			1.78 (1.66-1.91)
Most Influential	568	41.7		27	9.3	
Influential	509	37.4		35	12.0	
Somewhat Influential	198	14.5		50	17.2	
Not Influential	67	4.9		144	49.5	
No Response	20	1.5		35	12.0	

^aIndicates a participant’s response to the question, “Are you currently working or seeking employment in a position using your credential as a Certified Athletic Trainer?” The degree of influence was rated on a 4-point Likert scale, ranging from most influential (4) to not influential (1).

Influence of Work Factors on Participants Decision to Choose a Career in AT

Of the total number of respondents, 17.6% reported they were not employed nor were they pursuing employment in athletic training (Table 1). The majority of these respondents indicated they were pursuing education or employment in another healthcare or wellness profession (Table 4). To understand why ATEP graduates are pursuing other healthcare or wellness professions, we investigated the education and work-related factors that may influence their decisions.

The participants of this study, who identified themselves as choosing to not pursue a career using their ATC credential, identified work factors such as: salary, number of hours worked per week, found another profession more interesting, and uncertain or changing work schedule as the most influential, influential, or somewhat influential in their decisions. These findings are similar to those found by Mensch and Mitchell⁷ in a qualitative study describing the perceptions of potential athletic training recruits. They found "too much time involvement" and "interested in a different career" as the most frequently reported barriers to choosing a career in athletic training. A possible explanation for this phenomenon can be found by looking closely at the type of participant involved in this study. Each of these participants can be classified as a so-called "Millennial". Monaco and Martin⁹ define the Millennial generation as students born after 1982 and demonstrating the following characteristics; (a) feel special, (b) sheltered, (c) team orientated, (d) confident, (e) feel pressured, (f) achievement orientated, and (g) conventional. Millennial students typically desire a balance between their professional and personal life.¹⁰⁻¹⁴ Millennial students are not workaholics;¹⁰ they desire a good balance between their work, family, and social lives. Therefore, if, during the student's clinical experience, an ACI or CI modeled professional behavior that exhibited imbalance between their professional and personal life, they may perceive this to be the reality of the profession as a whole. This perceived reality does not fit into the paradigm of the Millennial's life. Another characteristic of the Millennial is a desire for organizational and professional support in maintaining this balance.¹⁰⁻¹⁴ The Millennial student may view the long hours and uncertain or changing work schedule as a lack of support from organizational and professional entities. This perception of lack of support may adversely impact the Millennial's need to be valued as a professional¹¹⁻¹²

Influence of ATEP Factors on Participant's Decision to Choose a Career in AT

The participants of this study who identified themselves as choosing to pursue a career in athletic training identified several ATEP program factors that influenced their decisions. Some of these factors included the roles and functions of their ACI or CI during their clinical experiences, the attitude of the ACI or CI toward their work setting, the ACI or CI demonstration of professionalism, and the encouragement they received from the ATEP faculty, ACI or CI as the most influential factors in their decision to pursue a career in athletic training (Table 6).

Each of these ATEP-related factors can be categorized under the umbrella of professional socialization and mentoring. Professional socialization, as defined in the literature, is a process whereby students become part of the athletic training professional culture.¹³ This process involves acquiring attitudes, skills, and behavioral norms of the athletic training professional.¹⁴ This is an informal induction process where students begin to develop professional values and identity.¹⁴⁻¹⁵ This process gives the students a vision of what it will be like for them to be an athletic training professional.¹⁵⁻¹⁸

For professional socialization to occur, the ACI or CI must take on the role of mentor. The literature indicates that mentoring is essential to a student's development,¹⁹ and for the process to be successful, a personal relationship must be developed between the student and the ACI or CI.^{11, 20} The relationship must have a foundation of congruent professional values and trust.^{19, 21} A successful mentoring process for the student fosters a caring student-teacher relationship,^{11, 20} a sense of belonging,^{11, 22} and professional acceptance.^{11, 18} Connected to this mentoring role is the process of modeling professional skills and assisting the students with skill acquisition.^{17, 22-23} The modeling role provides experiences where the students are provided opportunities to make decisions.²¹ Through this process, it is critical that the student be allowed to experiment with learning, while being supported and guided by their ACI or CI.^{8, 11, 21, 24} This provides a safe environment for the student to develop as a professional.²¹ Effective mentoring takes place when students feel as though their ACI or CI is accessible and approachable.¹⁹ The ACI or CI can provide a positive or negative outlook on the athletic training environment.^{6, 17} Students are aware of this outlook and determine this to be a very strong factor in shaping their own attitudes toward the profession.¹⁷ The athletic training professional's work environment perceptions shape the newly forming perceptions of the students. Students begin to take on the established perceptions of the ACI or CI. These perceptions become the student's vision of the profession, and this vision can be a positive or a negative perception of the profession or of a specific work setting. The participants of this study reported that the attitude of the ACI or CI toward their work-setting was influential in their choice to pursue a career as an AT (Table 6). Successful ATEP faculty, ACIs, or CIs create an environment of acceptability²²⁻²³ and autonomy^{11, 22-23} for the students. The student is encouraged to participate in the hands-on learning process and has the opportunity to experiment with didactic knowledge under the supervision of the ACI or CI.¹⁸ Students are guided^{8, 11, 21} and are allowed to systematically master clinical proficiencies. This constant encouragement by the ACI or CI provides the necessary connection^{16-13, 20} upon which the Millennial student thrives. These mini successes drive the Millennial student toward mastery of clinical proficiencies. A key characteristic of the Millennial student is the importance placed on doing rather than simply knowing.^{10-11, 24} Being allowed to search and discover information is paramount over simply being given information.^{10, 11, 24} The quest for information and the application thereof is enticing to the Millennial student who thrives in an environment where mentoring has a strong presence.^{10-11, 24} These students have a personal relationship with their mentors and this relationship is fostered through the student feeling supported and encouraged by their mentor.^{19, 23}

Limitations

The study sample was comprised largely of graduates who have registered for, who planned to register for, or who had already taken the BOC exam. If a student was not planning on entering the profession it is unlikely that he or she would have registered for or taken the BOC examination. Therefore they may have been less likely to respond to the survey request. This limitation was addressed by contacting the program directors of the accredited programs and asking them to identify those individuals who were not planning or had not taken the BOC examination. In addition, since the survey had a response rate of 22.4% it is possible that potential participants chose not to respond to the survey because they were not planning on pursuing athletic training as their career. These limitations make it difficult to determine if the results truly reflect the decisions of all ATEP graduates.

CONCLUSION

At the onset of this research, the purpose was to determine whether recent graduates were choosing a career as an AT, and if they were not choosing a career as an AT, what professional career choices were they making and what factors did they report as influential in making these decisions. Our findings highlight the importance of the ATEP faculty, ACI, and CI in the development of future athletic training professionals. Paramount in this process is the role of mentoring and professional socialization. The students who make these critical connections with their ATEP faculty, ACI, or CI appear to be more likely to pursue a career in athletic training. Our findings also illustrate the need to evolve as a profession in the areas of salary, work load, and work schedule. We need to clearly define our work day and work week or it may be difficult to retain well qualified professionals from the current and future generations. This is a necessary progression for the AT profession to be effective in recruiting and retaining our best and brightest students. The workforce is changing as Millennials enter our educational programs and the profession. Their desire for a work-life balance is critical to their professional and personal fulfillment. If we do not make progress and evolve from this professional ideal, we will lose these future professionals to other healthcare professions.

REFERENCES

1. Delforge GD, Behnke RS. The history and evolution of athletic training education in the United States. *J Athl Train*. 1999;34(1):53.
2. Board of Certification. http://www.bocatac.org/index.php?option=com_content&view=article&id=103&Itemid=109. Accessed August 8, 2009.
3. National Athletic Trainers' Association. Membership statistics. <http://cf.nata.org/members1/documents/membstats/index.cfm>. Accessed March 23, 2009.
4. Katz FE, Martin HW. Career choice processes. *Soc Forces*. 1962;41(2):149.
5. Pearl MJ. Factors physical therapists use to make career decisions. *Phys Ther*. 1990;70(2):105-107.
6. Scott I, Wright B, Brenneis F, Bret-MacLean P, McCaffrey L. Why would I choose a career in family medicine? *Can Fam Physician*. 2007;53:1956-1956.
7. Mensch J, Mitchell M. Choosing a career in athletic training: Exploring the perceptions of potential recruits. *J Athl Train*. 2008;43(1):70-79.
8. Riter TS, Kaiser DA, Hopkins JT, Pennington TR, Chamberlain R, Eggett D. Presence of burnout in undergraduate athletic training students at one western US university. *Athl Train Educ J*. 2008;43(2):57-66.
9. Monaco M, Martin M. The Millennial student: A new generation of learners. *Athl Train Educ J*. 2007;2(1):42-46.
10. Altier L. Communicating with the next generation. *Newborn Infant Nurs Rev*. 2004;4(1):2-3.
11. DiGilio JJ, Lynn-Nelson G. The Millennial invasion: Are you ready? *Inf Outlook*. 2004;8(11):15.
12. Olson ME. The "millennials": First year in practice. *Nurs Outlook*. 2009;57(1):10-17.
13. Shinyashiki GT, Mendes I, Trevizan MA, Day RA. Professional socialization: Students becoming nurses. *Rev Lat Am Enfermagem*. 2006;14(4):601-607.
14. Johnston S. See one, do one, teach one: Developing professionalism across the generations. *Clin Orthop Related Res*. 2006;449:186-192.
15. Pitney WA. The professional socialization of certified athletic trainers in high school settings: A grounded theory investigation. *J Athl Train*. 2002;37(3):286-292.
16. Clark CL. The professional socialization of graduating students in generic and two-plus-two baccalaureate completion nursing programs. *J Nurs Educ*. 2004;43(8):346-351.
17. Laurent T, Weidner TG. Clinical instructors' and student athletic trainers' perceptions of helpful clinical instructor characteristics. *J Athl Train*. 2001;36(1):58-61.
18. Hughes LC, Romick P, Sandor MK, et al. Evaluation of an informal peer group experience on baccalaureate nursing students' emotional well-being and professional socialization. *J Prof Nurs*. 2003;19(1):38-48.
19. Pitney WA, Ehlers GG. A grounded theory study of the mentoring process involved with undergraduate athletic training students. *J Athl Train*. 2004;39(4):344-351.
20. Gillespie M. Student-teacher connection: A place of possibility. *J Adv Nurs*. 2005;52(2):211-219.
21. Bourbonnais FF, Kerr E. Preceptoring a student in the final clinical placement: Reflections from nurses in a Canadian hospital. *J Clin Nurs*. 2007;16(8):1543-1549.
22. Levett-Jones T, Lathlean J, McMillan M, Higgins I. Belongingness: A montage of nursing students' stories of their clinical placement experiences. *Contemp Nurse*. 2007;24(2):162-174.
23. Curtis N, Helion JG, Domsohn M. Student athletic trainer perceptions of clinical supervisor behaviors: A critical incident study. *J Athl Train*. 1998;33(3):249-253.
24. Mangold K. Educating a new generation: Teaching baby boomer faculty about Millennial students. *Nurse Educ*. 2007;32(1):21-23.

Athletic Training Students' Perceptions of and Academic Preparation in the Use of Psychological Skills in Sport Injury Rehabilitation

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Context: Injured athletes rely on athletic trainers to assist them when recovering from injury. Over the last 20 years, the use of psychological skills to speed recovery has become increasingly popular.

Objective: Explore athletic training students' perceptions of the importance and effectiveness of psychological skills in the rehabilitation of sport injury as well as their academic preparation in their use, and examine the differences in perceived effectiveness for those with and without formal training in the skill.

Design: Survey.

Setting: Athletic training students enrolled in CAATE-accredited athletic training programs.

Participants: 180 athletic training students (males, n = 76; females, n = 104) from nine universities.

Data Collection & Analysis: The survey included 15 questions from the Attitudes About Imagery (AAI) survey and a demographic section including questions about their educational preparation, use of, and interest in psychological skills training. Two chi-square analyses, two ANOVAs, and a MANOVA were computed to investigate differences in athletic training students' educational preparation, use of, and interest in psychological skills training.

Results: While athletic training students agreed that it is important to treat the psychological aspects of injury (mean = 4.47 out of 5), only 50.6% reported that they had taken a course in sport psychology or psychological skills training. No differences in the perception of effectiveness were found between students that reported formal training in psychological skills compared to those that did not ($\chi^2_{4,176} = 7.48, P = .11$). Overall, the ratings of the effectiveness of psychological skills were positive as indicated by mean AAI scores between 4.31 to 6.17.

Conclusions: We found positive perceptions of psychological skills. However, the students' mean AAI scores were generally lower than previously surveyed athletic trainers and physical therapists.

Key Words: psychology, injured athlete, psychosocial competencies, sport psychology, mental skills, injury

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The effective incorporation of psychological skills into injury rehabilitation is vital to an athlete's successful recovery and return to play.¹⁻³ Ford and Gordon determined that while an athlete may be physically ready to return to sport after an injury, they may not be psychologically ready; hence, the incorporation of psychological skills training into injury rehabilitation is essential.⁴ In addition, Andersen concluded that numerous variables play an equally important role in an athlete's recovery from injury, one of which is the athlete's psychological readiness for return to competition.⁵

Research indicates that while psychological skills are important to an athlete's overall performance,⁴ athletic trainers (ATs) often do not incorporate them into their rehabilitation programs.^{7,8} Washington-Lofren, Westerman, Sullivan, and Nashman,⁸ for example, found that 47.5% of ATs surveyed believed they were unable to fully assist their athletes with the psychological aspects of their recovery. Yet, when athletes were surveyed, 39% of male and 40% of female collegiate soccer players believed their AT was qualified to help them cope with negative emotions regarding their injury.

Athletic trainers are constantly challenged to design and implement rehabilitation programs which return their patient to play as quickly as possible. With the use of psychological skills training becoming more popular, ATs are increasingly in a position to implement psychological skills programs.⁹ Therefore, it is important for ATs to both understand and use a wide variety of mental skills to improve rehabilitation effectiveness.^{7,10} However, the amount of formal training an athletic training student receives in psychosocial intervention and referral seems to be inadequate for the role ATs play in the psychological recovery of athletes from sport injury.¹¹

Athletic Training Education Program (ATEP) students must demonstrate competency and proficiency in 12 specific areas. The National Athletic Trainers' Association (NATA) Competencies dictate the inclusion of psychosocial intervention and referral competencies for all accredited ATEPs; this content area is called "Psychosocial Intervention & Referral" (PIR; Table 1). Despite the NATA Competencies' requirements to include psychosocial competencies, a course specifically in sport psychology is not required for athletic training education.¹⁰ When athletic trainers were surveyed, 85% indicated that a course in sport psychology was important, but only about half of those respondents had taken a course in sport psychology.⁷ Furthermore, newly certified athletic trainers do not feel adequately prepared in the areas of mental skills training, counseling, and psychosocial referral.¹¹ In fact, Stiller-Ostrowski and Ostrowski¹¹ found that newly certified athletic trainers reported feeling underprepared when communicating and handling psychological issues associated with athletes, parents, and coaches.

Hamson-Utley, Martin, and Walters' recent study¹² investigated athletic trainers' and physical therapists' perceptions of the effectiveness of the use of psychological skills used during injury rehabilitation. They found that both athletic trainers and physical therapists held positive attitudes about the effectiveness of psychological skills, which was an improvement compared to the earlier work of Weiss, Wiese and Yukelson.¹⁴ Hamson-Utley et al.¹² also reported that formal training was correlated with more positive attitudes about the use and effectiveness of psychological skills. Also of interest, recent research by Hamson-Utley & Stiller-Ostrowski surveyed ATEP program directors and asked them to rank instructional emphasis placed on each of the 12 content areas; the PIR content area received the lowest ranking overall (unpublished data, 2010).

No study to date has focused on athletic training students' perceptions of the importance and effectiveness of psychological skills. Students' perceptions are important to understand because they have recently met or are in the process of meeting the psychosocial intervention and referral competencies. Therefore, the purpose of this study was to determine athletic training students' perceptions of the importance and effectiveness of psychological skills in the rehabilitation of sport injury as well as their academic preparation in psychological skills. Similar to Hamson-Utley et al's findings,¹² it is expected that students who have had formal training in psychological skills (ie, taken a course) will hold different perceptions compared those who have not had formal training. In addition, it is expected that students' perceptions of the importance and effectiveness of psychological skills will differ by year in school (ie, freshmen, sophomore, junior, senior, or entry-level master's student), as the students who have been in school longer, (ie, senior or entry-level master's student) may have had more opportunity to be introduced to sport psychology or psychological skills training in clinical education settings.

METHODS

Participants

All participants (n = 180) were currently enrolled in a CAATE accredited athletic training program. A total of 76 males and 104 females ranging in age from 18 to 35 (mean [SD] = 28.16 [2.49]) completed the survey. Of these respondents, 6 (3.3%) were freshmen, 34 (18.8%) were sophomores, 62 (34.4%) were juniors, 70 (38.8%) were seniors and 7 (3.8%) were entry-level masters' athletic training students (note: one respondent did not indicate their year in school).

Procedures

Upon IRB approval, program directors from nine universities in the U.S. were contacted by email to request their participation

Table 1. The National Athletic Trainers' Association Competencies for Psychosocial Intervention & Referral: Competencies (C) & Clinical Proficiencies (CP)

Number	Description
PS-C1	Explain the psychosocial requirements (ie, motivation and self-confidence) of various activities that relate to the readiness of the injured or ill individual to resume participation.
PS-C2	Explain the stress-response model and the psychological and emotional responses to trauma and forced inactivity.
PS-C3	Describe the motivational techniques that the athletic trainer must use during injury rehabilitation and reconditioning.
PS-C4	Describe the basic principles of mental preparation, relaxation, visualization, and desensitization techniques.
PS-C5	Describe the basic principles of general personality traits, associated trait anxiety, locus of control, and patient and social environment interactions.
PS-C6	Explain the importance of providing health care information (communication) to patients, parents/guardians, and others regarding the psychological and emotional well being of the patient.
PS-C7	Describe the roles and function of various community-based health care providers (to include, but not limited, to: psychologists, counselors, social workers, human resources personnel) and the accepted protocols that govern the referral of patients to these professionals.
PS-C8	Describe the theories and techniques of interpersonal and cross-cultural communication among athletic trainers, their patients, and others involved in the health care of the patient.
PS-C9	Describe the basic principles of counseling (discussion, active listening, and resolution) and the various strategies that certified athletic trainers may employ to avoid and resolve conflicts among superiors, peers, and subordinates.
PS-C10	Identify the symptoms and clinical signs of common eating disorders and the psychological and sociocultural factors associated with these disorders.
PS-C11	Identify and describe the sociological, biological and psychological influences toward substance abuse, addictive personality traits, the commonly abused substances, the signs and symptoms associated with the abuse of these substances, and their impact on an individual's health and physical performance.
PS-C12	Describe the basic signs and symptoms of mental disorders (psychoses), emotional disorders (neuroses, depression), or personal/social conflict (family problems, academic or emotional stress, personal assault or abuse, sexual assault, sexual harassment), the contemporary personal, school, and community health service agencies, such as community-based psychological and social support services that treat these conditions and the appropriate referral procedures for accessing these health service agencies.
PS-C13	Describe the acceptance and grieving processes that follow a catastrophic event and the need for a psychological intervention and referral plan for all parties affected by the event.
PS-C14	Explain the potential need for psychosocial intervention and referral when dealing with populations requiring special consideration (to include but not limited to those with exercise-induced asthma, diabetes, seizure disorders, drug allergies and interactions, unilateral organs, physical and/or mental disability).
PS-C15	Describe the psychosocial factors that affect persistent pain perception (ie, emotional state, locus of control, psychodynamic issues, sociocultural factors, and personal values and beliefs) and identify multidisciplinary approaches for managing patients with persistent pain.
PS-CP1	Demonstrate the ability to conduct an intervention and make the appropriate referral of an individual with a suspected substance abuse or other mental health problem. Effective lines of communication should be established to elicit and convey information about the patient's status. While maintaining patient confidentiality, all aspects of the intervention and referral should be documented using standardized record-keeping methods.
PS-CP2	Demonstrate the ability to select and integrate appropriate motivational techniques into a patient's treatment or rehabilitation program. This includes, but is not limited to, verbal motivation, visualization, imagery, and/or desensitization. Effective lines of communication should be established to elicit and convey information about the techniques. While maintaining patient confidentiality, all aspects of the program should be documented using standardized record-keeping techniques.

