

## Peer-Assisted Learning in the Athletic Training Clinical Setting

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### **Abstract:**

Athletic training educators often anecdotally suggest that athletic training students enhance their learning by teaching their peers. However, peer-assisted learning (PAL) has not been examined within athletic training education in order to provide evidence for its current use or as a pedagogic tool. To describe the prevalence of PAL in athletic training clinical education and to identify students' perceptions of PAL. Descriptive. "The Athletic Training Student Seminar" at the National Athletic Trainers' Association 2002 Annual Meeting and Clinical Symposia. A convenience sample of 138 entry-level male and female athletic training students. Students' perceptions regarding the prevalence and benefits of and preferences for PAL were measured using the Athletic Training Peer-Assisted Learning Assessment Survey. The Survey is a self-report tool with 4 items regarding the prevalence of PAL and 7 items regarding perceived benefits and preferences. A total of 66% of participants practiced a moderate to large amount of their clinical skills with other athletic training students. Sixty percent of students reported feeling less anxious when performing clinical skills on patients in front of other athletic training students than in front of their clinical instructors. Chi-square analysis revealed that 91% of students enrolled in Commission on Accreditation of Allied Health Education Programs-accredited athletic training education programs learned a minimal to small amount of clinical skills from their peers compared with 65% of students in Joint Review Committee on Educational Programs in Athletic Training-candidacy schools ( $\chi^2 = 14.57, P < .01$ ). Multiple analysis of variance revealed significant interactions between sex and academic level on several items regarding benefits and preferences. According to athletic training students, PAL is occurring in the athletic training clinical setting. Entry-level students are utilizing their peers as resources for practicing clinical skills and report benefiting from the collaboration. Educators should consider deliberately integrating PAL into athletic training education programs to enhance student learning and collaboration.

**Key Words:** peer teaching, clinical instruction, athletic training students, peer education

### **Article:**

Peer-assisted learning (PAL) has long been recognized in theory, research, and clinical education as a valuable pedagogic tool in which students encounter mutual educational benefits as both teachers and learners.<sup>1,2</sup> International scholars Topping and Ehly<sup>3</sup> have identified several pedagogic methods that embody PAL, including peer tutoring, peer modeling, peer education, peer counseling, peer monitoring, and peer assessment. Substantial use of student peers in various PAL roles has been reported in the medical,<sup>4,5</sup> nursing,<sup>1,6-14</sup> occupational therapy,<sup>15</sup> speech-language pathology,<sup>16</sup> and physical therapy fields.<sup>17</sup> In fact, the use of PAL can be traced back to Aristotle's use of archons, or student leaders.<sup>12</sup>

The term peer-assisted learning warrants an operational definition. Peers are defined as either near peers or co-peers.<sup>18</sup> Near peers are students who have already surpassed the level at which they are teaching, tutoring, monitoring, etc (eg, seniors teaching freshmen) whereas co-peers are at the same academic or experiential level (eg, sophomores teaching fellow sophomores).<sup>18</sup> Although much rhetorical debate exists regarding the definition of learning, the operational definition of learning for the purposes of this study was "to gain knowledge, understanding, or skill through instruction or experience."<sup>3</sup> Therefore, PAL is the act or process of

gaining knowledge, understanding, or skill in athletic training-related tasks among students who are at either different or equivalent academic or experiential levels through instruction or experience.

Positive student feedback and outcomes have been reported in medical and allied health education programs that utilize PAL. Outcomes identified by students engaging in PAL activities include a decreased level of stress or anxiety when working with peers than with clinical instructors (CIs)<sup>6,19,20</sup>; improved communication skills<sup>21-23</sup>; increased cognitive and psychomotor improvement scores<sup>9,17</sup>; increased confidence in clinical skills and decision making<sup>22,24</sup>; and improved organizational skills.<sup>25</sup> Additional positive outcomes associated with PAL activities include opportunities to practice leadership skills<sup>7,26</sup> and teaching skills<sup>27,28</sup> and to review and enhance understanding of clinical skills.<sup>4,29,30</sup>

Although the use of PAL and subsequent beneficial outcomes have been well researched and documented within the medical and allied health fields, no authors have explored PAL in athletic training professional preparation. Our purpose, therefore, was to assess the prevalence of PAL in athletic training clinical education and to identify entry-level athletic training students' (ATs)' perceived benefits and preferences associated with PAL during clinical education. We also assessed the influence of various demographic factors on prevalence, perceived benefits, and preferences regarding PAL.

