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Continuing Professional Education in Athletic Training: Is Knowledge Acquired and Retained?

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UNIVERSITY OF MIAMI

CONTINUING PROFESSIONAL EDUCATION IN ATHLETIC TRAINING: IS
KNOWLEDGE ACQUIRED AND RETAINED?

By

Jennifer L. Doherty-Restrepo

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

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KNOWLEDGE ACQUIRED AND RETAINED?

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Objective: The purpose of this study was to assess certified athletic trainers' knowledge acquisition, knowledge retention, and satisfaction, following a continuing professional education (CPE) program offered in either a traditional, lecture-oriented format or an interactive format addressing adult learning strategy preferences. **Design:** We used a pre-test, post-test experimental design with comparison groups utilizing stratified randomization. **Setting:** The CPE program was held in the University wellness center classrooms. **Subjects:** Forty-six certified athletic trainers participated.

Measurements: After determination of learning strategy preferences, a 30 item multiple-choice exam was administered prior to, immediately after, and one-month following the CPE program to determine level of knowledge acquisition and retention. Participant self-reported level of satisfaction was assessed with a questionnaire immediately following the CPE program. **Results:** A significant main effect for treatment ($F_{2,70} = 6.02, p < 0.004$) was observed indicating that subjects in the lecture format CPE program acquired and retained more knowledge than subjects in the interactive format regardless of learning strategy preference. There was no significant loss in knowledge observed one-month following the CPE program regardless of learning strategy

preference or treatment (lecture or interactive CPE format). No significant differences in level of satisfaction by treatment (lecture or interactive CPE format) or by learning strategy preference (navigators, problem-solvers, or navigators) were noted; however, 13 (28.3%) reported an excellent level of satisfaction (mean satisfaction score of 4.0) and 31 (67.4%) reported an above average level of satisfaction (mean satisfaction scores of 3.0 to 3.88). **Conclusions:** Our data indicate that lecture format CPE programs may be optimal for knowledge acquisition and retention, independent of learning strategy preference. Knowledge retention did not decrease regardless of learning strategy preference or CPE format and actually demonstrated a further increase using the lecture format. Although our data suggest that participant satisfaction is independent of learning strategy preference and CPE format, the homogeneity of responses made it difficult to detect any relationship with regard to learning style preference and satisfaction. **Key Words:** andragogy, adult education, life-long learning, skill acquisition, skill retention, program evaluation.

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CHAPTER 1

INTRODUCTION

The completion of mandatory continuing professional education (CPE) units is a common method used by healthcare professions to keep their members abreast of current information, issues, and trends in the field. To advance the quality of healthcare, participants of CPE programs are expected to acquire information and retain that information so that it may be transferred into professional practice.¹ Numerous studies have shown that CPE programs are effective tools for increasing participant knowledge.²⁻⁶ Less research has been conducted on the long-term effects of CPE programs on knowledge retention⁷⁻⁹ and no evidence-based research exists to support the belief that completing CPE requirements will enhance or maintain practitioner competence.¹⁰

Continuing professional education is designed to address the theory of andragogy, or adult learning, in which professionals seek to obtain more practical knowledge that they deem important. In adults, three learning strategies have been proposed to identify how adults seek to obtain knowledge and skills to increase competence.¹¹ These are known as navigators, problem-solvers, and engagers. Navigators prefer teachers who provide a structured learning environment in which schedules and deadlines are provided, objectives and expectations are outlined, key points are summarized, and preparation for subsequent lessons are provided.¹² The preferred learning assessment technique for navigators include objective test items, such as multiple-choice questions, that allow for prompt feedback from the teacher.¹² Problem-solvers prefer teachers who create a fun learning environment by providing opportunities for practical experimentation, using

examples from personal experience, and storytelling.¹² Engagers prefer teachers who create relationships with them, encourage personal exploration throughout the learning process, and incorporate group work to establish a positive learning environment.¹² The preferred learning assessment techniques for problem-solvers and engagers include problem-solving activities and open-ended questions.¹² Regardless of the learning strategy preference, all incorporate learning skills in an experiential context that applies immediately to real-life tasks or problems.