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in the research study. These program directors were selected because they represented various regions throughout the U.S. (ie, Southern, Midwest, Eastern). All nine program directors that were contacted agreed to participate in the study and subsequently distributed the surveys to their students. Each program director was sent an introductory letter outlining the study administration directions, and copies of the informed consent and surveys to distribute to students. Once completed, program directors returned the informed consent forms and surveys in a postage-paid self-addressed envelope. Of the two hundred surveys distributed, 180 were completed and returned, for a 90% response rate. The surveys included the Attitudes About Imagery (AAI) Student Athletic Trainer survey,¹² a demographic survey, and several questions about their training in, use of, and interest in sport psychology and their beliefs about the psychological aspects of athletic injury. The survey was given to experts in sport psychology and athletic training (n = 5) for review; slight modifications were made to several questions based on feedback to improve overall clarity. No questions on the original AAI were modified.

Surveys

The Attitudes About Imagery (AAI) Survey: The AAI, developed by Hamson-Utley et al.,¹² contains 15 items that measure attitudes and beliefs about the effectiveness of psychological skills for rehabilitating from sport-injury (see Table 3 for the AAI items). An example item from the survey reads, “The use of mental imagery is an effective way to decrease pain during rehabilitation sessions” and the response is on a 7-point Likert scale with anchors *strongly disagree* and *strongly agree*. Hamson-Utley et al.¹² developed the survey based on the Integrated Model of Reponse,¹⁴ and previously established its content validity and reliability. More specifically, test-retest reliability of the survey was established at 0.60-0.84 for all 15 items, and Cronbach’s alphas ranged on the four clusters of the survey from 0.65-0.90 (mental imagery = 0.90, positive self-talk = 0.65, goal setting = 0.77, and pain tolerance = 0.77).

Demographic Survey: The demographic survey was comprised of several questions including gender, age, year in school, and the sport(s) in which the athletic training student had clinical experience.

Training, Use of, and Interest in Sport Psychology

Several questions were added to the instrument to assess students’ training in, use of, and interest in sport psychology and psychological skill training. To assess if the student had taken a class at the university level in sport psychology, the following question was included, “Have you taken a course at the university level that focused on sport psychology or psychological skills training (such as imagery, positive self-talk, goal setting, etc.)?” In addition, Hamson-Utley et al.¹² included four questions on mental imagery as part of their study. The four questions included: 1) “Have you had any formal training or courses that included the use of *mental imagery*?”; 2) “Have you ever used *mental imagery* to improve your sport performance?”; 3) “Have you ever used *mental imagery* to help you rehabilitate from an injury?”; and 4)

“Are you interested in learning about the use of *mental imagery* to help injured athletes.” Four additional questions for each of the three clusters in the AAI (positive self-talk, controlling pain, and goal setting) were added to assess students’ interest in, use of, and training in other areas within sport psychology.

Perceptions on the Psychological Affects of Injury

Two additional questions were added from Larson et al.’s study⁷ to assess the students’ perceptions of the psychological affects of injury. The students were asked to use a 5-point Likert scale with anchors *strongly disagree* and *strongly agree* when responding to these prompts: “Athletes are psychologically affected by athletic injuries” and “It is important to treat the psychological aspects of an athletic injury.”

Statistical Analysis

SPSS statistical software (version 12.0; SPSS Inc, Chicago, IL) was used for all statistical analyses with a set α -level of .05. Descriptive statistics were calculated for participant age, gender, and year in school, and to determine the students’ perceptions on the psychological effects of injury and their attitudes about the effectiveness of mental skills as a rehabilitation tool. Frequency statistics were also calculated to determine the percentage of students that had coursework and training in sport psychology as well as those that had experience using psychological skills.

To determine if athletic training students who took a course in sport psychology or psychological skills training differed by year in school, a 2 x 5 Pearson chi-square analysis was used. Two one-way analysis of variance (ANOVAs) were used to analyze possible differences in athletic training students’ perceptions based on their reported history of formal training in psychological skills. Furthermore, we analyzed possible differences in the athletic training students’ perceptions of effectiveness and importance of addressing psychological aspects of injury by year in school using a one-way multivariate analysis of variance (MANOVA).

RESULTS

Coursework, Use of, and Training in Sport Psychology

A total of 50.6% (n = 91) of the students reported that they had taken a course in sport psychology or psychological skills training. A 2 x 5 Pearson chi-square analysis indicated significant differences in year in school (freshmen, sophomore, junior, senior, and entry-level master’s) and if the student had taken a course in sport psychology or psychological skills training (Table 2). More specifically, junior, senior, and entry-level master’s students were more likely to indicate they had taken a course in sport psychology compared to freshmen and sophomores ($\chi^2_{24, 176} = 9.54, P = .049$). However, no differences were found regarding students’ perceptions of the effectiveness of psychological skills between those that reported formal training in psychological skills and those who reported no formal training ($\chi^2_{4, 176} = 7.48, P = .11$).

Table 2. Chi-Square Results in Differences in Year in School and University Coursework in Sport Psychology or Psychological Skills Training (No., %)

Year in School	Coursework in Sport Psychology	
	Yes (n = 91)	No (n = 85)
Freshman	1 (0.6)	5 (2.8)
Sophomore	11 (6.3)	22 (12.5)
Junior	37 (21.0)	25 (14.2)
Senior	38 (21.6)	30 (17.0)
Entry-Level Masters	4 (2.3)	3 (1.7)

^a $\chi^2 = 9.54, p = .049$

Students indicated that they had training in the use of goal setting (74.4%, n = 134) most often, followed by positive self-talk (31.7%, n = 57), imagery (25.0%, n = 45), and pain management techniques (21.7%, n = 39). The students also responded that they had used goal setting most often to improve their own sport performance (86.7%, n = 156), compared to positive self-talk (83.9%, n = 151), imagery (72.8%, n = 131), and pain management techniques (35.6%, n = 64). Similarly, the students stated they had used goal setting themselves most frequently to rehabilitate from a sport injury (78.3%, n = 141), compared to positive self-talk (52.2%, n = 94), pain management techniques (31.7%, n = 57), and imagery (31.1%, n = 56). The students were generally very interested in learning more about psychological skills; 90.6% (n = 163) of the students indicated interest in receiving training in goal setting, as well as training in pain management strategies (83.9%, n = 151), positive self-talk (83.3%, n = 150), and imagery (78.9%; n = 142).

Athletic Training Students' Perceptions on the Psychological Affects of Injury

Results indicated that, in general, the students agreed that athletes are psychologically affected by injury (mean = 4.67 out of 5). Using a one-way analysis of variance (ANOVA), we found no effect on students' year in school and their perceptions of the psychological effects of injury ($F_{4,174} = 2.24, P = .06$). In addition, our results suggested that students generally agreed that it is important to treat the psychological aspects of injury (mean = 4.47 out of 5). Using a one-way ANOVA, we found no effect on students' year in school and their responses on the importance of treating the psychological aspects of injury ($F_{4,174} = 1.73, P = .14$).

Attitudes about the Effectiveness of Mental Skills as a Rehabilitation Tool

The AAI was used to assess the students' attitudes about the effectiveness of mental skills as a rehabilitation tool and included questions within four clusters (ie, goal setting, positive self-talk, pain management strategies, and imagery). Overall, the ratings of the effectiveness of psychological skills were positive; mean scores ranged from 4.31 to 6.17 (Table 3). Overall, the students thought that goal setting was the most effective way to aid athletes in recovering from injury (mean = 6.02) compared to

pain management strategies (mean = 5.71), positive self-talk (mean = 5.67), and imagery (mean = 5.11).

A MANOVA was conducted on the students' effectiveness ratings on each of the clusters of mental skills and year in school. No main effect was found between students' ratings of the effectiveness of mental skills and year in school ($F_{4,16} = 1.47, P = .11, \eta^2 = .033$). The univariate results indicated one significant mental skills cluster (mental imagery) which differed by year in school ($F_{4,174} = 2.86, P = .025, \eta^2 = .06$). More specifically, the responses of junior students (mean[SD] = 4.95[0.79]) were significantly lower than entry-level master's students (mean[SD] = 5.95[0.82]) regarding perceptions of mental imagery as an effective rehabilitation tool.

DISCUSSION

The purpose of this investigation was to examine athletic training students' perceptions and academic preparation in the use of psychological skills in sport injury rehabilitation. In general, students' perceptions were positive. Additionally, regardless of year in school, they agreed that athletes can be psychologically affected by injury, and that it is important to understand how to treat these non-physical injury aspects, students overwhelmingly agreed on the importance of psychological aspects within the injury rehabilitation process.

The results of this study are similar to those reported by Hamson-Utley and colleagues¹² in which they found that both athletic trainers and physical therapists had positive perceptions of the effectiveness of psychological skills during injury rehabilitation and are presented herein for comparison (see Table 3). Looking closer at Table 3, it is important to note that nearly all reported means for the effectiveness of psychological skills by the students are lower as compared to the athletic trainers and physical therapists in Hamson-Utley et al.'s study.¹² This suggests that students may not have as positive of perceptions about the effectiveness of psychological skills during injury rehabilitation. It may also suggest that post-certification professional practice may serve to improve attitudes about psychological skills that students were once unsure would be useful in the rehabilitation setting.

The results of this study contradict Hamson-Utley et al.'s¹² findings in that no differences in perception of effectiveness were found between students who had and students who had not reported formal training in psychological skills. This is surprising given that we expected the students who reported formal training in psychological skills to perceive psychological skills as more effective and important within sport injury rehabilitation. This finding could be due to the fact that we sampled students whereas Hamson-Utley et al.¹² sampled practitioners in the field (ie, athletic trainers and physical therapists) who have years of experience using a variety of techniques within rehabilitation programs. Students who have yet to graduate may not have firm opinions or attitudes about what works best in rehabilitation programs as they are still learning and developing experience; hence, this could explain why formal training produced no significant differences in perception of psychological skill effectiveness.

Table 3. Attitudes about the Effectiveness of Mental Skills as a Rehabilitation Tool (Mean [SD] Compared to Hamson-Utley et al.¹²)

	Our Study	ATs in Hamson-Utley et al.	PTs in Hamson-Utley et al.
1. The use of mental imagery is an effective way to increase focus on specific rehabilitation exercises.	5.25 [1.01]*	5.47 [1.21]	5.62 [1.20]
2. The use of mental imagery is an effective way to improve focus on specific goals of rehabilitation.	5.40 [.97]*	5.56 [1.19]	5.42 [1.27]
3. The use of mental imagery is an effective way to decrease pain during rehabilitation sessions.	4.31 [1.32]*	4.73 [1.45]	4.91 [1.33]
4. The use of positive self-talk is an effective way to decrease pain during rehabilitation sessions.	4.88 [1.34]	5.28 [1.33]	5.30 [1.25]
5. The use of mental imagery is an effective way to maintain a positive mind-set during a long rehabilitation from sport-injury.	5.67 [1.05]*	5.95 [1.10]	5.69 [1.16]
6. The use of mental imagery during rehabilitation can aid the recovery process by visualizing healing occurring within the body.	4.73 [1.40]*	4.98 [1.49]	4.85 [1.42]
7. The use of mental imagery during rehabilitation from sport-injury has the potential to return the athlete to full participation faster than without the use of mental imagery.	4.75 [1.33]*	5.19 [1.30]	5.12 [1.24]
8. Keeping a positive attitude during rehabilitation will help speed up the recovery process.	5.95 [1.08]	6.51 [0.89]	6.17 [1.05]
9. Controlling the level of pain associated with rehabilitation exercises will help speed up the recovery process.	5.67 [1.21]	6.37 [0.93]	6.09 [1.17]
10. Setting appropriate rehab goals will help speed up the recovery process.	6.12 [0.90]	6.41 [1.01]	5.97 [1.10]
11. Keeping a positive attitude during rehabilitation will increase the athlete's adherence rate.	6.17 [0.86]	6.46 [0.80]	6.16 [1.00]
12. Controlling the level of pain associated with rehabilitation exercises will increase the athlete's adherence rate.	5.77 [1.00]	6.35 [0.89]	6.04 [1.05]
13. Setting appropriate rehab goals will help improve the athlete's adherence rate.	5.94 [0.97]	6.46 [0.81]	5.92 [1.07]
14. The use of mental imagery during rehabilitation is an effective way to increase motivation to complete rehabilitation exercises.	5.51 [0.97]*	5.48 [1.19]	5.28 [1.20]
15. The use of mental imagery to increase relaxation is an effective way to reduce anxiety prior to and following surgery.	5.44 [1.12]*	5.80 [1.21]	5.50 [1.24]

* $p \leq .025$

Note: These 15 items compose the Attitudes About Imagery (AAI) Survey.

Our findings indicate that nearly half of the students in this study have taken a university course in sport psychology or psychological skills training. This is similar to Larson et al.'s⁷ research that reported roughly half of ATs in their study had taken a course in sport psychology. Although upper-level students in the current study were more likely to have taken a course in sport psychology or psychological skills training, roughly 20% of senior and entry-level master's students still had not had a course in the area. This is concerning since senior and entry-level master's students are close to graduation and may not take a course in sport psychology or psychological skills training before graduation. This finding is not surprising given that athletic trainers report that their ability to assist athletes in the psychological aspects of injury recovery is limited, and that they generally do not feel adequately prepared to implement psychological skills.^{8,10,11} In addition, psychosocial intervention and referral (PIR) competencies are typically taught across the curriculum, not in a specific course (Hamson-Utley & Stiller-Ostrowski, in progress). In fact, the tendency to have a single course in a program to meet the PIR content is uncommon; hence, this could explain why only about half of the students in this study have taken a university course in sport psychology or psychological skills training. It is possible that the delivery of the PIR content should be encapsulated within one course (eg, Psychology of Sport Injury), versus spread across a variety of courses (eg, Advanced Topics, General Medical Issues, Rehabilitation) to offer the student a concentrated, practical approach that is likely not afforded when just a few competencies are addressed in each course; a concentrated instructional effort may increase attitudes and students' confidence in using psychological skills post-certification.

Of additional concern, the traditional sport psychology course, which is included in the education of the athletic training student to meet the NATA Competencies' requirements, may not address the use of psychological skills with injured athletes or illustrate the effectiveness of such skills when used within sport-injury rehabilitation. Adding to the quandary, it is likely that the academic preparation of the athletic training program faculty who are instructing the athletic training students do not possess the expertise to teach the psychology specific PIR content because of their lack of formal training and/or lack of confidence in implementing such techniques with patients. Hence, we recommend that instructors of the PIR content have adequate knowledge in the psychology of sport injury which may include faculty who are also Association for Applied Sport Psychology certified consultants (AASP-CC). What is promising, however, is that the students in this study indicated a strong interest in learning psychological skills to aid them in assisting athletes with their injury rehabilitation. In line with prior research,¹⁰ the students thought that of all of the psychological skills mentioned (positive self-talk, pain management strategies, goal setting, and imagery), goal setting was the most effective way to help an athlete recover from an athletic injury. In addition, students had the most training in goal setting, had previously used it to rehabilitate an injury, and were most interested in receiving training in this skill compared to others. This finding is not surprising given that Hamson-Utley et al.¹² concluded that goal setting is the most widely used psychological technique today within rehabilitation programs by ATs and other sports medicine practitioners.¹⁵

Practitioners, however, may not correlate goal setting behaviors with mental skills, although it clearly falls into that category. Furthermore, students may see goal setting as more concrete when compared to other mental skills such as imagery, relaxation, or self-talk. The effectiveness of goal setting has been thoroughly investigated and shown to be effective by many researchers¹⁶ and it is more widely used by practitioners and students alike, hence the higher mean rating of effectiveness in this study.

Limitations

Although all ATEPs follow the same set of guidelines to educate students, the convenience sampling technique used to recruit students from nine specific institutions in this study may have limited the generalizability of the findings. Future research on this topic should use stratified random sampling. In addition, it is reasonable to assume that some students have not yet progressed far enough in their academic coursework to take a class in which psychological skills are emphasized (eg, sport psychology). Therefore, it may prove more accurate to only survey athletic training students who are either graduating or in their final semester of coursework instead of all levels.

Future Research Recommendations

Unfortunately, since the questionnaires used in this study do not specifically ask students to rate their perceived future implementation of these psychological skills, future research could be done to include this information and compliment the work of Stiller-Ostrowski and Ostrowski.¹¹ Other future research could also examine pedagogical effectiveness when teaching the psychosocial intervention and referral content area; specifically, how the content is delivered (ie, lecture versus hands-on) and how it is assessed (ie, written versus practical exam). This is particularly important given the lack of training related to the psychosocial competencies that athletic training students in this study as well as ATs in other studies have reported.^{8,11,19}

Qualitative approaches to these questions should also seek to identify ATs who effectively and routinely use psychological skills in their rehabilitation programs. A better understanding of the theoretical and practical experiences that led to their success can shed light on best practices, and, in turn, expose possible avenues for curricular change. Likewise, longitudinal methods could also reveal where students and ATs receive the experience of applying psychological skills to the injury rehabilitation process.