## **METHODS**

### ***Participants***

A convenience sample of 170 entry-level ATs who attended the opening session of the 2002 National Athletic Trainers' Association's "The Athletic Training Student Seminar" in Dallas, TX, participated in this study. It was difficult to ascertain the exact number of students in attendance to determine the total sample population present at the opening session. However, the Chair of the Student Program Committee indicated that 350 to 400 students had registered for the convention. Seven of the 170 response forms were incomplete and removed from the data set. Participants who were currently in internship programs were excluded, which reduced the sample to 138 participants and represented 35% to 39% of the total students based on the registration estimates provided by the committee chair. As presented in Table 1, subjects represented both male and female ATs. all 10 membership districts, and different program types and academic levels. Of this sample. 1 participant did not indicate sex, and 8 did not know the type or status of the athletic training education program (ATEP) in which they were enrolled.

### ***Instrumentation***

The Athletic Training Peer-Assisted Learning Assessment Survey that we developed for this study was inspired by Iwasiw and Goldenberg's<sup>9</sup> Clinical Teaching Preference Questionnaire. The Questionnaire was developed and validated in the field of nursing and was used in an experimental design study that compared nursing students' preferences for peer teachers over CIs. Ten of these questions were adapted to fit the athletic training context.

The Survey also contained 4 demographic questions to determine sex, academic level, ATEP accreditation status (Commission on Accreditation of Allied Health Education Programs [CAAHEP] accredited, Joint Review Committee on Educational Programs in Athletic Training [JRC-AT] candidate, internship, and not seeking accreditation), and National Athletic Trainers' Association membership district. The following 4 questions were designed to assess the prevalence of PAL in the entry-level athletic training education programs:

1. What percentage of your clinical skills do you feel you have learned from other athletic training students?
2. What percentage of your clinical skills do you practice with other athletic training students?
3. What percentage of time in the clinical setting do you seek advice from other athletic training students?
4. What percentage of time in the clinical setting do you seek advice from your clinical instructors?

Response options were designated as minimal (<25% of the time), small (26-50% of the time), moderate (51-75% of the time), and large (76-100% of the time). The 17 items regarding the perceived benefits and preferences were presented in a stem statement followed by a 5-point Likert scale ( 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, 5 = strongly agree). Five of the stem statements were constructed to gauge students' perceived benefits of PAL. An example of such statements is, "When I work together with another athletic training student, I feel the experience is more competitive than collaborative." Eleven of the stem statements regarding students' preferences for PAL were constructed in a manner that allowed students to compare their interactions with peers and CIs. The comparative structure helped to gauge students' levels of preference. An example of such statements is, "I feel more self-confident when practicing my clinical skills with other ATs than with my CIs." For clarity, PAL jargon (eg, peer tutoring, peer monitoring, peer modeling, peer assessment) was avoided. Rather, questions were developed using descriptive terminology that could be linked to various methods of PAL. Three athletic training educators with experience in educational research evaluated the instrument for content validity. The instrument was reviewed by 10 undergraduate entry-level ATs to determine clarity.

**Table 1. Participant Demographics**

Demographic	n	%
<b>Academic level</b>		
Freshman	1	0.7
Sophomore	10	7.2
Junior	24	17.4
Senior	75	54.3
Entry-level master's	28	20.3
Total	138	100
<b>Sex</b>		
Male	44	32.1
Female	93	67.9
Total	137	100*
<b>Program status†</b>		
CAAHEP-accredited	82	59.4
JRC-AT candidate	48	34.8
I do not know	8	5.8
Total	138	100
<b>National Athletic Trainers' Association District</b>		
One	5	3.7
Two	3	2.2
Three	8	5.9
Four	22	16.3
Five	12	8.9
Six	41	30.4
Seven	13	9.6
Eight	10	7.4
Nine	15	11.1
Ten	6	4.4
Total	135	100‡

\*One participant did not indicate sex.