Although the literature provides evidence that adults prefer to learn in experiential environments,¹³⁻¹⁹ large, traditional, lecture-oriented conferences represent the most common vehicle available for healthcare professionals, such as athletic trainers (AT), to obtain CPE units. Lecture format CPE programs present well-defined learning objectives that are organized and presented in meaningful patterns to be followed by the learner. This favors the learning preferences of navigators.¹² In contrast, problem-solvers and engagers favor interactive CPE programs that incorporate active and engaging learning tasks that promote critical thinking and psychomotor skills.¹² Davis and colleagues¹⁵ suggest that the lecture method of delivery used with CPE programs is justified and that more interactive instructional techniques should be incorporated into the development and implementation of CPE programs. Failure to incorporate adult learning theory in developing and delivering CPE programs may impair one's ability to translate the knowledge and skills learned from a CPE program into improved healthcare.^{20, 21}

Acquiring and retaining knowledge is necessary to ultimately transfer knowledge to professional practice and improve healthcare provided to the patient. To date, there is no published research in the athletic training profession with regard to either the

acquisition or retention of knowledge following a CPE program. Furthermore, there is a void in the AT literature evaluating and comparing the effects of lecture and interactive instructional techniques. The purpose of this study was to examine knowledge acquisition and retention, as well as level of satisfaction, following a traditional, lecture-oriented CPE program and an interactive CPE program addressing adult learning theory.

CHAPTER 2

METHODS

Subjects

South Florida ATs in good standing with the Athletic Trainers' Association of Florida were contacted to participate in this study. South Florida ATs were defined by mailing zip codes south of, and including, Orlando, Florida. A total of 440 letters and brochures were mailed both electronically and via the US postal service. The letter included a brief description of the study, a request for volunteers, and a clause indicating that participation in this study was strictly voluntary and did not preclude them from attending the CPE program. The brochure for the CPE program provided the necessary information regarding the date, time, location, topics presented, and registration procedures. The CPE program was offered free of charge. Although 72 respondents registered for the CPE program, 46 (63.8%) attended and participated in the study. One month following the CPE program, 41 (89.1%) out of the 46 subjects completed follow-up data collection. The data gathered from the 41 subjects were used to examine knowledge acquisition and retention.

Procedures

The University of Miami Institutional Review Board approved this study prior to data collection in the summer of 2007. We examined ATs knowledge acquisition and retention, as well as level of satisfaction, following a CPE program. Prior to attending the CPE program, the learning strategy preference of each AT was evaluated using the *Assessing the Learning Strategies of Adults* (ATLAS)¹² survey. Based on the subjects' learning strategy preference, the volunteers were stratified as a navigator, problem-solver,

or engager and randomly assigned to either a traditional, lecture-oriented CPE program or an interactive CPE program (Table 1).

The lecture instructional format was utilized to be congruent with the learning strategy preference of navigators while the interactive instructional format was utilized to be congruent with the learning strategy preferences of problem-solvers and engagers. Participants assigned to the traditional, lecture-oriented CPE program remained seated in a classroom and listened to a power point-facilitated lecture presentation on peripheral joint mobilization techniques presented by a dual credentialed physical therapist/AT. Participants assigned to the interactive CPE program were presented the same information by the dual credentialed physical therapist/AT; however, hands-on demonstration and practice of peripheral joint mobilization techniques were included in a laboratory setting. A written summary of the presentation was not provided to participants in either the lecture or interactive CPE programs and they were instructed not to take notes to minimize confounding variables.²²⁻²⁵

The CPE program consisted of a 3-hour morning session and 3-hour afternoon session. Three allied healthcare professionals conducted a one-hour educational session presented in two formats: (1) a passive CPE program utilizing the traditional instructional technique of lecture format (addressing the learning strategy preference of navigators) and (2) an interactive CPE program utilizing an interactive, hands-on instructional technique addressing the learning strategy preference of problem-solvers and engagers. The formats of the CPE program were similar to national presentations and workshops offered by the National Athletic Trainers' Association, respectively. A sports nutritionist presented dietary methods to reduce cholesterol levels, a sport psychologist presented

stress-reduction strategies, and a dual credentialed physical therapist/AT presented peripheral joint mobilization techniques. Participant knowledge and satisfaction was assessed in the content area presented by the physical therapist/AT only.