CONCLUSIONS

Recommendations for Program Directors and ATEP Faculty

Our findings highlight students' lack of training in psychological skills and point to the importance of university faculty teaching psychological skills, their use, and their effectiveness within an injury rehabilitation program. Considering the emphasis on goal setting across the athletic training curriculum, it is imperative that those who instruct students prepare them to be well rounded practitioners, and place similar instructional emphasis on mental

imagery, self-talk, relaxation, and other psychological techniques as outlined by NATA Executive Committee for Education's guidelines (Table 1). The current trend in rehabilitative medicine is a holistic approach that includes both physical and mental therapies.¹⁷ For students to be fully prepared, they must not only master goal setting, but also the implementation of other psychological skills within the rehabilitation programs of injured athletes. Athletic trainers are medical professionals who are experts in injury prevention, assessment, and treatment and rehabilitation of primarily orthopedic and musculoskeletal injuries to return patients to play when they are both physically and mentally ready. This study highlights that fact that while students are aware of the psychological aspects of injury, they may not be fully trained in their implementation or be aware of the breadth of psychological "tools" in their rehabilitation tool kit. Psychological skills integrated into rehabilitation programs must be completely understood by the practitioner to be effective for the athlete or active patient.¹⁸ We recommend that these skills be taught using hands-on methods and assessed through practical exams to ensure that the athletic training student is competent in employing psychological skills in future work settings. This type of pedagogy has been shown in recent research by Hamson-Utley and Stiller-Ostrowski to increase confidence in graduating athletic training students' ability to use the aforementioned psychological techniques (unpublished data, 2010).

REFERENCES

1. Milne M, Hall CR, Forwell L. Self-efficacy, imagery use, and adherence to rehabilitation by injured athletes. *J Sport Rehabil.* 2005;14(2):150-167.
2. Scherzer CB, Brewer BW, Cornelius AE, Van Raalte JL, Petitpas AJ, Sklar JH, et al. Psychological skills and adherence to rehabilitation after reconstruction of the anterior cruciate ligament. *J Sport Rehabil.* 2001;10:165-172.
3. Driediger M, Hall C, Callow N. Imagery use by injured athletes: A qualitative analysis. *J Sports Sci.* 2006;24(3):261-279.
4. Ford IW, Gordon S. Perspectives of sports trainers and athletic therapists on the psychological content of their practice and training. *J Sport Rehabil.* 1998; 7:79-94.
5. Andersen MB. Returning to action and the prevention of future injury. In: Crossman J. *Coping with Sports Injuries: Psychological Strategies for Rehabilitation.* Melbourne: Oxford University Press; 2001:162-173.
6. Krane V, Williams J. Psychological characteristics of peak performance. In: Williams JM. *Applied Sport Psychology: Personal Growth to Peak Performance, 6th Edition.* New York, NY: McGraw Hill; 2010:169-188.
7. Larson GA, Starkey C, Zaichkowsky L. Psychological aspects of athletic injuries as perceived by athletic trainers. *Sport Psychol.* 1996;10(1):37-47.
8. Washington-Lofgren L, Westerman BJ, Sullivan PA, Nashman HW. The role of the athletic trainer in the post-injury psychological recovery of collegiate athletes. *Inter Sports J.* 2004; 8:94-104.
9. Handegard LA, Joyner AB, Burke KL, Riemann B. Relaxation and guided imagery in the sport rehabilitation context. *J Excellence.* 2006;10:146-164.
10. Evans L, Hare R, Mullen R. Imagery use during rehabilitation from injury. *J Imagery Res Sport Phys Activity.* 2006;1:1-19.
11. Stiller-Ostrowski JL, Ostrowski JA. Recently certified athletic trainers' undergraduate educational preparation in psychosocial intervention and referral. *J Athl Train.* 2009;44(1): 67-75.
12. Hamson-Utley JJ, Martin S, Walters J. Athletic trainers' and physical therapists' perceptions of the effectiveness of psychological skills within sport injury rehabilitation programs. *J Athl Train.* 2008;43(3): 258-264.
13. Wiese D, Weiss M, Yukelson D. Sport psychology in the training room: A survey of athletic trainers. *Sport Psychol.* 1991;5:15-21.
14. Wiese-Bjornstal D, Smith A, Shaffer S, Morrey M. An integrated model of response to sport-injury: Psychological and sociological dynamics. *J Appl Sport Psychol.* 1998;10:46-70.
15. Playford ED, Dawson L, Limbert V, Smith M, Ward. Goal setting in rehabilitation: Report of a workshop to explore professionals' perceptions of goal setting. *Clin Rehabil.* 2000;14:491-496.
16. Levack WM, Taylor K, Siegert TR, Dean SG, McPherson KM, Weatherall M. Is goal planning in rehabilitation effective? A systematic review. *Clin Rehabil.* 2006;20:739-755.
17. Sordoni, C, Hall, C, Forwell, L. The use of imagery in athletic injury rehabilitation and its relationship to self-efficacy. *Physiother Can.* 2002;Summer:177-185.
18. Monsma E, Mensch J, Farroll J. Keeping your head in the game: Sport-specific imagery and anxiety among injured athletes. *J Athl Train.* 2009;44(4):410-417.
19. Scherzer CB, Williams JM. Bringing sport psychology into the athletic training room. *Athl Ther Today.* 2008;13(3):15-17.

A Call for Evidence-Based Athletic Training Education

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THE CALL

"Evidence-based practice" has become a buzzword in medical and health professions. As our colleagues build a body of best evidence in medical education,¹ so must athletic training educators recognize, and act upon, the obligation to incorporate these concepts into both our teaching and our research.² It is time to conduct research studies and implement education guidelines that reflect this trend. To foster this type of scholarly work, the Research and Education Foundation can proactively encourage and solicit grant proposals regarding athletic training evidence-based education.

HEEDING THE CALL

The timeliness of this call can be recognized in the overall theme of the 2010 Lilly Conferences, "Evidence-Based Learning and Teaching." Information regarding these conferences states that evidence-based learning is the key to the development of critical thinking. Using evidence in teaching is scholarly teaching and producing evidence in teaching is the basis of the Scholarship of Teaching and Learning.³ In case you are not familiar, Lilly conferences are retreats that combine workshops, discussion sessions, and major addresses, with opportunities for informal discussion about excellence in college and university teaching and learning. Internationally-known scholars join new and experienced faculty members and administrators from all over the world to discuss topics such as gender differences in learning, incorporating technology into teaching, encouraging critical thinking, using teaching and student portfolios, implementing group learning, and evaluating teaching.³

Lucky for us, this call for evidence regarding our educational practice is supported by the availability of a repository for such information. Similar to Cochran Systematic Reviews to locate evidence for clinical practices, Campbell Systematic Reviews and

Campbell Library Approved Reviews provide evidence regarding educational practices, through a monograph series readily available online.⁴ The library also gives access to registered titles, approved protocols, and user abstracts. One such example of evidence in this repository is that according to a new meta-analysis just released by the U.S. Department of Education, online learning has been determined to have definite advantages over face-to-face instruction when it comes to teaching and learning.⁵ Certainly, this gives us pause to consider more online learning opportunities for our students.

SUCCEEDING IN THE CALL

The call for evidence-based athletic training education needs to include careful preparation of our athletic training educational manuscripts. Certainly, the standards for evaluating such papers should be as high as that of any other original papers that are published in athletic training.⁶ Perhaps guidelines produced by the *British Medical Journal* to review original papers that describe educational innovations could be used by authors who are preparing their work for the *Athletic Training Education Journal*.⁶ These suggestions for well-written (and conducted) studies could be used by researchers and authors to improve publication rates, ultimately having a greater impact on clinical practice. Of course, the studies and associated papers may take various forms--detailed observational studies, properly conducted questionnaire surveys, or randomized controlled studies. In all cases, the criteria listed in Table 1 could be applied.

CONCLUSION

Because our educational practices may impact patient care as well as individuals' learning,⁷ we must impose high standards of scientific rigor on our educational practices.³ Clinical research findings, however clear and useful, are diminished when their instruction lacks basis and rigor.

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Table 1. Criteria for Preparing an Athletic Training Educational Research Manuscript

Does it add anything new and valuable?

Studies should be genuinely original. This could include confirming and extending previous studies (particularly if they are methodologically superior to previous work). Studies confirming what has been shown several times before are of little interest.

Is it suitable for a general readership?

Papers that are intended primarily for an audience with a specialized interest in education should be published elsewhere. Educational jargon should be avoided, or at the very least, be explained simply and fully.

Is it readable?

Papers should be logical, coherent, and readable, visually attractive, with relevant tables and diagrams.

Are the aims and objectives clearly stated?

The educational rationale, context of the study, and methodology should relate to the aims and objectives. The research techniques used must be appropriate to answer the question(s) posed in the aims, and to achieve the study objectives.

Is the educational rationale explicit?

It should be obvious from the paper that the study is founded on the application of theoretical principles. An adequate review of the literature should be given to support the basis of the study.

Is the educational intervention described in context?

The paper should describe the population and its stage of educational development. This could include details regarding the individual course or module, its place within the curriculum, and the physical environment in which the study took place.

Are the Methods described in enough detail?

Balance is key, avoiding information overload but providing sufficient detail to allow scrutiny and reproducibility. The evaluation tool needs to also be described in enough detail.

Is recruitment of participants described in enough detail?

The method of recruitment needs justification. If control groups are used, the process of selecting controls should be fully described and rigorous.

Are the results meaningful?

Educational interventions are often difficult to analyze because multiple variables are involved, and because there may be more than one explanation for the results. The results need to be presented in sufficient detail to be meaningful, and the statistical analysis should be appropriate for the study design.

Is the discussion structured and useful?

The discussion should begin with a sentence on the principal finding, followed by a thorough examination of the strengths and weaknesses of the study itself (including in relation to other studies). Any differences in results, and why different conclusions have been reached, should be emphasized, discussing the generalizability and meaning and implications of the results (including implications for clinicians). Finally, unanswered questions and future research ideas should be discussed.

REFERENCES

1. Hart I. Best evidence medical education (BEME) (editorial). *Med Teacher*. 1999;21(5):453-454.
2. Stipek D. Scientifically based practice: It's about more than improving the quality of research. *Educ Week*. 2005;24(28).
3. McClain K. 2010 Lilly Conference of Greensboro. The University of North Carolina at Greensboro. 2009. Available at: <http://www.uncg.edu/tlc/lillyconference/>. Accessed October 6, 2009.
4. The Campbell Library. The Campbell Collaboration. 2009. Available at: <http://www.campbellcollaboration.org/library.php>. Accessed October 9, 2009.
5. *Evaluation of evidence-based practices in online learning: a meta-analysis and review of online learning studies*. Washington, D.C.: U.S. Department of Education, Office of Planning, Evaluation, and Policy Development; 2009.
6. Guidelines for evaluating papers on educational interventions. *BMJ*. 1999;318:1265-1267.
7. Morrison JM, Sullivan F, Murray E, Jolly B. Evidence-based education: Development of an instrument to critically appraise reports of educational interventions. *Med Educ*. 1999;33(12):890-893.

Incorporating Foundational Evidence-Based Practice Concepts and Skills Across an Athletic Training Education Program

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Objective: The purpose of this article is to provide an example of how to develop and implement an evidence-based practice (EBP) concepts and skills plan in an athletic training education program (ATEP).

Background: Evidence-based practice is an integral part of medical practice today. As stated in the *Athletic Training Educational Competencies 4th edition*, athletic training educators are expected to develop their students' abilities to engage in EBP. However, foundational concepts and skills are needed to effectively practice EBP.

Description: To eliminate redundancy and better prepare our students for EBP, a plan based on incorporating foundational concepts and skills concepts in small, sequential doses in our ATEP was devised and implemented.

Clinical Advantage(s): Exposure to foundational EBP concepts and skills is necessary for students to actively engage in EBP.

Conclusion(s): Despite the challenges for both students and faculty, the plan ensures we expose our students to EBP concepts and skills, therefore better enabling them to engage in EBP.

Key Words: evidence-based medicine, evidence-based athletic training, teaching evidence-based practice, pedagogy

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Incorporating Foundational Evidence-Based Practice Concepts and Skills across an Athletic Training Education Program

Lisa S. Jutte, PhD, ATC and Stacy E. Walker, PhD, ATC

There are many reasons why evidence-based practice (EBP) concepts and skills should be integrated into an athletic training education program (ATEP). First and most importantly, integrating the most current evidence into patient care can improve patient outcomes.¹ Improved patient outcomes ensure that our graduates are competitive in the health care industry. Other health care professionals, such as physicians, nurses and physical therapists, embrace EBP. In addition, the *Athletic Training Educational Competencies 4th edition*² states that athletic training educators are expected to develop their students' abilities to practice EBP. Despite the overwhelming support by various health care professions, many clinicians do not engage in EBP, citing a perceived lack of personal research and evaluation skills as the major barriers.^{3,4} Therefore, to increase the engagement of athletic trainers in EBP, educators must ensure that future clinicians possess the necessary skills and knowledge for EBP.

The process of properly searching for, evaluating, and applying evidence in clinical practice cannot be learned quickly by novice students. For students to actively engage in EBP, educators must progressively teach them foundational concepts and skills derived from evidence-based medicine (EBM);⁵ only then will they be able to effectively practice the 5 steps of evidence-based health care⁶ (Table 1). Therefore, in the spring of 2006, we developed a plan to integrate foundational EBP concepts and skills across our curriculum. The purpose of this article is to provide an example of how an ATEP can foster students' abilities to engage in EBP.

ATEP ASSESSMENT

Our program assessment began by informally evaluating our curriculum to identify EBP concepts and skills currently taught. This was accomplished at a weekly meeting where the three full-time faculty members discussed what types of EBP concepts and skills were being taught in the various classes. Prior to this project, none of the faculty had formal training in EBP, but all had read books and articles and attended conferences on the subject. During our discussions, we realized that we already taught many of the foundational concepts and skills needed to practice EBP. Unfortunately, these concepts and skills were unorganized, did not necessarily build on one another, and did not include common EBP terminology (eg levels of evidence, gold standard). After identifying which EBP principles were currently taught, we developed a plan to incorporate the remaining foundational concepts and skills and organize all of them into a logical sequence across the curriculum.

Developing the Plan

Beginning with the end in mind, we developed a list of specific student objectives (Table 2). We based these objectives on the five steps needed to practice evidence-based healthcare⁶ (Table 1)

and the current EBP pedagogy literature from other healthcare professions.^{5,7-19} Many of our objectives were designed to help teach EBP concepts and related terminology because before students can engage in EBP, they must understand the framework and language (eg, peer-review, levels of evidence, gold standard). We also included objectives, such as "conduct a simple clinical experiment," which are indirectly related to practicing EBP to stimulate students' appreciation for how clinical evidence is generated. Lastly, objectives were structured in small sequential units to foster a positive attitude towards EBP and lifelong practice in other health care students.^{5,9}

After establishing objectives, a list of specific foundational EBP concepts and skills (Table 3) students would need to reach our objectives was constructed. A plan to integrate those concepts and skills into various courses in our established curriculum was then devised based on the following factors: 1) which concepts and skills needed to be learned first (eg, finding evidence before applying it to clinical problems); 2) the student class level (e.g, freshman, sophomore); 3) the course content (e.g, injury evaluation versus therapeutic modalities); and 4) assignments and/or activities we could use to reinforce the concepts and skills. For example, there was more connection between EBP and course content if students in the upper and lower extremity orthopedic evaluation had an assignment regarding functional outcome instruments, rather than students in the organization and administration class completing the same assignment. By mapping out in which class or classes the foundational concepts and skills belonged, we ensured the information was presented in an organized fashion with concepts building upon one another.

Plan Overview by Class Level

In this section we present an overview of our current plan (Table 3) based on student class level (eg, sophomore, junior, senior). The

Table 1. Steps to Practicing Evidence-Based Health Care

1. Asking a clinical question based on the need for information.
 2. Researching the best evidence, which relates to the clinical question.
 3. Critically evaluating the validity, impact, and applicability of the evidence.
 4. Applying the evidence to the clinical problem in the context of your clinical expertise and the patient's values and circumstances.
 5. Evaluating the effectiveness of the previous steps, and seeking ways to improve evaluation, treatment, etc. of your patients for the future.
-

Table 2. Objectives of EBP Concepts and Skills Plan

1. Students will understand what EBP is and how it can affect clinical practice.
2. Students can efficiently ask clinical questions and obtain current and reliable evidence to answer these questions.
3. Students can conduct a simple clinical research experiment.
4. Students will demonstrate positive attitudes regarding EBP during their clinical experiences.
5. Students are able to incorporate EBP into their clinical practice.
6. Students are able to evaluate their EBP practice through self-reflection.

plan is arranged according to our ATEP course sequence, with some skills repeated in several classes. For example, the same foundational concepts and skills are taught in both the upper extremity and lower extremity evaluation courses. We have found that the repetition helps the students more fully understand EBP concepts. Since the plan builds through their six semesters in our ATEP, students are neither expected nor prepared to practice the five steps of evidence-based health care⁶ until their senior year.

Evidence-based practice is first introduced in the Introduction to Athletic Training class taken by freshman and sophomores prior to admittance into the ATEP. In this course, the students attend a library learning session where a librarian introduces them to basic search techniques, such as the use of Boolean terms, literature databases available at our institution (eg, MEDLINE, CINAHL), and EBP/M databases (eg, The Cochrane Library, Centre for Reviews and Dissemination Databases). Students then practice their research skills for a class assignment.

Once students are introduced to EBP concepts and understand where they can search for evidence, they are then introduced to more advanced concepts and skills in their sophomore level classes after being admitted into our ATEP. For example, in our Prevention and Care of Musculoskeletal Injuries course, we explain the differences between peer-reviewed case reports and original research articles. Students are instructed to select both a case report and original research article from a list (prescreened by the instructor for course relevance and straightforwardness) and write an annotative bibliography for each (format provided). The purpose of this assignment is to understand the difference between a case report and an original research article, which can both be relevant to athletic training. In the upper and lower extremity orthopedic evaluation courses, also during the sophomore year, we again discuss the concept of EBP, but this time we present more advanced ideas, such as the levels of evidence, clinical prediction rules (eg, Ottawa ankle rules, Wells clinical prediction rules), position statements (eg, concussion, cervical-spine management), and clinician and patient-based outcomes. To help students develop their understanding of these concepts, the students complete the following assignments: 1) one of three EBP tutorials, internet-based, interactive guides on

EBP (Table 4); 2) complete either the Lower Extremity Function Scale (LEFS)²⁰ or the Disabilities of the Arm, Shoulder, and Hand (DASH)²¹ with a patient at their clinical experience; 3) locate the Wells clinical prediction rule²² and discuss this clinical prediction rule with your clinical instructor; 4) locate the 2009 NATA Position Statement: Acute Management of the Cervical Spine-Injured Athlete²³ and discuss this position statement with your clinical instructor. The purpose of these assignments is to relate the information learned thus far to their clinical experiences.

The following year, as juniors in the Therapeutic Modalities and Therapeutic Exercise classes, students are ready to synthesize information from multiple sources (eg, peer-reviewed articles, Cochrane summaries, expert opinion) into a single assignment. One assignment in the Therapeutic Modalities class requires students to determine a treatment plan and provide support for their clinical decisions based on the best evidence for a case study or “paper patient” and present their clinical decision to their fellow classmates for discussion. In the Therapeutic Exercise class, students develop a PICO question regarding a patient with an orthopedic impairment, such as limited range of motion. After a brief review of sources for clinical evidence learned in previous classes, students are instructed to prepare a modified critically appraised topic (CAT) paper explaining the current evidence for treating their patient’s impairment (Table 5). At the end of the modified CAT project, students are also asked to reflect and write about their current search for evidence and compare it to past strategies for finding clinical evidence.