†CAAHEP indicates Commission on Accreditation of Allied Health Education Programs; JRC-AT, Joint Review Committee on Educational Programs in Athletic Training.

‡Three participants did not indicate district.

## **Procedures**

The Institutional Review Board at Ball State University approved this study before data collection. All entry-level ATs attending the opening session of "The Athletic Training Student Seminar" at the National Athletic Trainers' Association 53rd Annual Meeting and Clinical Symposia in Dallas, TX, were invited to participate in this study. Time was allotted at the seminar for data collection. Participants received an envelope containing the Athletic Training Peer-Assisted Learning Assessment Survey, a scannable response form, and a No. 2 pencil. The envelope had a label affixed to the outside stating that high school students should not complete the survey. The participants received both verbal and written instructions for completing the questionnaire, including an

operational definition of PAL. Participants were notified that by virtue of completing the survey, they were providing implied consent. The scannable forms were not coded with personal identifiers in order to ensure that all responses remained anonymous. Subjects were instructed to complete the surveys using the No. 2 pencil and place them in designated boxes when they exited the lecture hall.

### *Data Analysis*

Taking advantage of the large data set, we first conducted reliability testing on the 17 items related to perceived benefits and preferences of PAL. Pearson  $r$  reliability coefficients ranged from .133 to 1.00, and kappa reliability coefficients ranged from .101 to 1.00. Of the 17 original statements, only the 7 with kappa coefficients of .60 and higher were used in further data analyses. Frequencies and percentages were calculated for each of the remaining questions on the instrument. Not all questions had responses; therefore, data analyses were based on the number of responses for each particular question. Chi-square analyses were completed to examine associations in the responses to the 4 questions regarding prevalence of PAL and the independent variables of sex, academic level, and type and status of the ATEP. We computed a 2-way multiple analysis of variance to examine differences among the 7 statements regarding benefits and preference and sex and academic level. Univariate analyses of variance were used to examine significant differences found in the multiple analysis of variance. The alpha level was set at .05. Power observed for the multiple analysis of variance concerning sex by academic level was adequate, with observed levels of .57 for sex, .79 for academic level, and .98 for their interaction. We used the Statistical Package for the Social Sciences (version 12; SPSS Inc, Chicago, IL) to analyze the data.

## **RESULTS**

### *Prevalence of Peer-Assisted Learning*

Approximately 19% ( $n = 26$ ) of the participants learned a moderate to large amount of their clinical skills from other ATs. A combined 66% ( $n = 91$ ) of all participants indicated that they practiced a moderate to large amount of their clinical skills with other students. Chi-square analysis revealed that 91% ( $n = 75$ ) of students enrolled in CAAHEP-accredited ATEPs learned a minimal to low amount of clinical skills from their peers compared with 65% ( $n = 31$ ) of students in JRC-AT candidacy schools ( $\chi^2 = 14.57, P < .01$ ). A total of 66% ( $n = 91$ ) of the students indicated that they practiced a moderate to large amount of their clinical skills with their peers. Approximately 31% ( $n = 43$ ) of the participants indicated that they sought advice from other students greater than half of the time while in the clinical setting. Female students tended to seek advice from their peers more than male students ( $\chi^2 = 8.37, P < .05$ ); however, caution should be used in interpreting this result, as the number of female participants was more than double that of the male participants. Seventy-one percent ( $n = 98$ ) of the participants indicated that they seek advice from their CIs more than half of the time while in the clinical setting.

### *Perceived Benefits and Preferences*

Descriptive statistics for each of the 7 perceived benefits and preference items are presented in Table 2. For the multiple analysis of variance, the homogeneity of covariance was violated (Box  $M = 199.15, F = 112,6256.37, P = 1.43, P = .002$ ). Therefore, we computed a second multiple analysis of variance after ensuring that all cell sizes were equal by drawing a random subset of subjects for each condition equal in size to the number forming the smallest group. When the group sizes are equal, the multiple analysis of variance can be conditionally robust to the homogeneity of covariance violation.<sup>31</sup> The results of the second multiple analysis of variance for sex by academic level found no main effects, but an interaction between these 2 independent variables was seen (Pillai trace = .96,  $F = 21,84, P = 1.88, P = .023$ ). With univariate tests, we found interactions occurring for 2 items: "When I work together with other ATs, I feel the experience is more competitive than collaborative" ( $F = 3,32, P = 3.02, P = .044$ ) and "When I have a question when working with an athlete/patient, I feel more comfortable asking fellow ATs than my CIs" ( $F = 3,32, P = 6.44, P = .002$ ).