Lastly, seniors in the athletic training capstone class complete a semester-long project in which they ask a clinical research question, complete background research, and collect data to answer their question. The project begins with class discussions regarding basic research design, such as clinical trials, cohort studies, case control studies, and as the semester progresses, students develop a research question based on the PICO method and write a literature review. During this process, students critically examine the available literature while developing their literature review for which they receive feedback in a format similar to a manuscript peer-review process. After collecting data, students submit an abstract of their research as a final report.

Revising Our Plan

Our ATEP faculty reviews the EBP concepts and skills plan annually. Revisions are made to the objectives, concepts/skills, lecture content, and assignments as needed. At the end of the 2007-2008 academic year, we revised the objectives to increase focus on the reevaluation skills needed for effectively practicing the 5th step of EBP by adding the objective, “Students are able to evaluate their EBP practice through self-reflection.” Other programmatic revisions were based on new resources and/or concepts to which individual faculty member had been introduced over the academic year. For example, the addition of the EBP tutorial assignments to facilitate student comprehension was based on the availability of the online tutorials that were relevant to our purpose. Another example of a class assignment revision was changing the project format used in the therapeutic exercise

Table 3. List of Specific Concepts and Skills Students Need to Practice, Organized by ATEP Course Sequence

Concept / Skill	Who acquires the evidence?	Example of Activities	Class
Introduce the concept of evidence based practice and review the scientific method	No evidence needed	<ul style="list-style-type: none"> ▪ EBP lecture ▪ Mini class experiment ▪ Library session 	<ul style="list-style-type: none"> ▪ Introduction to Athletic Training
Understand the concept of peer-review and the differences between primary sources, secondary sources, popular magazines, and websites	Instructor	<ul style="list-style-type: none"> ▪ Students read examples of each type of evidence 	<ul style="list-style-type: none"> ▪ Introduction to Athletic Training ▪ Prevention and Care of Musculoskeletal Injuries ▪ Lower Extremity Evaluation ▪ Upper Extremity Evaluation
Reading comprehension of research articles	Instructor	<ul style="list-style-type: none"> ▪ Students write abstracts 	<ul style="list-style-type: none"> ▪ Prevention and Care of Musculoskeletal Injuries
Summarize information	Instructor	<ul style="list-style-type: none"> ▪ Students write abstracts 	<ul style="list-style-type: none"> ▪ Prevention and Care of Musculoskeletal Injuries
Understand the concept of EBP and related terminology	Instructor	<ul style="list-style-type: none"> ▪ EBP Lecture ▪ Complete EBM/P tutorial 	<ul style="list-style-type: none"> ▪ Lower Extremity Evaluation ▪ Upper Extremity Evaluation ▪ Athletic Training Capstone
Search for evidence	Student after instruction	<ul style="list-style-type: none"> ▪ Students find evidence on a specific topic ▪ Public v. Fee Databases ▪ EBP/M databases such as DARE, Cochrane, etc ▪ Save search results ▪ Email search results 	<ul style="list-style-type: none"> ▪ Lower Extremity Evaluation ▪ Upper Extremity Evaluation
Finding & retrieving evidence: library search (hard copy), electronic journals, & interlibrary loan	Students after instruction	<ul style="list-style-type: none"> ▪ Student obtains articles: ▪ Hard copy from library ▪ E-journal (soft copy) ▪ Interlibrary loan 	<ul style="list-style-type: none"> ▪ Lower Extremity Evaluation ▪ Upper Extremity Evaluation
Understand differences between levels/types of evidence. (eg difference between basic research and randomized clinical trials)	Instructor Students after instruction	<ul style="list-style-type: none"> ▪ Levels of evidence lecture ▪ Students read examples of different levels of evidence. ▪ After instruction, student find examples of different evidence levels 	<ul style="list-style-type: none"> ▪ Lower Extremity Evaluation ▪ Upper Extremity Evaluation

Table 3. List of Specific Concepts and Skills Students Need to Practice, Organized by ATEP Course Sequence (continued)

Concept / Skill	Who acquires the evidence?	Example of Activities	Class
Develop a clinical question	N/A	<ul style="list-style-type: none"> ▪ Students use PICO method to develop a question 	<ul style="list-style-type: none"> ▪ Therapeutic Exercise ▪ Athletic Training Capstone
Find and apply current evidence to patient problems	Students	<ul style="list-style-type: none"> ▪ Case studies & Presentation ▪ Treatment guidelines ▪ Students write a modified Critically Appraised Topic (CAT) 	<ul style="list-style-type: none"> ▪ Therapeutic Modalities ▪ Therapeutic Exercise
Evaluate EBP process		<ul style="list-style-type: none"> ▪ Students reflect on process of finding and applying evidence 	<ul style="list-style-type: none"> ▪ Therapeutic Exercise
Understand different research designs, ie clinical trials, cohort studies, case control studies, cross-sectional surveys, case studies, expert opinion, & anecdotal.	Instructor Students after instruction	<ul style="list-style-type: none"> ▪ Students read different types of articles then compare and contrast articles 	<ul style="list-style-type: none"> ▪ Athletic Training Capstone
Critically review evidence	Students	<ul style="list-style-type: none"> ▪ Students criticize study for strengths and weaknesses rather than their understanding & use. ▪ Student uses an appraisal check list to evaluate evidence 	<ul style="list-style-type: none"> ▪ Athletic Training Capstone
Generate a literature review	Students	<ul style="list-style-type: none"> ▪ Students write a literature review 	<ul style="list-style-type: none"> ▪ Athletic Training Capstone
Develop a research question	Students	<ul style="list-style-type: none"> ▪ Students develop research question / hypothesis 	<ul style="list-style-type: none"> ▪ Athletic Training Capstone
Conduct an EBP research study	Students	<ul style="list-style-type: none"> ▪ Students carry out data collection & makes conclusions. Instructor assess with data analysis 	<ul style="list-style-type: none"> ▪ Athletic Training Capstone

Table 4. Evidence-Based Practice Tutorials

Duke University Medical Center Library and Health Sciences Library, UNC-Chapel Hill, Introduction to Evidence-Based Practice	http://www.hsl.unc.edu/services/tutorials/ebm/index.htm
SUNY Downstate Medical Center Evidence-Based Medicine Tutorial	http://library.downstate.edu/EBM2/contents.htm
Evidence-Based Practice Tutorial for Nurses	http://www.libraries.psu.edu/psul/tutorials/ebpt.html

Table 5. Description of Critically Appraised Topic (CAT) Assignment

<p>I. Students need a minimum of 5 pieces of evidence and 1 piece should be a EBP summary report or meta-analysis</p>
<p>II. For each article/piece of evidence the following information is given:</p> <ul style="list-style-type: none">▪ Study Design (e.,g., number of treatment groups, is there a control group, are subjects and/or patients blinded to treatment)▪ Participants (e.g, age, gender, activity level)▪ Intervention Investigated▪ Outcome Measure(s)▪ Main Findings▪ Level of Evidence▪ Conclusion
<p>III. Students provide an overall summary describing which treatments are most and/or least effective based on the evidence.</p>

class from a series of annotated bibliographies followed by a summary paragraph to a modified CAT paper. While the new Therapeutic Exercise assignments are still very similar to their original counterparts, the modified CAT format reinforces an EBP resource students might use in the future.

CHALLENGES & BENEFITS

Developing and implementing the EBP concepts and skills plan was not extremely difficult, but it did take time and effort. We were already covering several of the concepts/skills but were not relating them to the EBP concepts and skills. For example, prior to the implantation of our plan, we discussed current research in our therapeutic modalities and rehabilitation classes, but had neither introduced the EBP concept of levels of evidence nor clearly used EBP terminology. We suggest those who were not formally taught

evidence-based health care to start by reading, *Evidence-based Medicine: How to Practice and Teach EBM*.⁶ This book is known as the “gold-standard” and presents the 5 steps of evidence-based health care. It is beyond the scope of this article to provide a detailed list of available resources (eg, articles, books, websites, tutorials, databases) but some of this information can be found elsewhere.²⁴

For the plan to be successful, faculty need to not only understand and be able to teach the new concepts and skills, but also develop new class resources and assignments to reinforce them. By linking EBP across our curriculum, students are exposed to the material in a sequential and efficient manner. This has fostered a change in attitude and behavior towards evidence, with students now sharing articles and websites outside of class assignments with faculty and classmates, and inquiring about evidence associated with course content if it is not adequately addressed.

CONCLUSION

Our hope was that by sharing our experiences of incorporating EBP into our ATEP we will encourage others to do the same. We suggest taking the following steps to integrate EBP concepts and skills into your ATEP:

1. Identify if and where EBP concepts and skills are currently being taught in your ATEP;
2. Identify the concepts and skills that need to be added so your students are prepared to practice the five steps of evidence-based health care⁶;
3. Develop a plan regarding how and where concepts and skills will be addressed in your ATEP;
4. Implement your plan;
5. Revise as needed.

Practicing EBP can be challenging for clinicians if they are unfamiliar with EBP concepts or how to efficiently find and review current information. By developing EBP concepts and skills in a stepwise approach throughout our ATEP curriculum, we are fostering an appreciation for EBP, and have begun to see changes in students’ abilities and attitudes towards practicing EBP.

REFERENCES

1. Steves R, Hootman JM. Evidence-based medicine: What is it and how does it apply to athletic training? *J Athl Train*. 2004;39(1):83-7.
2. National Athletic Trainers' Association. *Athletic Training Educational Competencies*. 4th ed. Dallas, TX; 2006.
3. Retsas A. Barriers to using research evidence in nursing practice. *J Adv Nurs*. 2000;31(3):599-606.
4. Iles R, Davidson M. Evidence based practice: a survey of physiotherapists' current practice. *Physiother Res Int*. 2006;11(2):93-103.
5. Wyer PC, Keitz S, Hatala R et al. Tips for learning and teaching evidence-based medicine: Introduction to the series. *Can Med Assoc J*. 2004;171(4):347-8.

6. Straus SE, Richardson WS, Glasziou P et al. *Evidence-based Medicine: How to Practice and Teach EBM*. 3rd ed. Edinburgh: Elsevier Churchill Livingstone; 2005.
7. Rambur B. Fostering evidence-based practice in nursing education. *J Prof Nurs*. 1999;15(5):270-4.
8. Krueger PM. Teaching critical appraisal: A pilot randomized controlled outcomes trial in undergraduate osteopathic medical education. *J Am Osteopath Assoc*. 2006;106(11):658-62.
9. Coomasamy A, Khan KS. What is the evidence that postgraduate teaching in evidence based medicine changes anything? A systematic review. *Br Med J*. 2004;329(7473):1017.
10. Alper BS, Vinson DC. Experiential curriculum improves medical students' ability to answer clinical questions using the internet. *Fam Med*. 2005;37(8):565-9.
11. Ciliska D. Educating for evidence-based practice. *J Prof Nurs*. 2005;21(6):345-50.
12. Hazlett CB. Teaching evidence-based medicine. *Hong Kong Med J*. 1998;4(2):183-90.
13. Copus SF, Empanaza JI, Hadley J et al. A clinically integrated curriculum in evidence-based medicine for just-in-time learning through on-the-job training: The EU-EBM project. *BMC Med Educ*. 2007;7:46.
14. Khan KS, Coomasamy A. A hierarchy of effective teaching and learning to acquire competence in evidenced-based medicine. *BMC Med Educ*. 2006.
15. Kelly EK, Hunley AL, Wegner JL et al. Evidence-based nursing: Making changes in the clinical practice through the collaboration of nursing students and practicing nurses. *Appl Nurs Res*. 2005;18(4):229-31.
16. Shorten A, Wallace MC, Crookes PA. Developing information literacy: A key to evidence-based nursing. *Int Nurs Rev*. 2001;48(2):86-92.
17. Shin JH, Haynes RB, Johnston ME. Effect of problem-based, self-directed undergraduate education on life-long learning. *CMAJ* 1993;148(6):969-76.
18. Pitkala K, Mantyranta T, Strandberg TE et al. Evidence-based medicine - How to teach critical scientific thinking to medical undergraduates. *Med Teach*. 2000;22(1):22-6.
19. Romanello ML, Martin M. Information literacy in athletic training: A problem-based approach. *Athl Ther Today*. 2006;11(3):40-3.
20. Binkley J, Stratford P, Lott S et al. The lower extremity functional scale (LEFS): Scale development, measurement properties, and clinical application. *Phys Ther*. 1999;79(4):371-83.
21. Hudak P, Amadio P, Bombardier C et al. Development of an upper extremity outcomes measure: The DASH (Disabilities of the arm, shoulder, and hand). *Am J Ind Med*. 1996;29:602-8.
22. Lin KW. Wells clinical prediction rule for DVT in primary care. *Amer Fam Physician*. 2006;73(4):690.
23. Swartz EE, Boden BP, Courson RW et al. National Athletic Trainers' Association position statement: Acute management of the cervical spine-injured athlete. *J Athl Train*. 2009;44(3):306-31.
24. Jutte LS, Walker SE. Incorporating and teaching evidence-based practice. *The Athletic Trainer's Pocket Guide to Clinical Teaching*. Thorofare, NJ: Slack Inc.; 2009. p 43-60.

Should Athletic Training Educators Utilize Grades When Evaluating Student Clinical Performance?

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Objective: To explore and address some of the challenges for assessing, interpreting, and grading athletic training students' clinical performance and to suggest athletic training educators consider using a more universal assessment method for professional consistency.

Background: In years past students learned from teachers or mentors on an individualized basis without receiving a grade for their performance. Grading began primarily from a need to teach and evaluate more students at one time. Over the past two centuries, grading has become a complex process that serves multiple roles including evaluation of learning, skill development, motivation, communication abilities, organizational skills and behaviors.

Description: Currently there are many ways to evaluate and grade students in clinical education courses. When evaluators use inconsistent assessment techniques and a grade is not measuring the same criteria, the validity of a grade becomes questionable. Consequently, feedback from a universal assessment instrument may be more meaningful.

Clinical Advantages: Clinical instructors in athletic training education programs who assess and grade student clinical performance should measure similar criteria. Currently most educators express measurement of these criteria with a single letter grade. Consideration for a more reliable and valid instrument that includes more information should be given.

Conclusion: A universal system of assessing clinical performance would present more accurate and consistent information than a single grade indicates. Athletic training educators are encouraged to consider re-evaluating how they assess clinical performance of students and what a single grade actually communicates to the student and others.

Key Words: grading practices, evaluation of clinical skills, validity of grades, clinical performance assessment models

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Should Athletic Training Educators Utilize Grades When Evaluating Student Clinical Performance?

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Since entering the profession, we have graded athletic training students for various didactic and clinical courses. During the past fall semester, we made a cursory review of average class grades for the didactic and clinical courses we taught over the past several semesters. Typically, our students have averaged between a B to B+ in the didactic courses and an A- to A for the clinical courses. This is particularly interesting since we had mostly the same students in both types of courses. We suspect that this discrepancy would not surprise anyone who deals with grading in clinical education programs, and we doubt that our numbers would have been much different if we looked back 20 years or further.

This grading difference caused us to reflect and wonder what part of our evaluation criteria results in these higher grades. It also caused us to speculate if the grades we assign are meaningful to the students or others who may view them. We believe part of the discrepancy occurs because the grade is based upon different criteria for the clinical courses, which places more emphasis on professional behaviors than student learning. We also feel it may be more difficult to assess and grade clinical skills along with professional traits, thereby causing us to be more lenient.

Regardless of how we choose to grade a student's learning or clinical performance, it is evident that many athletic training educators use different grading criteria. For example, some instructors are much "harsher" in terms of taking off points for late assignments than they are for the demonstration of a clinical proficiency at an "average" level rather than an "excellent" level. Noting this, we question what a grade truly represents. Interestingly, when surveying selected athletic training education programs (ATEPs), we found that 88% (29 of 33) of the programs currently utilize letter grades for their clinical courses as opposed to a pass/fail system.

The purpose of this paper is to briefly review the history of grading and discuss some of the challenges of grading accurately and consistently, particularly for clinical courses. Our second purpose is to suggest that it may be time for ATEPs to consider using a universal assessment/grading system so course grades are more meaningful and valid across the athletic training profession.

Should we view a grade of A the same if 90% of the students in the class receive an A compared to an A grade in a class when only 20% of the students receive an A? What does it really tell us? It is ironic that grades often attract the most attention while only providing us with minimal information. If we see that a student received a B or C in a clinical course, we know something is "wrong" but we probably do not know what is wrong. The grade may indicate inadequate mastery of clinical skills, but it is far more likely to be indicative of unprofessional behavior, noncompliance, late assignments, poor attitude, or poor communication skills. Unfortunately and upon self-reflection, a large segment of our grading practices have become a system of "punishment and

reward" versus being a useful measure of student learning or clinical performance. According to Kohn¹, some educators argue their purpose is not to sort or motivate students (by grading), but to provide feedback so students can learn more effectively. In addition, Kohn^{1(p4)} states "The best evidence we have of whether we are succeeding as educators comes from observing behavior rather than test scores or grades." Perhaps we should take this to heart in our future grading practices. Alfara-LeFevre², a nursing educator, presents an argument that clinical courses should be graded pass-fail because in order to promote and evaluate critical thinking, educators must consider performance from many different aspects. We believe this may have merit as a way to evaluate clinical skill performance because we, as potential employers, are typically more interested in an applicant's clinical skills and professional characteristics than their grade point average.

We also feel giving feedback regarding clinical performance is crucial, but it is not necessary to have a grade attached to every aspect of it. Therefore, we cannot realistically expect a single final grade to be completely indicative of a student's performance. More than two decades ago, Draper³ addressed the importance of a consistent clinical evaluation model in regards to the evaluation of athletic training students during their clinical experiences. A joint committee on standards of evaluation, representing 12 different educational disciplines, defined evaluation as the systematic investigation of the worth or value of some object (ie, a course grade).⁴ Those of us trying to improve the efficiency of the educational process need to be consistent or risk the perpetuation of invalid grading practices.⁵ Few teachers actually have formal training in grading methods and have limited knowledge about their effectiveness.⁶ This fact results in most instructors grading their students similar to the way they were graded. Although there are many purposes of grading, few teachers agree on which is most important. Consequently, teachers often attempt to address all purposes of grading with a single procedure or policy but end up achieving none particularly well.⁶

HISTORY AND PURPOSE OF GRADING

Many early scholars such as Shakespeare, Galileo, Plato, Thomas Jefferson, and Ben Franklin shared something unique about their education. All of these individuals attended schools or had teachers who graded them on a pass/fail system. These early students learned by interacting with other students and teachers throughout the day. As the students finished their education, the most important fact they could share about their experience was the name of their teacher or mentor, not their institution or grade point average (GPA).⁷ This mentoring relationship does not seem much different than what many current athletic training educators desire of clinical education experiences. Students often prefer one-on-one learning because they feel it is the most efficient instructional method.⁸

Multiple sources report that Cambridge University tutor William Farish “invented” grades in about 1792.^{7,9} During the Industrial Revolution, schools began paying educators based on the number of students they taught instead of a fixed salary. Farish took the model for grading shoe quality and developed grades for his students. Thus, he could process more students in a shorter period and be paid more. This educational system of using a lecture hall or classroom to teach students spread rapidly throughout Europe and America; consequently, the previous system of mentoring students on a more individualized basis was lost. Education reform in athletic training resulted in moving back to a one-on-one relationship for teaching and evaluating clinical skills/proficiencies to the student.¹⁰ However, performance in most clinical courses is still graded with a letter, which represents a multitude of factors.

According to Walvoord and Anderson,¹¹ grading is a complex process that serves multiple roles including evaluation, motivation, communication, and organization. Frisbie and Waltman¹² state that grades primarily communicate student achievement to the student, their parents, and others. Secondly, grades provide a motivation for learning, information about a student’s strengths and weaknesses, information regarding past performance, and a prediction of future academic success. Grades seem to be a motivating factor for A and B students, yet they may reinforce failure-oriented behaviors in those students with poor grades. Frisbie and Waltman¹² also discuss the importance of each teacher reflecting upon their values to establish a consistent grading scheme. We have always felt that grades should be a reflection of primarily student learning although we know it is seldom the case, particularly in clinical courses.

WHY USE GRADES TO ASSESS CLINICAL PERFORMANCE?

During a job search, is a letter of recommendation more important than a student’s GPA? This question has always led to interesting discussions in our senior seminar course and among our faculty. Our students have also discussed if and how their GPA may influence their preparation for graduate study, an entry-level athletic training position, or some other pursuit. As one may imagine, the opinions about what grades really indicate vary substantially each semester. We have often advised our undergraduate students that prospective employers are usually more interested in their professional characteristics and clinical skills (as stated in a letter of recommendation) than their GPA (as indicated by their transcript). It is likely that most athletic training educators can remember a time when they recommended a student with a lower GPA more enthusiastically than another student with a higher GPA. When our faculty discuss grading, they present a relatively wide range of mechanisms for evaluating and grading student work. Generally, they also discuss the validity of a grade. The bottom line is that a grade often reflects something different to each individual in the process. Grades are intended to communicate to students, graduate schools, parents, or future employers the potential for future performance or success.¹³ If the grade is not valid, it is unlikely that it will accurately convey these purposes.

Anyone who has taught recently has likely heard questions such as “Will this information be on the exam?”; “Will we be graded on this material or assignment?”; or “What can I do to improve my grade or get extra credit?” It appears obvious to us that students who ask these questions often seem more concerned about their grade than their learning.¹⁴ While it is important to clarify for students how they will be graded and what the course objectives are, how often have students asked you to help them be a more efficient learner, develop their skills, or be a better writer? Grades have somehow evolved into the most important aspect of our educational programs even though they may reflect different things to different people. It seems we have created a system for evaluating every aspect of “learning” and turned it into a single letter or number that is most likely invalid. How do we change or impact a grading system that has perpetuated for a long time into something more useful?

Grades have been identified as the single greatest stressor in a college student’s life.^{11,15} If we know grading causes the most stress in a student’s life and so much “structure” decreases learning,¹² why do we grade? To address the issue that medical school is inherently stressful, many schools have moved toward a pass/fail system in recent years.¹⁵ For some insight on this issue, we refer to an important finding reported by a one medical school. While using pass/fail grading for the first 2 years of medical school, students demonstrated improved psychological well-being and satisfaction.¹⁵ These positive outcomes occurred without any reduction in course performance, test scores, success in residency placement, or level of attendance.

GRADING CLINICAL COURSES

Grading clinical classes can be particularly challenging. There is little question that current clinical course outlines at our institution typically place a higher premium on several factors other than student learning. For example, our courses place a heavy weight on grades for attendance, participation, accumulation of clinical hours, skill demonstration, and clinical instructor (CI) evaluations of the student’s clinical skills and professional characteristics. The grades for our CI evaluations rely more on professional traits (interest, attitude, response to constructive criticism, timeliness or tardiness, dependability, etc.) than learning (see Appendix A). Singham^{16(p52)} presents an interesting perspective by stating, “The implicit message of the modern course syllabus is that a student will not do anything unless bribed by grades or forced by threats.” An important consideration is if we want to “force” students to learn by giving or taking away a grade for virtually everything they do or do not do. Singham¹⁶ also indicates there is a wealth of literature that shows controlling environments consistently reduce people’s interest in whatever they are doing. Guskey⁶ states that giving zeros and low grades more often causes students to withdraw from learning.

London^{17(p117)} asks, “What is the relationship between behavior and grades?” and feels educators need to design an approach to grading that supports rather than discourages student learning. One suggested solution is to give one grade for academics and another grade for class behavior(s). Others concur and recommend reporting behavioral aspects separately from academic grades.⁶

As we reviewed our clinical course grading schemes, we realized that much of our grade is affected by behavioral measures as opposed to learning objectives. As a result, we agree that we should give a minimum of two grades for each clinical course.

Currently, we base grades for our “clinical” courses on several primary criteria. The student must demonstrate all required clinical competencies/proficiencies for each level, complete several relevant readings, obtain a set number of clinical experience hours, complete reflective narratives for these clinical experiences, and be evaluated by their clinical instructors. When we break down these criteria, we see that very little of the student’s final grade is actually based on what the student may have learned or demonstrated clinically. The most substantial grade reductions listed in our syllabi are for not completing assignments on time and/or performing in an unprofessional manner (eg, absent or tardy, poor attitude or behavior, inappropriately dressed). Students understand that if they receive a B or C in a clinical course, it means some component of their performance was substandard. However, how does one know whether the lower grade is due to attendance, attitude, professionalism, or skill competency?

MOVING TOWARD A SOLUTION WITH EXAMPLES OF CLINICAL ASSESSMENT OF STUDENTS

According to English, Wurth, Ponsler, and Milam¹⁸ most physical therapy education programs have moved toward a uniform method of evaluating student clinical performance. The American Physical Therapy Association (APTA) has developed a physical therapist clinical performance instrument, which consists of 18 performance criteria categorized into three sections: (1) professional practice (safety, professional behavior, communication, clinical reasoning, etc), (2) patient management (evaluation, plan of care, interventions, documentation, etc), and (3) practice management (budget, supervision, and professional development).¹⁹ To utilize this instrument, each clinical instructor must complete web-based training to assure consistent evaluations. A model of this nature utilized in athletic training education programs could be useful in creating a more consistent evaluation of students regardless of the institution’s location.

Typically, ATEPs are required to document evaluations of various student characteristics and performance. We currently evaluate our students with a form that addresses both personal and professional characteristics (Appendix A). The CI completes this form at least two times during a student’s assigned time with them, and the ratings become a portion of the student’s final clinical course grade. Once the course instructor gathers this information on a student’s behavioral characteristics, we combine it with their clinical skill performance and other assignments. These evaluations are then lumped into a single letter grade that is supposedly an accurate measure of their total performance.

We are frustrated because we assess so much and give only one grade. Because we give students a lot of feedback throughout their clinical assignments, we suggest that if students must be graded, they should receive at least two separate grades for all clinical coursework—one for clinical comprehension and performance and one for professional attributes and behaviors. In addition, we should give students (and others evaluating their transcripts) more feedback about multiple aspects of their clinical performance. If the feedback is adequate, perhaps a pass/fail grade would be as appropriate as the current letter grade.

Rubrics that list criteria for a piece of work and articulate gradations of quality can be valuable assessment tools.²⁰ They can be used to clarify the expectations of the students and focus instruction and student learning. However, we must ask that if rubrics are utilized, do they need to result in a letter grade or just determine pass/fail for a certain clinical proficiency or professional behavior? For evaluating most of the required clinical performance skills, we utilize various types of scoring rubrics (Figure 1). Our rubrics contain feedback on student performance and are scored in a Likert-type manner from 1 (poor performance) to 5 (excellent). Ultimately, we convert these scores to a letter grade for transcript purposes.

It appears ironic to us that the most important part of the process is the initial feedback yet students and others see only a grade. We have found that once students know what grade they have received, they seem much less concerned about hearing or

Figure 1. Basic Assessment Rubric (Score of at least 4 needed to pass)

5	Took appropriate injury Hx, determined MOI, observed for deformity/asymmetry, palpated appropriate structure, performed all major special tests (ROM, MMT, ligament laxity tests, CIRC and NEURO tests). Determined extent of injury adequately to move onto the next clinical decision making task. Did not need instructor intervention and demonstrated effective clinical reasoning skills.
4	Took appropriate injury Hx, determined MOI, observed for deformity/asymmetry, palpated appropriate structure, performed most major special tests (ROM, MMT, ligament laxity tests, CIRC and NEURO tests). Determined extent of injury adequately to move onto next clinical decision making task. Caused no potential harm to patient, but needed minimal instructor intervention, and demonstrated effective Clinical Reasoning skills.
3	Took most of the appropriate steps for determining extent of injury. However, needed instructor assistance for taking appropriate injury Hx, determining MOI, observing for deformity/asymmetry, palpating appropriate structures, or performing most major special tests (ROM, MMT, ligament laxity tests, CIRC and NEURO tests). Could not determine extent of injury adequately to move onto next clinical decision making task, and Clinical Reasoning skills were ineffective.

reading any feedback. This finding has been reported in the literature as well. Mulder²¹ concluded that when both feedback and grades are given simultaneously, students showed more interest in the grade than the feedback. Black and William²² found that comments accompanied by grades often lead to reduced learning when compared to comments alone. Since virtually all ATEPs likely use some type of evaluative structure like this, it does not seem to be much of a stretch to suggest formulating an instrument that all ATEPs could use for collecting some of this important baseline information. Perhaps some sort of an educational task force should attempt to formulate a plan that would move our educational system(s) in this direction.

RECOMMENDATIONS AND CONCLUSIONS

We suggest it is time to explore the possibility of all ATEPs using a similar assessment tool for student clinical performance. First, it should be determined if grades are actually useful or essential. An initial consideration would be for all athletic training educators to clarify the purpose for evaluating a student's clinical performance. Is it to calculate a grade or to determine clinical and professional competence? As educators, we need to establish a common purpose or goal for our evaluations (eg, sorting or ranking students, extrinsic motivation, measure of learning, behavioral considerations).

Changing any aspect of the current grading system that is so ingrained in our educational system is a daunting, perhaps impossible, task. Regardless of our opinions on how we grade or what criteria we use, it seems most professionals (professors, clinical instructors, etc.) can identify the "good" students or entry-level professionals. Perhaps it is time to work together to establish better consistency in measuring traits we would like to see in our young professionals. We believe that many, if not most, clinical educators already utilize many similar evaluation tools. Assuming this is the case, we may not be far off from developing a universal tool all ATEPs could use.

The Education Council (now the Executive Committee on Education) established the Educational Competencies and Clinical Proficiencies that are required to be taught to each student.¹⁰ Would it not be possible to establish an assessment instrument of them? The APTA has successfully developed an instrument for evaluating student clinical performance that is being utilized universally for physical therapy education programs.¹⁸ If athletic training education programs moved in this direction, it would likely result in more consistent student clinical evaluations. More emphasis would be on written or verbal feedback than on grades, and students (or faculty) would not have to be concerned about how the feedback is turned into a letter grade.

When we read a letter of recommendation that speaks specifically to professional performance, characteristics, or traits, we usually understand what it means. When we see a grade of A in a clinical course, we are essentially guessing what that means, especially when a high percentage of all students receive the same grade. If we are unsure of whether our students are ready to demonstrate what they know, there is an easy way to find out—we can ask or observe them and give them feedback. Students seem to respond

better to feedback and find it more useful than receiving a single grade. We believe appropriate feedback is far more important than a grade for enhancing student learning and encourage moving away from the use of a single grade for "measuring" all aspects of a student's clinical performance.

REFERENCES

1. Kohn A. Grading: The issue is not how but why. *Educ Literature*. 1994;1-7. <http://alfiekohn.org/teaching/grading.htm>. Accessed October 21, 2009.
2. Alfaro-LeFevre R. Should clinical courses get a letter grade? *Crit Thinking Indicator*. 2004;1(1):1-5.
3. Draper DO. An evaluation model of the student athletic trainer's clinical experience. *Athl Train: JNATA*. 1989;24:330-332.
4. Brinkerhoff RO, Brethower DM, Hluchyj T, Nowakowski JR. *Program Evaluation Sourcebook*. Boston, MA: Kluwer-Nijhoff; 1983:8-15.
5. Allen JD. Grades as valid measures of academic achievement of classroom learning. *Clearing House*. 2005;3:218-223.
6. Guskey, TR. Are zeros your ultimate weapon? *Educ Digest*. 2004;11(70):31-35.
7. Hartmann T. William Farish: The world's most famous lazy teacher. *Adolesc Literacy*. 2005:1-5. <http://www.adlit.org/article/5891>. Accessed September 17, 2009.
8. Scriber K, Trowbridge C. Is direct supervision in clinical education for athletic training students always necessary to enhance student learning? *Athl Train Educ J*. 2009;4(1):32-37.
9. Postman N. *Technopoly: The Surrender of Culture to Technology*. New York City, NY: Alfred Knopf; 1992.
10. National Athletic Trainers' Association Education Council. *Guidelines for the Clinical Education of Students Enrolled in Accredited Athletic Training Education Programs*. Dallas, TX: National Athletic Trainers' Association; 2002.
11. Walvoord BE, Anderson VJ. *Effective Grading: A Tool for Learning and Assessment*. San Francisco, CA: Jossey-Bass Publishers; 1998.
12. Frisbie DA, Waltman KK. Developing a personal grading plan. *Instr Top Educ Meas*. 1992;3:35-42.
13. Vanderbilt Center for Teaching. Grading student work. http://www.vanderbilt.edu/cft/resources/teaching_resources/assessment/grading.htm. Accessed October 1, 2009.
14. Durm MW. An A is not an A is not an A: A history of grading. *Educ Forum*. 1993;57:1-4.
15. Bloodgood RA, Short JG, Jackson JM, Martindale JR. A change to pass/fail grading in the first two years at one medical school results in improved psychological well-being. *Acad Med*. 2009;84(5):655-662.
16. Singham, M. Death to the syllabus! *Liberal Educ*. 2007;93(4):52-56.
17. London, H. Do our grading systems contribute to dumbing down? *Natl Assoc of Secondary Sch Principals Bull*. 1996;80(580):117-120.

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18. English ML, Wurth RO, Ponsler M, Milam A. Use of the physical therapist clinical performance instrument as a grading tool reported by academic coordinators of clinical education. *J Phys Ther Educ.* 2004;1:1-7.
 19. American Physical Therapy Association. Physical Therapist Clinical Performance Instrument for Students. <http://www4.uwm.edu/chs/academics/doctoral/dpt/CPI.pdf>. Published June 2005. Accessed September 9, 2009.
 20. Andrade HA. Teaching with rubrics: The good, the bad, and the ugly. *Coll Teaching.* 2005;53(1):27-30.
 21. Mulder R. Temporal separation of feedback from grades. *Enhancing Assess Biol Sci.* 2009;(March):1-2. <http://bioassess.edu.au>. Accessed February 4, 2010.
 22. Black P, William D. Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan.* 1998;80(2):139-148.

APPENDIX A. Athletic Training Student Evaluation Form

Athletic Training Student _____ Semester/Year _____

Primary Clinical Experience _____ Clinical Instructor/Supervisor _____

Please use the following numbering system for the evaluation of the above named ATS

NB = no basis 1 = unacceptable 2 = needs improvement 3 = acceptable 4 = good 5 =excellent

Personal Characteristics	NB	1	2	3	4	5
Communication skills						
Composure & demeanor						
Dependability & punctuality						
Initiative/Involvement						
Maturity & self confidence						
Work ethic & enthusiasm						
Professional appearance						
Organizational skills						
Rapport with athletes						
Rapport with coaches						
Rapport with ATs & other ATs						

Comments (Use space on back side, if needed):

Clinical Skills & Performance	NB	1	2	3	4	5
Practice preparation & routine duties						
1st aid procedures						
Taping & wrapping						
Injury assessment						
Modality choice & operation						
Rehabilitation techniques						
Record keeping & adheres to P & P						
Productive use of down time (Clin. Ed.)						
Receptive to constructive feedback						

Comments (Use space on back side, if needed):

Suggested Final Grade for Clinical Experience: ___A ___B ___C ___D ___F ___Incomplete

Comments on Grade Given (Use space on back side, if needed):

At this time I can:

recommend this student w/out reservation recommend w/reservation cannot recommend this student

...To continue in the clinical portion of the Athletic Training major

If "recommend with reservation", or "cannot recommend", provide reason(s) here:

Instructor/Supervisor & Date

Athletic Training Student & Date

Pedagogical Tools to Address Clinical Anatomy and Athletic Training Student Learning Styles

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Context: A thorough knowledge of anatomy is needed in four of the six domains of athletic training: prevention, injury/condition recognition, immediate care, and treatment/rehabilitation. Students with a solid foundation can achieve competency in these specific domains.

Objective: To provide educators with pedagogical tools to promote a deeper understanding of the human body and its relationship with athletic injuries

Background: Research demonstrates that there is no one dominant learning style among athletic training students, and therefore, educators are encouraged to utilize and expose students to a variety of teaching strategies. Throughout the athletic training literature, there are a host of pedagogic tools that can help encourage independent thinking, cognitive knowledge, and skill application. The same techniques can be tailored to increase human anatomy knowledge and application. Additionally, most curriculums do not have the ability to create a class solely dedicated to human anatomy. Therefore, it is important to incorporate as many learning opportunities within existing curriculums to help student learning.

Description: Discourse, puzzles, open discussion, and simulations are teaching methods that can be utilized in existing curriculums to further facilitate anatomical knowledge.

Clinical Advantages: Students who have a solid background in human anatomy will demonstrate a stronger understanding and apply their knowledge within four of the six domains of athletic training.

Conclusions: Educators can use a variety of teaching techniques in order to develop a student's acquisition and retention of anatomical knowledge. The use of multiple educational techniques can not only address a student's strengths as a learner but also challenge them by impelling them to address their weaknesses as a learner. It will also encourage practical application of anatomy when evaluating and treating athletic injuries.

Key Words: pedagogy, athletic training students, clinical competence, proficiency

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Pedagogical Tools to Address Clinical Anatomy and Athletic Training Student Learning Styles

Stephanie Mazerolle, PhD, ATC and Susan Yeargin, PhD, ATC

Athletic training programs are designed to prepare athletic training students with the knowledge and skills in six domains as defined by the Board of Certification (BOC).¹ A common thread within four of these domains is a sound understanding of the human body including anatomy, physiology, and kinesiology (see Table 1). Therefore, it is essential for athletic training programs to integrate opportunities for students to gain the specific knowledge related to the human body and make the connection to the specific domains of athletic training. Frequently, to address the educational competencies² directly associated with clinical anatomy, many programs require a general anatomy and physiology course or an applied/clinical kinesiology course. The aforementioned courses are most often not taught by an athletic trainer, and the connection between the human body and athletic injuries may be underemphasized. From our experiences, a student with a strong background for anatomy, particularly with an anatomical structure's attachments and functions, will be able to make appropriate clinical diagnoses, create comprehensive treatment programs, and develop preventive strategies for their patients. An additional benefit of increased human anatomy knowledge is improved communication with other allied health and medical professionals.