After examining the interaction concerning the experience as more competitive than collaborative, we found that sex differences appeared in the junior year of study. Junior males perceived higher competitiveness than junior females (group means of 4.00 and 2.20, respectively), but no sex differences were found for other years.

For males only, a difference was noted between sophomore and junior male students (means of 2.20 and 4.00, respectively). The statement concerning comfort in asking fellow ATs compared with the CI revealed opposing trends for males and females. Males rated this item lower as sophomores and higher as entry-level graduate students (means of 1.60 and 3.60, respectively). Females showed the opposite pattern, with sophomore females rating the item higher than entry-level graduate student females (means of 2.60 and 1.80, respectively).

## DISCUSSION

### Prevalence

Our results suggest that students are engaging in PAL-related activities. The participants' understanding of the concept and operational definition of PAL may have affected their interpretations of the questions presented on the instrument. Nevertheless, ATs perceived that they learned a moderate to large amount of their clinical skills from their peers. Although we cannot determine the students' interpretation of the 1 prevalence question that used the term learn, based on the operational definition of PAL, students perceive that they have gained knowledge, understanding, or skill from interactions and experiences with their peers. This is not to imply that students are being educated primarily by their peers but rather that peer interactions enhance and refine material initially instructed by their CIs.

**Table 2. Descriptive Statistics for Survey Questions Relating to Perceived Benefits of and Preferences for Peer Clinical Education: Number (%)**

Question	Mean*	SD	Strongly Disagree	Disagree	Undecided/ Don't Know	Agree	Strongly Agree
I am less anxious when performing clinical skills in the presence of other ATs than in front of my CIs.†	3.36	1.07	3 (2.2)	40 (29.0)	12 (8.7)	70 (50.7)	13 (9.4)
Being taught clinical skills by other ATs increases my interaction and collaboration with other students more than being taught by my CIs.	3.32	0.88	1 (0.7)	27 (19.6)	46 (33.3)	55 (39.9)	9 (6.5)
The feedback I receive from other ATs is more helpful than feedback I receive from my CIs.	2.32	0.80	13 (9.4)	82 (59.4)	31 (22.5)	10 (7.2)	2 (1.4)
Other ATs are more supportive to me when I am practicing a clinical skill than my CIs.	2.59	0.90	9 (6.5)	65 (47.1)	42 (30.4)	18 (13.0)	4 (2.9)
I feel more self-confident when practicing my clinical skills with other ATs than with my CIs.	3.12	0.99	4 (2.9)	41 (29.7)	33 (23.9)	54 (39.1)	6 (4.3)
When I work together with another AT, I feel the experience is more competitive than collaborative.	2.83	1.06	11 (8.0)	53 (38.4)	28 (20.3)	41 (29.7)	5 (3.6)
When I have a question when working with an athlete/patient, I feel more comfortable asking a fellow AT than my CIs.	2.38	0.92	15 (10.9)	80 (58.0)	20 (14.5)	21 (15.2)	2 (1.4)

\*1 = strongly disagree; 5 = strongly agree.

†ATS indicates athletic training student; CI, clinical instructor.

Students enrolled in CAAHEP-accredited ATEPs perceived that they learned a smaller amount of their clinical skills from their peers compared with students enrolled in JRC-AT candidacy programs. This may be because of the clinical education and instructional standards met by the accredited ATEPs. A preponderance of the ATs surveyed in this study practice a moderate to large amount of their clinical skills with other students. These results suggest that students may be engaging in a form of PAL referred to as peer monitoring. Peer monitoring allows students to identify and provide feedback regarding appropriate and inappropriate behaviors.<sup>2</sup> Translated into the athletic training context, peer monitoring involves students providing one another with formative feedback regarding correct and incorrect aspects of psychomotor skills or clinical proficiencies. This is not to suggest that ATs should not be receiving feedback on their performances from their CIs but rather that peer monitoring can provide a student with additional immediate feedback when practicing clinical skills with peers.