Although we recognize it is not always plausible to add a course that is dedicated solely to the anatomy needs of the student, we do acknowledge the need for athletic training education programs (ATEP) to infuse references to anatomy throughout their curriculums as this can only enhance content retention and learning over time. Thus, the purpose of this manuscript is three-fold. First, we include a brief discussion of the common learning styles associated with athletic training students. Second, we illustrate a variety of educational techniques designed to meet the different learning style needs of the students while integrating clinical anatomy into the ATEP. Finally, we discuss ways athletic training (AT) educators can incorporate anatomy into the curriculum in order to advance their students' knowledge and understanding of the human body, which has the potential to enhance their clinical skills, confidence, and overall competence as a clinician.

LEARNING STYLES

Undergraduate students utilize different approaches to gather and apply new information and knowledge, which is often referred to as one's personal learning style.³ The literature reveals a multitude of learning styles, but within athletic training and other medical professions steeped in anatomical foundations, four learning styles have been predominately studied:³⁻⁶ accommodators (concrete, active), divergers (concrete, reflective), convergers (abstract, active), and assimilators (abstract, reflective).⁷ The aforementioned learning styles are a part of the Kolb Learning Style Inventory (KLSI),⁷⁻⁸ which is rooted in experiential learning theory. Accommodators prefer to be actively engaged in their

learning processes, are risk takers, and to learn through trial and error and solve problems intuitively.⁷ Divergers excel with idea development and brainstorming because they enjoy the creativity it provides, appreciate various perspectives and input, and typically have culturally diverse backgrounds.⁷ Convergers are deductive reasoners who value the importance of practical application to real-life situations and prefer to work with things rather than people.⁷ Finally, assimilators use reflective reasoning and observation for cognitive retention and employ inductive reasoning to solve problems.^{3-4,7-8}

More recently, researchers have investigated the Gregorc Mind Styles model within the athletic training profession.⁹ The foundation of this model is in an individual's perception and experiences, which influence one's preference for a particular learning method. Using this model, it appears students learn best when the learning environment is busy, social, and unstructured, but they also thrive with hands-on experiences and structured activities such as worksheets.⁹ Students enrolled in nursing, physician assistant, and medical programs—curriculums similar to AT—demonstrate learning styles consistent with assimilators and accommodators, who are learners who thrive on hands-on experiences and practical application of ideas and knowledge.¹⁰⁻¹¹

Based on the results of the studies using the KLSI and Mind Styles, athletic training students appear to be diverse learners with no apparent dominant style^{3-6,9} and may even select their preferred instructional method based on the materials presented or learned.³⁻⁷ This theory parallels a recent literature review of learning styles by Pashler et al,¹² which suggests it is unnecessary to assess a student's learning style as the evidence fails to fully validate its success. The authors of this review, however, are quick to point out that the "optimal instructional method is likely to vary across disciplines"^{12(p116)} and that some students may benefit at times from one learning style over another.

Keeping this research study¹² and the previous literature within athletic training in mind,^{3-6,9} we advocate the use of a variety of instructional methods (eg, case studies, discourse, lecture) to provide an environment that promotes and fosters student learning.^{3-6,7,9} Additionally, exposure to a variety of teaching methods can promote critical thinking, which is a major challenge and goal for AT educators.¹³ Through our experiences as educators, as well as a search of the existing literature, we have discovered several pedagogic strategies to help promote anatomical knowledge by specifically addressing the learning styles mentioned previously. Table 2 provides examples of specific techniques and activities that can be incorporated into a variety of AT courses to stimulate anatomical discussions and anatomical knowledge.

Table 1. Examples of specific anatomical knowledge and the relationship to athletic training domains

Anatomical Concept	Domains			Rehabilitation
	Prevention	Evaluation	Immediate Care	
Sartorius origin	Used during core stabilization programs with the lumbopelvic complex	Cause of an ASIS avulsion fracture	Awareness of its role in a hip pointer treatment and rehabilitation	Awareness of its role in PNF lower extremity patterns
Hamstring origin and psoas major origin	Stretching and strengthening across all joints that are crossed by the muscles	Contributing factor to lumbar regional pain	Massage covers the entire muscle, not stopping at the gluteal or inguinal fold.	Eccentric focus during exercises for more functionality
Biceps brachii origin	Involvement during shoulder stability programs	Cause of a SLAP lesion	Immobilization during a tendon rupture	Initial avoidance of the muscle's multiple actions post-op. When strengthening occurs, functional eccentric exercises need to be included.
Number of tendons emanating from the flexor digitorum superficialis and profundus	Analysis of wrist and finger positioning during sport and occupational activities to avoid inflammation of tendons	Contributing factor to carpal tunnel syndrome	Swelling control over the entire wrist flexor complex while being cautious of nerve pathways	Five stages of tendon glides to minimize scarring down
The number of muscles found in the anterior compartment of the lower leg, their individual actions, and their shared innervations	Utilization of appropriate equipment to protect the entire compartment	A multi-symptomatic recognition of anterior compartment syndrome	Swelling control of the compartment and understanding its possible affects on other compartments	The understanding that all ROM is affected, not just DF, PF; the inclusion of non-resisted PNF patterns
The number of muscles that attach to the occipital bone; the C2 nerve pathway.	Utilization of appropriate equipment to restrict triggering motions	A contributing factor to headaches, whiplash, and brachial plexus injuries	Allow immobilization for healing and scarring	Manual therapy focusing on anterior and posterior specific muscles
The relationship between the pectoralis major and rhomboideus muscles	Tightness of one structure can cause weakness of the other	Functional postural abnormalities	Strengthening that is weak and lengthening that is tight through attachment knowledge	Focus upon how anterior muscles affect posterior structures

Table 2. Methods to Incorporate Anatomy into the Classroom

AT Course	Objective/Competency	Teaching Method	Activity
Prevention and Care of Musculoskeletal Injuries Introduction to Athletic Training	Recognition of anatomical structures injured in a lateral ankle sprain.	Univocal Discourse ¹⁴	Pose the question, "What soft tissue structures are injured with a lateral ankle sprain?"
Therapeutic Rehabilitation	Identify and discuss exercises to improve muscular strength and endurance when treating multidirectional instability of the glenohumeral joint.	Dialogic Discourse ¹⁴	Pose the question, "When developing a treatment program for a volleyball player suffering from multidirectional instability what muscle groups must be addressed and what exercises would address those involved?"
Assessment or Clinical Evaluation and Diagnosis	Identify and palpate the bony and soft tissues structures that can become injured with medial epicondylitis.	Formal/Informal Group Sessions ^{15-17,24}	With a partner have students develop a list of structures that must be evaluated/palpated with medial epicondylitis and then have them palpate those structures.
Strength and Conditioning, Biomechanics, or Foundations of Conditioning	Develop a fitness program appropriate to the patient's needs and select activities that meet the requirements established by the appropriate governing agency and/or physician for enhancing speed, strength, flexibility, and power.	Case Study or Presentation of the Problem ^{13,20-21}	In small groups present students with the following problem/case: a wrestler with lordosis. Develop a plan to address this athlete's needs. Be prepared to support the plan.
Assessment or Clinical Evaluation and Diagnosis	Explain the roles of special tests in injury assessment.	Open Discussion Quiz ²⁴	In small groups have students answer the question, "Why do athletes suffering from a SLAP lesion suffer from weak shoulder flexion and pain during the deceleration phase of throwing?"
Prevention and Care of Musculoskeletal Injuries	Describe strength assessment using resistive range of motion, break tests, and manual muscle testing.		
Prevention and Care of Musculoskeletal Injuries Therapeutic Rehabilitation	Describe the principles and concepts of body movement including joint movements and joint action terminology.	Crossword Puzzles ²²	Develop a crossword puzzle that challenges the AT student to connect an injury with an anatomical structure or muscle action with a muscle.

Table 2. Methods to Incorporate Anatomy into the Classroom (Continued)

AT Course	Objective/Competency	Teaching Method	Activity
Emergency Procedures or Evaluation of the Head, Neck, Spine	Recognition of structures involved with an injury to C7.	Simulations ²¹	Scenario: An athlete with a possible brachial plexus injury reports numbness and weaknesses along C7; evaluate C7
Capstone Course or Senior Seminar Course	Ability to demonstrate musculoskeletal assessment of the knee to accurately identify the athletic injury.	Problem-Based Learning ¹⁸⁻¹⁹	Have students develop a concept map outlining the anatomical structures involved in the evaluation of the knee for a possible patella dislocation.
Clinical or Anatomical Kinesiology	Describe the principles and concepts of body movement including joint movements.	Jeopardy ²⁵	Sample questions include, "This muscle when in a closed kinetic position helps unlock the knee by laterally rotating" or "This special test places the arms in a position of scaption (approximately 30 degrees of horizontal adduction with the shoulders abducted to 90 degrees)"
Assessment or Clinical Evaluation and Diagnosis	Explain the roles of special tests in injury assessment.		
Clinical or Anatomical Kinesiology	Apply the use of anatomically correct terminology of motions and joints	"Picture Perfect" ²⁵	Place students in groups of 2-3. Place a picture on the screen of someone frozen in action. One student faces away from the picture while the group members must place their classmate in the same position as the picture through verbal directions. Only the use of correct anatomical motions and the anatomical names of joints can be used to describe the position.
Prevention and Care of Musculoskeletal Injuries	Understand common mechanisms of injury and recognize what anatomical motions are occurring and what joints		
General Medicine Course	Recognition of anatomical structures involved with general medicine conditions and an understanding of how disease can spread	Ordering Games ²⁵	Place each anatomical structure on a separate note card and mix-up. Place students in groups. Students must place the anatomical structures in order correctly and faster than the other groups. A variation on the game includes adding a list of general medicine conditions also on note cards and have them placed next to the correct anatomical structure that it affects.

EDUCATIONAL TECHNIQUE

Drawing from the activities presented in Table 2 and addressing those students who demonstrate an accommodating learning style, educators should incorporate learning activities such as problem-based learning, open discussion quizzes, jeopardy, and dialogic discourse.^{7,9} The previously mentioned activities allow the accommodator to assume a leadership role particularly with the open discussion quizzes, presentation of the problem activity, and problem-based learning activities. Furthermore, the accommodator, through these types of classroom activities, can be actively engaged in the process and take advantage of their intuitive problem-solving abilities.

Problem-based learning activities, concept mapping, picture perfect, group assignments/quizzes, and simulations are effective teaching tools to address the learning needs of the diverger.^{7,9} The aforementioned classroom activities take advantage of the diverger's reflective ability by encouraging the generation of ideas and solutions to problems primarily through brainstorming within a small group of peers/classmates who may have differing opinions.

The converger would benefit from activities such as crossword puzzles, Jeopardy, univocal/dialogic discourse, case studies, ordering games, and simulations as this learner is more individually driven rather than group orientated.^{7,9} The previously mentioned techniques rely heavily on right and wrong answers, independent learning, and practical application of knowledge, which are all strengths of a converger.⁷ Discourse, problem-based learning, simulations, and case study presentations are effective methods to use in the classroom when attempting to meet the needs of the assimilator.^{7,9} This learner relies greatly on structured activities with detailed instructions, which allow for the logical development of an answer or solution to a given problem or situation. The assimilator also appreciates abstract concepts and alternative solutions to problems, as long as they appear to be logical and sound.^{7,9}

To be effective educators, we must appreciate each student's strengths and weaknesses as learners; therefore, we must facilitate learning by introducing students to a variety of instructional methods. The previously mentioned learning styles have been studied extensively in the athletic training literature,^{3-6,9} and the suggested activities are meant to help AT educators correspond to the student's learning style for a better learning environment. Furthermore, implementing multiple pedagogical tools in the course can meet the student's learning needs and preferences while simultaneously challenging them to step out of their learning comfort zone.^{7,9,13}

ACTIVITY DESCRIPTIONS

Discourse is the process of communication and is either written or oral/verbal. In the educational forum, discourse is often referred to as a discussion-based classroom activity where there is a verbal exchange between the student(s) and the teacher.¹⁴ Two major types of discourse can be implemented in

the classroom: univocal and dialogic. Educators rely heavily on univocal discourse to communicate basic cognitive knowledge, such as facts and lower-level concepts (eg, anterior talofibular ligament prevents excessive inversion and is therefore involved with grade I inversion ankle sprains). This type of classroom tool is very effective in introductory courses when a student needs to gain the basic or underlying concepts prior to application or higher-level thinking.¹⁴ Conversely, when using dialogic discourse, the educator encourages higher level critical thinking by incorporating the thoughts and experience of both the student and the instructor. This pedagogical tool is heavily rooted in providing meaning to student learning, allowing them to take ownership over the learning process, and encouraging multiple solutions to a problem by gathering multiple perspectives (ie, the ATF ligament attaches to the talus and fibula, therefore gliding the talus anteriorly during joint play will stress this ligament).¹⁴ Table 2 provides an additional example for implementation.

Group lab sessions are an effective way to actively involve students in the learning process while taking ownership of their learning responsibilities. The lab sessions serve multiple purposes including a means to foster teamwork, developing leadership skills, and promoting healthy competition between groups. This type of pedagogical tool has proven effective in promoting student learning and retention of course materials.¹⁵ Prior to implementation, educators must consider the main purpose of the group work, provide instructions and objectives for the task or work assigned, use appropriate group size, encourage a fair division of labor, and evaluate the work assigned.¹⁶⁻¹⁷ Group sessions can be either formal or informal. A formal group session could be a specific assignment and or task that must be accomplished over a period of time (one class session versus semester project), such as using clay to re-create the arm muscles that control the elbow. An example of an informal group session could be an impromptu assignment or class discussion (usually ends in one class period),¹⁷ such as having the students develop an acronym to remember the order of the carpal bones.

Problem-based learning (PBL) is a instructional method grounded in teaching students to think critically and solve problems.¹⁸ Problem-based learning, which has gained popularity in athletic training education curriculums, is a group-based activity that consists of a small group of individuals with the same goal in mind.¹⁸ This type of formal group work is designed to engage the learner in real life situations by taking into consideration all of the elements that can influence learning and decision making in a real-world setting.¹⁸ Simply having the students find the anatomical cause of an injury is a way to utilize PBL in the classroom. The use of concept mapping is also a popular approach embedded within problem-based learning. Concept mapping allows students to make connections between major concepts in a hierarchal fashion and is an effective means to evaluate a student's understanding and retention of knowledge.¹⁹ Table 2 provides an example of using concept mapping¹⁹ as it relates to clinical anatomy and an injury evaluation. Although problem-based learning is more of a global curricular approach to student learning, the concept of student-based learning and working together to solve problems can be effective in singular classroom sessions such as case studies and reviewing clinical anatomy.

Case studies/presentation of the problem fosters critical thinking in the classroom.¹³ Case studies, which are either contrived or real, allow for students to become engaged in the learning process, connect theory to practice, and gain multiple perspectives to application.²⁰ Case study presentations can be done collaboratively in small groups or individually, but prior to implementation, educators should consider the overall goal of the activity and the desired outcome. Open-ended questions should be prepared for discussion. Also, when presenting the case, it is important that the students are prepared for the material covered within the case. For example, present to a group of students in an assessment course a case involving a baseball player with internal impingement. Direct the students to focus on the anatomical structures involved while presenting the special tests involved with the evaluation process of the injury. Table 2 provides another anatomy-specific example.

Simulations, similar to case study presentations, are a great tool to help promote critical thinking and allow students to apply theory to a “real-life” situations.²¹ Unlike case study presentations, simulations are designed to allow students to implement or practice skill-based knowledge particularly when those skills are not always called upon (eg, CPR, first aid, or ACL evaluation).²¹ Traditionally, simulations are used for objective and subjective evaluation of a student’s performance on a particular skill (eg, injury evaluation) but can be easily adapted to address clinical anatomy. Focusing on the injury evaluation process and incorporating differential diagnoses, have students identify the structures involved in both an osteochondral lesion of the knee and a meniscal injury. Once this is completed, have them perform the assessment to differentiate the two conditions; however, be sure to discuss the relationship between the clinical outcomes and the anatomical structures involved. Table 2 provides another example for implementation. Educators, when developing simulations, need to consider several components including selecting the topic, understanding the level of the student, identifying the critical elements to be covered and evaluated, and establishing the criteria for assessment.²¹ For a more in-depth discussion on implementing simulations, we encourage readers to review Vallev and Paskevich’s²¹ discussion on assessing clinical skills of the student.

Nontraditional teaching strategies, such as crossword puzzles and Jeopardy, have become an important tool to promoting student learning and interest in course readings, as well as promoting confidence and motivation to learn.²²⁻²³ Nontraditional activities, although initially time consuming for the educator to develop, can help students learn the basics regarding clinical anatomy including origin, insertion, muscle action, and nerve intervention. The use of crossword puzzles is an effective instruction method that can help the student learn and recall information related to therapeutic modalities. In addition, crossword puzzles support multiple learning style preferences.²² Crossword puzzles help students choose the anatomical structure that is involved with the orthopedic or general medicine injury provided in the clue or for recalling muscle origin and insertions.

CURRICULUM SITUATIONS

There are many ways programs can address the clinical anatomy needs of their students. Our aim with the following discussion is to highlight several common and successful methods employed currently with ATEPs, which we have identified through informal conversations with program directors across the country. One ideal situation for infusing anatomy within an athletic training curriculum is to have the introductory class taught by an athletic trainer, particularly with a strong background in the subject matter. The advantages to this situation are the assurance of content coverage and the ability to provide profession-related examples during the lecture and laboratory sections. The instructor is also able to connect anatomy content within other athletic training classes he/she teaches and can help colleagues with their classes via anatomy class material, pictures, and examples. Another benefit is the periodic content updates, which the AT educator can give the clinical staff who can challenge the student to apply the knowledge in the clinical setting immediately after learning the concept. If this is not obtainable, another feasible option is to have a separate lab section associated with an anatomy course (eg, kinesiology, applied anatomy and kinesiology) but taught by an athletic trainer. This option will allow for the same athletic training-specific connection to the course material.

Another idyllic situation involves the development of an athletic training specific anatomy course, which would be taught by an athletic trainer. We suggest having students enroll in the anatomy course simultaneously with their evaluation or assessment courses. The advantages of this situation are the assurance that content is reviewed and information gaps filled. The instructor can also teach the evaluation class or work with another instructor to connect the content. Another benefit is the ability to assume that the students have obtained the foundation information in the pre-professional class and then truly make the class profession-specific and “advanced” in nature.

The final component includes the addition of a cadaver and/or a hands-on anatomy lab to either of the above lecture courses. The use of cadavers can exponentially help learning, knowledge retention, and knowledge application. Students can conceptualize the course material beyond the illustrations in a textbook and begin to appreciate the dynamics of the human body. A review of professional curriculums for physical therapy, medicine, and physicians assistant education programs indicates that cadaver labs are used to promote and facilitate learning and retention of anatomical concepts. Suggestions for inclusion of cadaver anatomy include combining efforts with a physical therapy department or medical school that may already have access to cadavers or use them currently in their programs. Some biology departments may also be willing to combine efforts and/or share costs with cadaver lab opportunities.

Programs that may not have the opportunity to collaborate with other on-campus programs or have access to cadavers can still provide an authentic experience to their students. There are books and flash cards that use only cadaver pictures, which provide some of the benefits listed above. Cadaver pictures from web

sources can be added into multimedia modes. Even though these examples do not allow for hands-on interaction as compared to real cadavers, they can still teach a student important concepts. Examples of these important concepts include anatomical structure identification (important as structures are not nicely colored as in artist-created pictures), differences in structure composition, and anatomical variations. Also, anatomical resources that can be placed within the athletic training learning area will allow students repeated exposure to the material. Some examples of these resources are provided in Appendix I. The resources provided in Appendix I not only address different student learning styles but can also be used for testing purposes in a variety of classes. The best example is placing numbered stickers on the resources set up at “stations” and asking students to identify structures or answer questions about the anatomical structures. Another example of how the resources can be used in class is having students use the disarticulated skeleton to identify convex and concave bony articulations and practice joint mobilizations. Students can use software during lab time and individual study time. The interactive 3-D nature of many software programs allows the student to gain multiple perspectives of an image, which is often very comparable to the cadaver. Primal Pictures®, one of the leading anatomy software programs, has affordable licensing agreements for schools and provides educators and students the opportunity to actively engage in the learning process.

Although the aforementioned “ideal situations” where athletic training faculty are teaching the pre-professional course or an advanced anatomy course within the ATEP are unlikely, the purposeful addition of anatomical information, reviews, and practice applications in other classes is not unreasonable. We have outlined these classes in the first column of Table 2. Discourse of anatomy can also be added into medical terminology, therapeutic modalities, exercise physiology, and emergency medicine.

CONCLUSION

We believe that students who have a solid understanding and appreciation of anatomy, particularly clinical anatomy, demonstrate a stronger ability to grasp the foundations of athletic training; specifically, they possess stronger clinical evaluation and treatment skills. Although students do not have a preferred learning style and current literature questions the efficacy of determining a student’s learning style, they may demonstrate preferences for one style over another. The process of learning, regardless of the content, is ongoing and educators need to provide optimal learning environments for students. Furthermore, many of the pedagogical tools discussed in this article can be easily applied to other athletic training specific concepts, not just clinical anatomy.

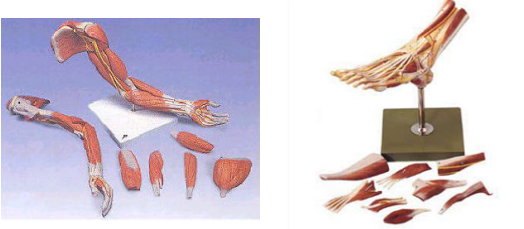



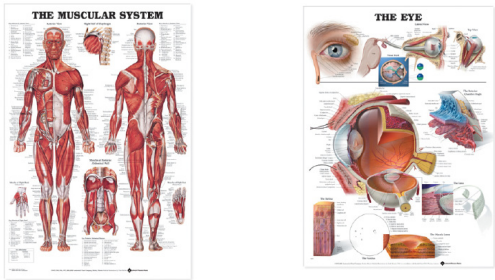
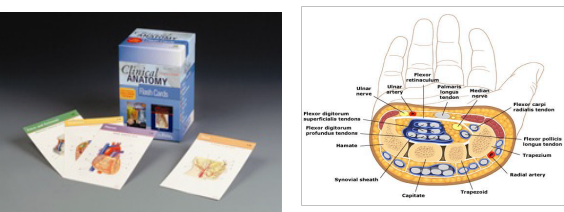
REFERENCES

1. Board of Certification. *Role Delineation Study*, 5th ed., Omaha, NE; 2004.
2. National Athletic Trainers’ Association. *Athletic Training Educational Competencies*. 4th ed. Dallas, TX; 2006.

3. Bower KA, Stemmens CL, Ingersoll CD, Langley DJ. An investigation of undergraduate athletic training students learning styles and program admission success. *J Athl Train*. 2001;36(2):130-135.
4. Stradley SL, Buckely BD, Kaminski TW, Horodyski M, Fleming D, Janelle CM. A nationwide learning-style assessment of undergraduate athletic training students in CAAHEP-accredited athletic training programs. *J Athl Train*. 2002;37(4)(supp):S141-S146.
5. Harrelson GL, Leaver-Dunn D, Wright KE. An assessment of learning styles among undergraduate athletic training students. *J Athl Train*. 1998;33:50-53.
6. Mensch JM, Ennis CD. Pedagogic strategies perceived to enhance student learning in athletic training. *J Athl Train*. 2002;37(4)(suppl):S199-S207.
7. Kolb DA. *Learning Style Inventory*. Boston, MA: McBer & Co; 1976.
8. Markert RJ. Learning style and medical students’ performance on objective examinations. *Percept Mot Skills*. 1986;62:781-782.
9. Gould TE, Caswell SV. Stylistic learning differences between undergraduate athletic training students and educators: Gregorc Mind Styles. *J Athl Train*. 2006;41(1):109-116
10. Lynch TG, Woelfl NN, Steele DJ, Hanssen CS. Learning style influences student examination performance. *Am J Surg*. 1998;176:62-66.
11. Joyce-Nagata B. Students’ academic performance in nursing as a function of student and faculty learning style congruency. *J Nurs Educ*. 1996;35(2):69-73.
12. Pashler H, McDaniel M, Rohrer D, Bjork R. Learning styles: Concepts and evidence. *J Assoc Psych Sci*. 2008;9(3):105-119.
13. Walker S. Gazzillo. Promoting critical thinking in the classroom. *Athl Ther Today*. 2003;8(5):38-41.
14. Casa TM, Casa DJ. Dialogic discourse: Higher-level learning through class discussions. *Athl Ther Today*. 2007;12(2):25-29.
15. Beckman, M. Collaborative learning: Preparation for the workplace and democracy. *Coll Teaching*. 1990;38(4):128-133.
16. Connery BA. Group work and collaborative writing. *Teaching at Davis*. 1988;14(1):2-4.
17. Johnson DW, Johnson RT, Smith KA. *Cooperative Learning: Increasing College Faculty Instructional Productivity*. Washington, DC: School of Education and Human Development, George Washington University, ASHE-FRIC Higher Education Report No.4; 1991.
18. Heinrichs KI. Problem-based learning in entry-level athletic training professional-education programs: A model for developing critical-thinking and decision-making skills. *J Athl Train*. 2002;37(4)(suppl):S-189-S-198.
19. Harrelson GL. Concept mapping. *Athl Ther Today*. 2006;11(1):25-27.

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20. Herreud CF, Schiller NA. The National Center for Teaching Case Studies in Science. <http://ublib.buffalo.edu/libraries/projects/cases/case.html>. Accessed October 19, 2009.
 21. Vallevand AL, Paskevich DM. Using simulations to assess clinical skills in student athletic therapists. *Athl Ther Today*. 2005;10(6):64-65.
 22. Berry BC, Miller MG. Crossword puzzles as a tool to enhance athletic training student learning: Part I. *Athl Ther Today*. 2008;13(1):29-31.
 23. Franklin S, Peat M, Lewis A. Non-traditional interventions to stimulate discussion: The use of games and puzzles. *J Biol Educ*. 2003;37(2):79-84.
 24. Chen D. Enhancing student learning through classroom discussions in circuit courses. Proceedings: 35th Annual Frontiers in Education Conference; October 27-31, 2005.
 25. Rozzi S, Fuetrell M. Games educators play. Presented at: 58th National Athletic Trainers' Association Annual Meeting and Clinical Symposium; June 21-30, 2007; Anaheim, CA.

APPENDIX I. Common Anatomical Resources to Supplement Teaching Methods

Resource	Description	Example
<p>Muscular Models:</p> <ul style="list-style-type: none"> Muscular Arm Muscular Leg Muscular Hand Muscular Foot 	<p>Allows students to take apart and put back together different muscles by body part. This instills an understanding of how muscles are layered on the skeleton. It also reinforces attachment sites and neurovascular pathway information. This can be compared to their own personal surface anatomy to gain an understanding of its application during evaluations.</p>	
<p>Ligamentous Models:</p> <ul style="list-style-type: none"> Shoulder Wrist and Hand Knee Ankle 	<p>Allows students to examine where ligaments and capsules are attached to the skeleton. Students can also gain an understanding of what motions are restricted and what joints are stabilized by these anatomical structures.</p>	
<p>Additional Models:</p> <ul style="list-style-type: none"> Eye Ear Torso 	<p>Allows students to take apart and put together anatomical structures. This instills an understanding of layering, ordering, and function.</p>	
<p>Skeletons:</p> <ul style="list-style-type: none"> Full Individual 	<p>Allows students to touch attachment sites of muscles and ligaments to better understand how the insertion moves towards the origin to create an action. Also aids in better practice of surface palpations. Encourages individual hands-on learning of anatomical bony landmarks.</p>	
<p>Charts:</p> <ul style="list-style-type: none"> Muscular system (front/back, superficial/deep) Nervous system Vascular system Eye and ear Respiratory System Heart 	<p>Allows students to see global and local anatomical concepts. Allows students to compare “normal” anatomical structures with charts showing injured/diseased anatomical structures. Labeled charts will also allow comparisons to models. Neurovascular pathways and their connection to rehabilitation will improve understanding.</p>	
<p>Flashcards:</p> <ul style="list-style-type: none"> Various Parts Cross Sectional Pictures 	<p>Allows students to review anatomical structures individually. Encourages self-quizzing with immediate access to information found on the back. Aids in understanding diagnostic imaging.</p>	

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Learning with Mnemonics in a Therapeutic Modalities Course: A Case Report

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As the profession of athletic training evolves, so does the number and complexity of educational components required to be a successful athletic trainer (AT). Being a competent AT often requires recalling and integrating information not only when the Board of Certification examination looms, but also in clinical practice. In fact, as ATs we are often required to recall and utilize large quantities of information learned one, five, or perhaps ten years earlier, in situations where it is impossible to search for a specific fact or skill to manage the situation.

The ability to recall information in a meaningful way whether as an AT or student, often in situations when time matters can occur through the use of a memory aid known as Mnemonics.¹⁻² Mnemonics are techniques utilized by many medical and non-medical professionals and students to improve memory by encoding information with associations between new and previously learned information in long-term memory.³ Mnemonics can be utilized at any time in the learning process; assuming an individual takes adequate time to learn and refine the skills necessary to make the use of the strategy worthwhile. The array of available mnemonic strategies will allow a student to acquire a large amount of information, integrate it in a meaningful way, and then retrieve it at a later day at will.²⁻⁴ Many professions use mnemonics as a learning strategy, without even realizing it, to teach and reinforce information related to disciplines such as neonatal resuscitation,⁵ nursing,^{4,6} dermatology,⁸⁻⁹ medicine,¹⁰⁻¹³ psychiatry,¹⁴ and even sports medicine.¹⁵

The purpose of this case report is to demonstrate the use of different mnemonic learning strategies in a therapeutic modalities course used to improve an athletic training student's learning outcomes. The report will first present the student's background

information followed by the mnemonic interventions used and the results obtained by the student. The principles underlying mnemonics is further discussed. Appropriate institutional review board approval was obtained.

CASE REPORT

Background

A 22-year-old female athletic training student enrolled in a therapeutic modalities course reported to the course instructor's office five days prior to a unit examination focusing on the management of musculoskeletal pain. Julie (pseudonym) expressed a sincere concern with her inability to grasp, retain, and recall a large portion of the more moderate-to-difficult pain and pain management concepts even after repeatedly reading through the textbook and course notes. Some of the specific examples encountered by Julie included recalling the function of afferent and efferent nerve impulses traveling to and from the brain, differentiating between the different sensory and noxious organs, the ascending spinal pathways, and the pain theories, particularly the Gate Control Theory. Julie scored a 26%, (class mean = 62.8% [17.05]) on a pre-test examination.

Intervention

As the course instructor, I met with Julie for approximately one hour reviewing the concepts of concern. In order to help Julie organize the information she was having difficulty remembering into something more meaningful for her, several types of mnemonic strategies were examined, including: (1) keyword, (2) first letter, (3) ridiculous association and (4) link-word mnemonics.

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In keyword strategy, Julie was shown how to link new information to keywords already encoded to memory, followed by generation of a visual image to connect the word(s) to be learned with its definition or concept¹⁶ (Figure 1). We then discussed the concept of first letter mnemonics, a simple yet effective strategy using the first letters of the words to be remembered together to form a word or word-like unit¹⁷ (Figure 2). For the concept of ridiculous association we used a vivid poem to strengthen the link between the content to be memorized and the images in the poem. Here is an excerpt of the ridiculous association poem:

*I got stung by a bee, oh what a shame,
the pain caused by A-delta is now what I must blame.
Rubbing my arm causes A-betas to control the pain
by helping to limit delta, because A-betas aren't all that lame.*

Finally, link-word mnemonics were used to learn a series of items in order, using a visual image of adjacent items on a list (Table 1).

Results

Julie's post-exam score was 92% (class mean 90.1[5.57]). Julie reported in a debriefing session that her primary reason for success on the post-exam were the mnemonic strategies she had learned prior to the unit examination. She reported that many of the questions asked on the examination required her to recall information she learned with the mnemonic strategies. Julie also reported that she applied the mnemonic strategies to several other pain and pain management concepts she was having problems

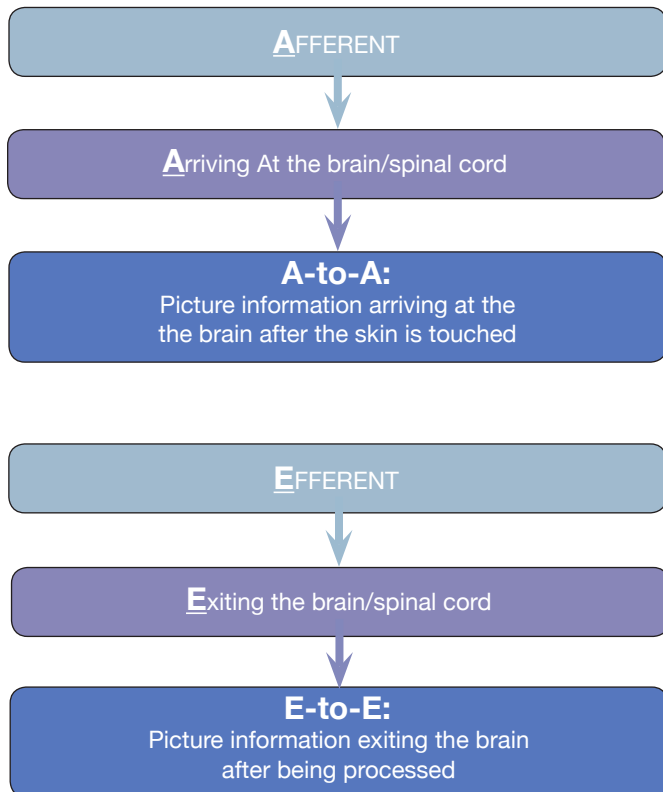


Figure 1. Keyword Mnemonic Strategy to Recall How Nerve Impulses Travel to and From the Brain

Neospinothalamic Pathway

- **F**ast
- **A-D**elta

“**N**athan **F**alls **A**lmost **D**aily” or **NFAD**

Paleospinothalamic

- **S**low
- **C-F**iber

“**P**aul’s **S**lipping **C**auses **F**ear” or **PSCF**

Figure 2. First Letter Mnemonic Strategy to Recall Spinal Pain Pathways

with, as well as other classes she was having difficulty with. She reported utilizing the concepts of ridiculous association more often than the other three techniques. She enjoyed the ability to create meaningful associations using her own interpretation(s) of the content, thereby allowing her to recall the information at a later date.

Discussion

Mnemonic strategies organize and integrate the transformation of difficult to remember information into something that is more meaningful for individuals to recall at a later date by using associations between new and previously learned information in long-term memory.^{2-3,6,18-19} In healthcare, mnemonic strategies have been used to reinforce a plethora of concepts including a systematic approach to and remembering key points during patient care and assessments^{1,6-7,13, 20} and patient compliance.²¹ Educationally, mnemonics can have a significant impact on student learning¹⁸ and can improve recall and bolster the student’s self-confidence,^{4-5,19 22} which in the healthcare field is important because the ability to recall new information is often more difficult due to the unfamiliarity of the content. In fact, Levin¹⁸ points out four factors affecting a student’s ability to remember difficult

Table 1. Link-Word Mnemonic Strategy to Recall Peripheral Nerve Characteristics.

Fibers	Diameter (µm)	Conduction Velocity (µs)	Function
A-alpha	12-20	70-120	Touch
A-beta	6-12	36-72	Touch/pressure
A-delta	1-5	6-36	Pain-Fast
C-fiber	0.3-1.0	0.4-1.0	Pain-Slow
Familiar Link			
Alphabetical Order	Biggest-to-Smallest	Fastest-to-Slowest	Sensation-to-Pain

information: (1) the amount of information, (2) unfamiliarity with the information, (3) abstractness, and (4) the complexity of the information. Certainly, a newly matriculated athletic training student would face all four of these obstacles when confronted with the immense amount of information required to continue through the academic sequence.

Mnemonic devices or strategies are divided into different types of activities, which relate to the two activities of the human brain: unitizing and symbolizing.²³ First, organizational mnemonics allows individuals to organize and interrelate new information so material can be recalled later.²⁴ The second type is referred to as encoding mnemonics. Encoding mnemonics transform low-imagery, abstract material into a more memorable form. Once in this form, organizational mnemonics are then used to store the information in the memory for recall at a later time.²⁴ However, it should be noted that in specific cases it is necessary for encoding mnemonics to occur first before the organizational model can be applied. Examples of organizational mnemonics include: (1) peg-word mnemonics, (2) story mnemonics, and (3) link-word mnemonics.^{2,24} Encoding mnemonics have the ability to turn abstract words into high-imagery substitutes that then make the abstract words easier to remember at a later date.²⁴

In this case study, Julie utilized four different mnemonic strategies. These include: (1) keyword strategy, (2) first letter, (3) ridiculous association, and (4) link-word mnemonics.

Keyword

In the keyword strategy students are asked to link new information to keywords already encoded to memory. This is followed by the generation of a visual representation of the information to connect the word(s) to its definition or concept.¹⁶ In this example, Julie needed to recall how nerve impulses travel between the skin and brain. To accomplish this, a four step process was used (Table 2).