As expected, ATs are appropriately seeking clinical advice from their CIs. In addition, ATs are also turning to their peers for such advice. Approximately 31% (n = 43) of the ATs indicated that they sought advice from other students more than half the time. These results suggest that students may again be engaging in peer monitoring or peer counseling (or both). Peer counseling, as another form of PAL, can provide an effective support system by using active listening and problem-solving skills.<sup>2</sup> Authors<sup>32</sup> of a recent qualitative study in athletic training explored the perceptions of ATs regarding pedagogic strategies that enhanced learning in the clinical setting. Although the authors did not specifically examine the use of PAL in the clinical setting, several participants suggested it was helpful to be paired with a peer in the clinical setting because it provided an environment in which students could ask each other questions and encouraged autonomy.

Interestingly, female students sought advice from their peers more often than did male students. Given that there were twice as many females as males represented in the sample, generalizations should perhaps be made with caution. However, recent demographics<sup>33</sup> of ATEP graduates (2000-2004) indicate a steady increase in the ratio of female to male graduates. Consequently, the reasons why female students more often seek advice from their peers require further research.

### *Perceived Benefits and Preferences*

When ATs are learning new skills, it is important that peer feedback supplement and not replace CI feedback. The individual psychomotor skills particularly lend themselves to peer feedback, but integrating these skills into clinical proficiencies may be more effective under the close supervision of a CI. Appropriate and accurate feedback is a critical component in clinical education. Without feedback, mistakes go uncorrected, good performance is not reinforced, and learning can be compromised.<sup>34</sup> Reasonably, only a small number of ATs felt that the feedback they received from other students was more helpful to them than the feedback given by their CIs. Similarly, nursing students reported that the feedback they received from fellow students was not as helpful as what they received from their CIs.<sup>9</sup> However, because a CI may supervise multiple students, PAL in the form of peer monitoring may provide important immediate feedback that may not be available from the busy CI.<sup>35</sup> This is particularly crucial today because athletic training CIs encounter role stress when they attempt to balance the health care of their patients with their clinical teaching responsibilities.<sup>36,37</sup>

Several aspects of this study suggest that ATs may prefer clinical education experiences that are collaborative in nature. As mentioned previously, ATs seek the advice of their peers in the clinical setting. Close to half of the participants view peer teaching as a way to increase collaboration in the clinical setting. Research in physical therapy education indicates that having CIs supervise paired students fosters peer collaboration and problem solving in the clinical setting.<sup>38</sup> Perspectives provided by ATs in a previous study<sup>32</sup> regarding effective teaching strategies indicate that working together with fellow students is a positive aspect of the clinical setting. Interestingly, our study suggested that some students may view interactions with their peers as more competitive than collaborative.

Athletic training students may experience varying levels of anxiety when working with their peers and CIs. The results of this study suggest that ATs are more comfortable approaching their CIs for help when caring for an athlete/patient. However, perhaps because of ease of relationships among fellow students, they are less anxious and more self-confident when practicing their clinical skills with their peers than with their CIs. Previous research<sup>39</sup> regarding the effect of anxiety on learning indicates a curvilinear relationship between anxiety and learning. Although some anxiety promotes the motivation to learn, high levels of anxiety interfere with learning.<sup>40</sup> Students' perceptions of stress in the clinical environment have been substantially researched in the field of nursing.<sup>6,28,40-43</sup> Several authors<sup>6,20,28</sup> suggested the use of PAL for decreasing student anxiety. Athletic training students who have a heightened level of anxiety may experience decreased levels of learning while practicing their clinical skills with their CIs. Therefore, developing clinical experiences that encourage students to collaborate with, and learn from, their peers may help to reduce anxiety, improve self-confidence, and create a more positive and productive learning experience.<sup>4,6,10,28,44</sup>

### *Peer-Assisted Learning in Athletic Training Clinical Education*

The goals of clinical education include assisting students to acquire technical skills and progressing those skills from dependent, supervised practice to independent, collaborative practice.<sup>9</sup> We feel that PAL is an appropriate method to aid in the achievement of these goals in athletic training professional preparation.

As noted by Knight,<sup>45</sup> PAL can facilitate learning over time, a concept critical to the current clinical education guidelines. In Knight's<sup>45</sup> modular approach to clinical education, he suggested that as students master a skill, they must remain accountable for it by teaching it to a younger student. This facilitates a further level of understanding because the student must synthesize the information in a different way in order to explain it to other students. Previous researchers<sup>32</sup> in athletic training clinical education stated that a clinical environment encouraging problem solving enhances students' learning. Thus, PAL emphasizes the active learning aspect of clinical education by creating an environment in which ATs can solve clinical problems together under the supervision of a CI.

Peer-assisted learning can be easily facilitated through clinical rotations or assignments in which several ATs are placed together in the same setting. The guideline ratio recommended by CAAHEP for students to CIs in the clinical setting is 8:1.<sup>46</sup> This ratio is highly conducive for integrating PAL. Physical therapy educators have experimented with different clinical teaching models that integrate opportunities for PAL, specifically the 2:1 student-to-CI ratio model.<sup>17,38,44</sup> This model operates with a significantly lower student-to-CI ratio than is required in athletic training clinical education. Although a low student-to-CI ratio is ideal for student and CI interaction, research indicates that even the higher ratio can provide opportunities for meaningful peer clinical education.<sup>17,38,44</sup> Physical therapy researchers<sup>44</sup> studied students' satisfaction with a clinical placement in a 2:1 ratio. "Students indicated that they practiced their skills with each other and engaged in joint problem-solving activities without interrupting the CI. Students also were able to help each other by correcting each other's mistakes, which led to a more concise plan for a patient's treatment. The presence of a peer also reduced the stress associated with entering a new and unfamiliar environment."<sup>44</sup> Again, this is not to suggest that students should be working independently without CI supervision but rather that students can learn from peer interactions and feedback under appropriate CI supervision.

Research in medical education also supports the use of PAL in the clinical setting. Medical educators hypothesize that medical students involved in PAL demonstrate enhanced teaching abilities during patient education on entering professional practice.<sup>4,47</sup> The use of peer teaching in athletic training may similarly help students to develop more effective teaching skills, which are essential for patient care and clinical instruction of ATs. Several studies in nursing,<sup>9,10</sup> physical therapy,<sup>17</sup> and medicine<sup>25,48</sup> indicated that students participating in PAL have improved cognitive and psychomotor test scores as well as improved overall clinical performance. Indeed, integrating PAL into athletic training education programs could likely enhance student mastery of psychomotor competencies and clinical proficiencies.

Peer-assisted learning can be integrated into athletic training clinical education in the laboratory setting, clinical education setting, and field experience at all levels of program progression, from pre-ATs to senior ATs. For example, PAL can be used in the laboratory setting in the form of near peers acting as teaching assistants. More specifically, senior-level students can serve as laboratory assistants in a junior-level therapeutic modalities laboratory. It is often difficult for athletic training faculty to provide immediate feedback to all students in a laboratory setting. However, faculty can benefit from utilizing ATs who have competency and proficiency instruction and evaluation experience to facilitate small-group instruction of psychomotor skills as well as to provide valuable feedback.

Peer-assisted learning can be integrated in the clinical or field experience by assigning both co-peer and near peer ATs to 1 CI. For example, assigning 2 sophomore-level ATs and 1 junior-level AT to 1 CI working with an athletic team provides an opportunity for multiple forms of PAL. The sophomore students may engage in PAL as co-peers during one situation and receive PAL from a near peer (junior-level AT) during a different

situation. It is conceivable that the students in this scenario would benefit from their roles as both teachers and learners.

## CONCLUSIONS

We offer several conclusions and recommendations regarding this study. According to ATs' perspectives, PAL is taking place in the athletic training clinical setting. However, we emphasize that it should not be viewed as a replacement for initial instruction by a CI but rather as a form of supplemental feedback. We recommend that educators consider integrating PAL opportunities into the structure of athletic training education programs to potentially enhance student mastery of psychomotor competencies and clinical proficiencies. Entry-level ATs feel that they are less anxious practicing skills with their peers and utilize their peers to practice more than half of their clinical skills. We suggest that time should be purposely designated in the clinical setting for students to practice skills with their peers without the anxiety of formal evaluation.