Julie was shown how to link new information to keywords she already had encoded in her memory, followed by generation of an image to connect the word(s) to be learned with its definition or concept. She was taught the definition of the new words (ie, afferent and efferent). Then she was asked to remember the keyword(s) and envision a picture, the brain in this case, and how it relates to the definition. The visual representation consisted of an image of information traveling to the brain when the skin is touched. The final component was recalling the association. This was accomplished by taking the word “afferent,” recalling the image of information going to the brain when the skin is touched and realizing that the **A** in “**A**fferent” is paired with the **A** in “**A**rriving” at the brain and that “afferent” information is sensory informing traveling toward or “**A**t” the brain (Figure 1).

Table 2. Keyword Four-Step Process¹⁶

- | | |
|----|---|
| 1. | Think back to the keyword |
| 2. | Think of the picture |
| 3. | Remember what else was happening in the picture and |
| 4. | Produce the definition |

First Letter Mnemonics

A first letter mnemonic are a simple yet effective strategy that uses the first letter of words to be remembered to form a word, or word-like, unit.¹⁷ Acronyms and acrostics are two types of strategies often utilized. An acronym is a word derived by taking the first letter from each word that you want to remember and making a new word from all those letters.^{4,25} For example, AVPU, SAMPLE, OPQRST, AEIOU-TIPS, and RICE are used to recall different aspects of emergency medicine (Table 3). In athletic training, management of a concussion requires immediate and delayed memory recall, but how many of us have difficulty remembering the five words we have asked the injured athlete to remember? A great practical application of first letter mnemonics would be creating an acronym to remember the 5 words, specifically using the athletic training credential and the state where the athletic trainer resides. For example, ATC-MI could stand for **A**pple, **T**iger, **C**rab, **M**aid, **I**nsect.

Acrostics support memory recall of large quantities of information by creating an entire sentence where the first letter of each word is the targeted information.^{4,25} As educators we use this mnemonics strategy more than we think, especially in healthcare. Ever heard of “**O**n **O**ld **O**lympus **T**owering **T**op **A** **F**inn **A**nd **G**erman **V**iewed **A** **H**orse”, a strategy for the recalling the 12 cranial nerves, **O**lfactory, **O**ptic, **O**culomotor, **T**rochlear, **T**rigeminal, **A**bducens, **F**acial, **A**uditory (Vestibulocochlear), **G**lossopharyngeal, **V**agus, **A**ccessory, **H**ypoglossal? A search of the Internet found over 200 sites with “**R**andy **T**ravis **D**rinks **C**old **B**eers”, the framework of the brachial plexus (**R**oot, **T**runk, **D**ivision, **C**ord, **B**ranches) and **O**ld **P**eople **F**rom **T**exas **E**at **S**piders, the bones of the skull (**O**ccipital, **P**arietal, **F**rontal, **T**emporal, **E**thmoid, **S**phenoid). The lists of these acronyms and acrostics in healthcare are endless but useful. A study examining the effects of first letter mnemonics on the content achievement of at-risk nursing students found that the treatment group who were taught the memory strategy over a seven-week period demonstrated a significant improvement in outcome scores compared to the low-achieving students who were not using the strategy and the students considered high-achievers.²⁶

In this case study, first letter mnemonics were used to recall the pain spinal pathways. Julie created both an acronym and acrostics to remember the spinal track for ascending pain information (Figure 2).

Ridiculous Association

Ridiculous association uses vivid and ridiculous images, poems, stories, etc to strengthen the association between content to be recalled and the association utilized.⁴ Almost anything can be used to make the ridiculous association as long as it provides meaning for the student. For example, to remember the position of the erector spinae muscles (ie, iliocostalis, longissimus, spinals) in the lumbar spine, visualize a pilot attempting to land a plane on the left runway on the athlete’s back who needs to use the **I**nstrument **L**anding **S**ystem (**ILS**). Moving from lateral to medial we have (1) **I**liocostalis (lumborum), (2) **L**ongissimus (thoracis), and (3) **S**pinalis (dorsi). Ridiculous association can also be used

Table 3. Emergency Medicine Acronyms

Acronym	Purpose	Meaning	
AVPU	Assessment of a patient's level of consciousness	A lert V erbal P ain U nresponsive	
SAMPLE	Components of a secondary assessment	S ymptoms A llergies M edication P ast pertinent history L ast oral intake E vents leading to the injury/illness	
OPQRST	Assessment of a patient's symptoms	O nset of symptoms P rovocation Q uality of symptoms R adiation S everity (0-10 scale) T ime	
AEIOU-TIPS	Causes of a patient's loss of consciousness	A alcohol, airway, anaphylaxi E epilepsy, electrocution I insulin (too much, too little) O overdose, oxygen (hypoxic) U uremia (other metabolic pathology) T trauma, tumor I infection P poisoning, psychiatric S syncope, seizure, shock, stroke	
RICE	Immediate treatment for musculoskeletal injuries	R est I ce C ompression E levation	OR R est I mmobilization C old E levation

to recall the location of the neurovascular structures of the femoral triangle. Visualize a **VAN** traveling up the right femur moving from distal to proximal. When the **VAN** reaches the femoral triangle the femoral **V**ein, **A**rtery, and **N**erve are running medial to lateral. In this case, rather than an image, Julie created a ridiculous poem to help link the multiple components of the Gate Control Theory.

Link-Word Mnemonics

Link or chain mnemonics use paired associations to link together items which need to be recalled at a later time in a particular order. This strategy has two components assuming that learning a task is to master new material. First, the strategy must help students link familiar material to unfamiliar material.² Second, the strategy must provide an association with the new material's meaning.² This association is typically in the form of some type of visual imagery where the adjacent item(s) within a list are interacting (in order) in a meaningful way for the students.

For example, Julie needed to recall the characteristics of different sensory and noxious organs associated with pain management.

The familiar link in this case was Julie's ability to understand the alphabet and concepts of biggest-to-smallest and fastest-to-slowest. The association to establish the meaning of the new material was easy once the familiar link was established. The sensory and noxious organs when identified by type, **A-Alpha**, **A-Beta**, **A-Delta**, and **C-Fiber** can be placed in alphabetical order. The link, **A-Alpha** comes before **A-Beta**, **A-Beta** before **A-Delta**, and **A-Delta** before **C-Fibers**. This linkage then automatically places the organs in order based on size and transmission speed (Table 1). Thus, when Julie was confronted with a question such as "True or False: A-Delta information travels faster than A-Beta" all she needed to do was visualize the alphabetical order of the organs to know that the A-Beta is before A-Delta so A-Delta is going to be smaller and slower than A-Beta.

CONCLUSION

Mnemonic strategies used to enhance recall by connecting new knowledge with familiar words and images are a simple, yet powerful learning tool. That "aha" moment, when students make an association with an educational concept is priceless and is

something that will last forever. Many of the strategies utilized here do take some time to learn. However, the benefits of allowing students to think freely while associating cognitive knowledge with ideas and materials that are relevant to a student's life is what makes this teaching and learning strategy very useful for remembering information.

REFERENCES

1. Halpern J. Mnemonics used for patient assessment. *J Emerg Nurs*. 1994;20:219-221.
2. Joyce B, Weil M. Memorization: getting the facts straight. *Models of Teaching*. Boston: Allyn and Bacon; 2009:189-212.
3. Zimbardo P, Johnson R, Weber A. *Psychology Core Concepts*. 5th ed. Boston: Allyn and Bacon; 2006.
4. Gibson H. Using mnemonics to increase knowledge of an organizing curriculum framework. *Teach Learn Nurs*. 2009;4:56-62.
5. Feranandes C, Speer M. Using mnemonics and visual imagery to teach the new neonatal resuscitation program. *J Perinatol*. 2002;22(5):411-413.
6. Melillo KD. Mnemonics - Use in gerontological nursing practice. *J Gerontol Nurs*. 1991;17(7):40-44.
7. Sarvis C. Calling in NERDS for critically colonized wounds. *Nurs*. 2007;37(5):26-27.
8. Al Aboud K, Al Hawsawi K, Ramesh V, Al Aboud D. Mnemonics in dermatology: An appraisal. *Int J Dermatol*. 2002;41(9):594-595.
9. Goldsmith SM, Solomon AR. A series of melanomas smaller than 4 mm and implications for the ABCDE rule. *J Eur Acad Dermatol Venereol*. 2007;21(7):929-934.
10. Beevers G, Lip G, O'Brien E. ABC of hypertension: Blood pressure measurement. *BMJ*. 2005;322:981-985.
11. Blue AV, Chessman AW. Medical students' abilities to take an occupational history: Use of the WHACS mnemonic. *J Occup Environ Med*. 2000;42(11):1050.
12. American Red Cross. *Emergency Response*. Yardley, PA: Staywell; 2001.
13. Newberry L, Barnett G, Ballard N. A new mnemonic for chest pain assessment. *J Emerg Nurs*. 2005;31(1):84-85.
14. Caplan J, Stern T. Mnemonics in a nutshell: 32 aids to psychiatric diagnosis. *Curr Psychiatr*. 2008;7(10):27-33.
15. Chumbley EM, O'Connor F, Nirschl P. Evaluation of overuse elbow injuries. *Am Fam Physician*. 2000;61:691-700.
16. The Access Center. Using mnemonic instruction to facilitate access to the general education curriculum. Available at: http://www.k8accesscenter.org/training_resources/Mnemonics.asp. Accessed June 1, 2010.
17. Carney R, Levin J, Levin M. Enhancing the psychology of memory by enhancing memory of psychology. *Teach Psychol*. 1994;21(3):171-174.
18. Levin J. Mnemonic strategies and classroom learning: A 20-year report card. *The Elementary School J*. 1993;94(2):235-244.
19. Levin M, Levin J. Scientific mnemonics: Methods for maximizing more than memory. *Am Educ Res J*. 1990;27(2):301-321.
20. Larsen J, Risør O, Putnam S. P-R-A-C-T-I-C-A-L: a step-by-step model for conducting the consultation in general practice. *Fam Pract*. 1997;14(4):295-301.
21. Atreja A, Bellam N, Levy S. Strategies to enhance patient adherence: making it simple. *Med Gen Med*. 2005;7(1):4.
22. Carney RN, Levin J. Conquering Mnemonophobia, with help from three practical measures of memory and application. *Teach Psychol*. 2008;35(3):176-183.
23. Miller G. Information and memory. *Scientific Am*. 1956;195:42-46.
24. Bellezza F. Mnemonic devices and memory schemes. In: McDaniel M, Pressely M, eds. *Imagery and Related Mnemonic Processes: Theories, individual differences, and applications*. New York: Springer-Verlag; 1987:35-55.
25. Bolich B, McLaughlin T. The use of mnemonic strategies as instructional tools for children with learning disabilities. *Int J Special Educ*. 2001;16(2):40-48.
26. Heywood R. The effects of the FIRST-Letter Mnemonic Strategy adaptation on the content achievement of at-risk nursing students. 1994. *Boston College Dissertations and Theses*. Paper AAI9428780.

Web-Based Conferencing Tools for the Athletic Training Educator

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The options for web conferencing solutions are vast. In this column I will provide an overview of web conferencing, a synopsis of the most popular web conferencing tools, and a discussion of best practices for selecting and hosting your first web conference.

THE PROBLEM

A Clinical Education Coordinator from a small mid-western liberal arts institution is challenged with bringing together 15 approved clinical instructors (ACIs) from 10 clinical sites. The ACIs are spread over a 70 mile radius and have little time to travel to campus for the bi-annual recertification workshop and it is not feasible for the Clinical Education Coordinator to visit with the ACIs individually. The Clinical Education Coordinator must find a low-cost solution to meet with the ACIs or face being in non-compliance with their accrediting agency.

WEB-BASED CONFERENCING 101

Web-based conferencing tools are computer programs that allow the user to connect synchronously using either a web browser or standalone computer application. Users are able to meet via conference call using either a dial-in number or through voice-over-IP (VoIP). Video conference calls (presenter only or all attendees) are also an option when broadband Internet is available. Collaborative tools such as document sharing, white board, polling and desktop sharing are standard features. There are numerous free and fee-for-service web-based conferencing tools available to the athletic training educator to address the aforementioned problem. A review of the most popular web conferencing tools follows.

WEB-BASED CONFERENCING TOOLS

Dimdim (www.dimdim.com) is a browser-based web conferencing tool. Users access the web conference by directing their browser to a URL. There are four levels of service available ranging from free for 10 person meetings to \$65 per month for meetings up to 1000 users. Dimdim supports up to four video cameras. Dimdim's level of technical support and reliability increases with paid versions of the program. Dimdim works on Mac and PC.

Skype (www.skype.com) is a free popular instant messaging program, most known for high quality VoIP phone calls. To use Skype you must download an application to your computer. Most people use it for instant text messaging and low cost phone calls; however, Skype also can function as a web conferencing tool. To do so, select the Share Selection or Share Full Screen option from the tool bar. This will allow you to share documents with your attendees directly from your desktop. The advantage of Skype over other products is its ease of use. In less than 5 clicks of the mouse you can launch a meeting with up to 25 users. Skype works on Mac and PC.

Yugma (www.yugma.com) is a web conferencing solution that is available in free and paid versions. In order to use Yugma, you must download and install an application to your computer. Yugma works on Mac and PC. The free version of the program allows you to conference with up to 25 users. Paid versions of the program are scalable up to 500 users.

ooVoo (www.oovoo.com) is an excellent alternative if you are interested in using video web conferencing. ooVoo's free version supports 2-way video conferencing, whereas the paid options

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support up to 6-way video conferencing. To run ooVoo you must download and install an application on your computer. ooVoo automatically recognizes your webcam upon launching the application.

GoToMeeting (www.gotomeeting.com) is a popular fee for service web conferencing tool. GoToMeeting requires that you download and install an application to your computer. Video conferencing is not currently available for GoToMeeting. Attendees are able to access audio by dialing into a conference call number or may use VoIP. GoToMeeting supports up to 1000 users. Unfortunately, GoToMeeting does not offer a free version; however, there is a fully functional 30-day trial available. If archiving your web conference is a required feature GoToMeeting is the best choice. GoToMeeting works on Mac and PC.

BEST PRACTICES FOR WEB BASED CONFERENCING TOOLS

- ▶ Insist that each attendee complete the setup process at least 48 hours in advance. This will give you at least 48 hours to resolve any technical issues.
- ▶ Disseminate all documents that will be used during the web conference ahead of time.
- ▶ If attendance is being recorded, try to acknowledge each attendee by asking them to raise a virtual hand during the meeting.
- ▶ Practice makes perfect. Do not wait until the day of the conference call to try out a new system. Practice using all of the tools that you will use during the web conferencing ahead of time.
- ▶ Open the web conference at least 30 minutes prior to the time you would like to start your conference. This will give you plenty of time to resolve any last minute technical issues.
- ▶ When all else fails revert to using the audio conference call only.
- ▶ Archive your meeting for playback.
- ▶ For the fee-for-service web conferencing tools, use the free trial for at least 30 days prior to making your final decision.

OVERALL IMPRESSIONS

There are many web conferencing solutions available on the market today. In order to determine which solution will work best for you, consider the following questions.

- ▶ Do you want to record/archive your meeting?
- ▶ Do you have a budget?
- ▶ Do you want to offer toll-free audio?
- ▶ Do you want to use video conferencing?
- ▶ Do you sharing documents?
- ▶ Do you want interaction on screen
- ▶ Are your attendees computer savvy?
- ▶ Do you want to collaborate in real time on a document?
- ▶ Are your users allowed to install software on their computer?

Answering these questions will help you determine which web conferencing solution is right for you. I strongly recommend you try out at least three of the applications prior to making your final decision.

Current Literature Summary

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Our charge is to monitor education-related journals (eg Journal of Nursing Education, Journal of Higher Education) and identify articles which are the most applicable to our readers. We will provide brief synopses of the articles plus potential applications to AT education.

Abrums M, Resnick J, Irving L. Journey or destination? Evaluating student learning about race, class, and privilege in health care. *Nurs Educ Res.* 2010;31(3): 160-166.

Reviewed by Carrie Meyer, Fort Lewis College

The number of racially and ethnically diverse people pursuing healthcare careers is not keeping up with the overall diversity of the country. Only 9% of nurses are from an underrepresented group versus 25% of the overall population. Education must include teaching and discussion of cultural differences so understanding of how discrimination influences health care disparities for patients and interactions with co-workers can be developed by students.

Students within a Cultural and Social Issues in Health Care course were assigned papers to assess their understanding of cultural differences. One paper was autobiographical – asking students to reflect on their experiences with race, class, and privilege in their neighborhoods, family, and schools. In another paper, students were asked to apply course content as it related to their nursing experiences thus far. Narrative analysis was then applied to their writings. Four learning levels were identified from nine overall themes. Additionally, they examined the connection between students' backgrounds and their level of learning. For example, the majority of students in the highest level of learning were from underrepresented backgrounds.

Athletic training is very similar to nursing in that we have limited practitioner diversity. As educators, we need to be teaching and practicing cultural and racial competency within our curriculums so students are prepared to appropriately and effectively work with and treat those who are different from themselves.

Campo M, Shiyko M, Lichtman S. Sensitivity and specificity: A review of related statistics and controversies in the context of physical therapist education. *J Phys Ther Educ.* 2010; 24(3): 69-78

Reviewed by David Diers, Governors State University

Evidence-based practice (EBP) is being emphasized in all health professions. An integral part of EBP is reading and comprehending the justification for using certain diagnostic tests or interventions. There is an increasing amount of literature about the validity of many of the special tests we commonly use. The specificity and sensitivity of the special tests determines the validity of the special test. This article explains the concepts and process for determining the validity of special tests focusing on specificity and sensitivity. However, positive and negative predictive values, likelihood ratios, post-test probabilities, and receiver operating characteristic (ROC) curves are also discussed.

The article also discusses how the validity of special tests should be included in an academic curriculum. The special tests are an important part of the clinical decision making process and the accuracy of these special tests is very important to understand. This article is very clear and makes understanding the concepts of specificity and sensitivity easy. This article is a must read for any instructor and student. Everyone using special tests to diagnose an injury needs to know which tests are most appropriate to use for a given condition and how they should be applied.

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Reviewed by Michelle Monaco, Lehigh Carbon Community College.

Healthcare professionals work collaborately on behalf of their patients to provide the best medical care. Educators have been effectively integrating collaborate learning theories into the classroom to increase critical thinking abilities. Members of the nurse education community have assessed collaborate testing in a baccalaureate nursing program to foster critical thinking in decision making and group processing skills. Collaborate testing is defined as students working together on a test. Currently, data on collaborative testing as a learning strategy is limited. Results of this study indicate that student learning by measure of a final test score were higher for those who did collaborative testing than for those who took the test individually. Students indicated that they studied and learned more when preparing for a collaborative test. Student responses also provided respectful and collaborative behaviors within their testing group with high levels of discussion within the group during testing. Retention scores based on final examinations were similar to those who were tested individually.

In athletic training education, collaboration on assignments and clinical practice has been embraced. The effects of collaborate testing may be a valuable learning strategy especially with analysis and application of higher concepts. Interprofessional collaboration will continue in the healthcare environment, and this technique, along with other collaborative teaching strategies must also continue to be investigated.