## Future Research

Ours was the first study to explore PAL within the context of athletic training clinical education. In an effort to validate the pedagogic use of PAL in athletic training education programs, PAL should be further defined through qualitative measures that capture the first-hand perspectives of ATs. Qualitative information from ATs interviews can be used to further develop and improve the reliability of the Athletic Training Peer-Assisted Learning Assessment Survey by employing terms and perspectives expressed by students. In addition, it would be beneficial to obtain data from program directors regarding the occurrence of purposeful PAL activities in athletic training education programs. The influence of PAL on objective cognitive and psychomotor scores as well as clinical performance also needs to be examined.

## REFERENCES

1. Aviram M, Ophir R, Raviv D, Shiloah M. Experiential learning of clinical skills by beginning nursing students: "coaching" project by fourth-year student interns. *J Nurs Educ.* 1998;37:228-231.
2. Topping K. *Peer-Assisted Learning: A Practical Guide for Teachers.* Newton, MA: Brookline Books; 2001.
3. Topping K, Ehly S, eds. *Peer-Assisted Learning.* Mahwah, NJ: Lawrence Erlbaum Assoc; 1998.
4. Escovitz ES. Using senior students as clinical skills teaching assistants. *Acad Med.* 1990;65:733-734.
5. Wadoodi A, Crosby JR. Twelve tips for peer-assisted learning: a classic concept revisited. *Med Teach.* 2002;24:241-244.
6. Aston L, Molassiotis A. Supervising and supporting student nurses in clinical placements: the peer support initiative. *Nurse Educ Today.* 2003; 23:202-210.
7. Scott ES. Peer-to-peer mentoring: teaching collegiality. *Nurse Educ.* 2005; 30:52-56.
8. Glass N, Walter R. An experience of peer mentoring with student nurses: enhancement of personal and professional growth. *J Nurs Educ.* 2000;39: 155-160.
9. Iwasiw CL, Goldenberg D. Peer teaching among nursing students in the clinical area: effects on student learning. *J Adv Nurs.* 1993;18:659-668.
10. Cason CL, Cason GJ, Bartnik DA. Peer instruction in professional nurse education: a qualitative case study. *J Nurs Educ.* 1977;16:10-22.
11. Davidson ME, McArdle PE. Peer analysis of interpersonal responsiveness and plan for encouraging effective shaping. *J Nurs Educ.* 1980; 19:8-12.
12. Mickey M. Peer review: a process of socialization. *J Nurs Educ.* 1986; 25:69-71.
13. Kammer C. Using peer groups in nursing education. *Nurse Educ.* 1982; 7:17-21.
14. Kinsey DC. Implementation of peer review within a baccalaureate nursing program. *J Nurs Educ.* 1981;20:29-33.
15. Milner T, Bossers A. Evaluation of the mentor-mentee relationship in an occupational therapy mentorship programme. *Occup Ther Int.* 2004;11: 96-111.
16. Claessen J. A 2:1 clinical practicum. incorporating reciprocal peer coaching, clinical reasoning, and self-and-peer evaluation. *J Speech Lang Pathol Audiol.* 2004;28:156-165.
17. DeClute J, Ladyshevsky R. Enhancing clinical competence using a collaborative clinical education model. *Phys Ther.* 1993;73:683-689.

18. Whitman NA. Peer Teaching: To Teach is to Learn Twice. Washington, DC: Association for the Study of Higher Education; 1988.
19. Erickson GP. Peer evaluation as a teaching-learning strategy in baccalaureate education for community health nursing. *J Nurs Educ.* 1987;26:204-206.
20. McKay SR. A peer group counseling model in nursing education. *J Nurs Educ.* 1980;19:4-10.
21. Burnside IM. Peer supervision: a method of teaching. *J Nun Educ:* 1971; 10:15-22.
22. Flynn JP, Marcus MT, Schmadl JC. Peer review: a successful teaching strategy in baccalaureate education. *J Nurs Educ.* 1981;20:28-32.
23. Kerr MM, MacDonald TH. Project 2000 student nurses' creative approach to peer education. *Nurse Educ Today.* 1997;17:247-254.
24. Hart G. Peer consultation and review. *Aust J Adv Nurs.* 1990;7:40-46.
25. Walker-Bartnick LA, Berger JH, Kappelman MM. A model for peer tutoring in the medical school setting. *J Med Educ* 1984;59:309-315.
26. Ammon KJ, Schroll NM. The junior student as peer leader. *Nurs Outlook.* 1988;36:85-86.
27. Swan RA, McDonald RJ. The buddy system: peer teaching in veterinary medicine. *J Vet Med Educ.* 1980;7:131-133.
28. Yates P, Cunningham J, Moyle W, Wollin J. Peer mentorship in clinical education: outcomes of a pilot programme for first year students. *Nurse Edite Today.* 1997;17:508-514.
29. Vaidya SR. Improving teaching and learning through peer coaching. *Education.* 1994;115:241-245.
30. Bos S. Perceived benefits of peer leadership as described by junior baccalaureate nursing students. *J Nurs Educ.* 1998;37:189-191.
31. Stevens J. *Applied Multivariate Statistics for the Social Sciences.* 3rd ed. Mahwah, NJ: Lawrence Erlbaum Assoc; 1996.
32. Mensch JM, Ennis CD. Pedagogic strategies perceived to enhance student learning in athletic training education. *J Athl Train.* 2002;37(4 suppl): S199-S207.
33. JRC-AT. JRC-AT follows entry-level graduates. *NATA News.* April 2005: 20-21.
34. Ende J. Feedback in clinical medical education. *JAMA.* 1983;250:777-781.
35. Bowman CL, McCormick S. Comparison of peer coaching versus traditional supervision effects. *J Educ Res.* 2000;93:256-261.
36. Weidner TG, Henning JM. Historical perspective of athletic training clinical education. *J Athl Train.* 2002;37(4 suppl):S222-S228.
37. Weidner TG, Henning JM. Importance and applicability of Approved Clinical Instructor standards and criteria to certified athletic trainers in different clinical education settings. *J Athl Train.* 2005;40:326-332.
38. Triggs Nemshick M, Shepard KF. Physical therapy clinical education in a 2:1 student-instructor education model. *Phys Ther.* 1996;76:968-981.
39. Eysenck MW. Anxiety, learning, and memory: a reconceptualization. *J Res Pers.* 1970;13:365-385.
40. Kim KH. Perceived Levels and Sources of Anxiety of Senior Nursing Students in the Clinical Setting [dissertation]. Milwaukee, WI: University of Wisconsin; 1997.
41. Bell ML. Learning a complex nursing skill: student anxiety and the effect of preclinical skill evaluation. *J Nurs Educ.* 1991;30:222-226.
42. Horsfall J. Clinical placement: prebriefing and debriefing as teaching strategies. *Aust J Adv Nurs.* 1990;8:3-7.
43. Kleehammer K, Hart AL, Keck JF. Nursing students' perceptions of anxiety-producing situations in the clinical setting. *J Nurs Educ.* 1990;29: 183-187.
44. Ladyshevsky R. Clinical teaching and the 2:1 student-to-clinical instructor ratio. *J Phys Ther Educ.* 1993;7:31-35.
45. Knight KL. *Assessing Clinical Proficiencies in Athletic Training: A Modular Approach.* 3rd ed. Champaign, IL: Human Kinetics; 2001.
46. Commission on Accreditation of Allied Health Education Programs. *Standards and Guidelines for the Athletic Trainer.* Chicago, IL: Commission on Accreditation of Allied Health Education Programs; 2001.
47. Dwyer RG, Deloney LA, Cantrell MJ, Graham CJ. The first clinical skill: students teach students to take vital signs. *Med Educ Online [serial online].* 2002;7:9-13.

48. Trevino FM, Eiland DC Jr. Evaluation of a basic science, peer tutorial program for first- and second-year medical students. *J Med Educ.* 1980; 55:952-953.