A *Knowledge Assessment Instrument* was developed in accordance with the established learning objectives of the CPE program to assess baseline knowledge, knowledge acquired, and knowledge retained by participants. The *Knowledge Assessment Instrument* was a 30-item multiple-choice exam developed using an expert panel of physical therapists, ATs, and statisticians. The expert panel reviewed the instrument for the establishment of content and construct validity.²⁶ Each question on the *Knowledge Assessment Instrument* was assessed using an open comment section. A Likert scale was used to examine each question for clarity (1: Unclear, 2: Somewhat Unclear, 3: Somewhat Clear, 4: Clear, 5: Very Clear), relevance (1: Irrelevant, 2: Somewhat Irrelevant, 3: Somewhat Relevant, 4: Relevant, 5: Very Relevant), and difficulty (1: Not Difficult, 2: Somewhat Difficult, 3: Difficult, 4: Very Difficult). A multiple-choice question with a mean score of less than 3.0 for clarity and relevance was modified based on the panel's comments. With regard to the level of difficulty, the *Knowledge Assessment Instrument* included the following ratio: not difficult (10%), somewhat difficult (30%), difficult (30%), and very difficult (30%) multiple-choice questions.

We administered the *Knowledge Assessment Instrument* at three different time points to determine baseline knowledge, knowledge acquisition, and knowledge retention. According to standard evaluation procedures, administering an exam prior to, immediately after, and one-month following a CPE program is an acceptable protocol to evaluate baseline knowledge, knowledge acquisition, and knowledge retention,

respectfully.^{7-9, 27-29} The order of the multiple-choice questions was randomized with each administration to minimize carry-over or learning effects. Baseline knowledge was evaluated immediately prior to the CPE program. Knowledge acquisition was evaluated immediately following the CPE program and knowledge retention was evaluated one-month following the CPE program. Dichotomous scoring (1 point awarded for correct answers and 0 points awarded for incorrect answers) was utilized to collect difference scores, which demonstrated the level of knowledge acquired and retained.

Data on participant satisfaction with the CPE program content and speaker were collected via a survey adapted from the National Athletic Trainers' Association Course Evaluation Form,³⁰ which is typically used following national presentations and workshops. Level of satisfaction was assessed using a four-point Likert scale with 1 reflecting a "poor" rating and 4 reflecting an "excellent" rating. We administered this survey immediately following the CPE program.

Data Analysis

A pre-test, post-test experimental design with comparison groups was utilized. All statistical analyses were performed using the statistical package SPSS version 15.0 (SPSS Institute, Chicago, IL). A Chi Square Statistical Analysis was performed to examine the distribution of subjects categorized by the three learning strategy preferences: navigators, problem-solvers, and engagers. The Chi Square distribution assumption was examined for frequencies greater than or equal to 5 for 80% or more of the categories.³¹ We met the assumption of independent scores by using stratified randomization in the research design.³¹ Cramer's V (*V*) effect size measure was reported to indicate the degree of association among the learning strategy preferences.³²

An Analysis of Variance (ANOVA) was performed to examine knowledge acquisition, knowledge retention, and satisfaction following the CPE program. Change scores for knowledge acquisition and retention were calculated from the data collected by the *Knowledge Assessment Instrument* at three time points (pretest, posttest₁, posttest₂). The change scores for knowledge acquisition (posttest₁ – pretest) and knowledge acquisition (posttest₂ – posttest₁) were used in the ANOVA statistical procedures. The mean score for each subject obtained from the *Participant Satisfaction Survey* was used in the ANOVA statistical procedures. The Homogeneity of Variance assumption was examined using Levene's test ($p > 0.05$) to determine if the variance was roughly equal among the samples observed.²⁶ Partial eta squared (η_p^2) effect size measures were reported to indicate the proportion of variance in the change scores that was explained by the treatment or learning strategy preference.³²

Additionally, estimates of reliability for the *Knowledge Assessment Instrument* (assessed at three time points: pretest, posttest₁, and posttest₂) and *Participant Satisfaction Survey* were conducted using Cronbach's alpha (α) to assess internal consistency in scores, or the extent to which items measure the same construct.^{26, 31} The equivalency assumption for the *Knowledge Assessment Instrument* and *Participant Satisfaction Survey* was met because all items measured the same underlying construct; peripheral joint mobilization techniques and satisfaction, respectively.³¹ The unrelated errors assumption for both instruments was examined using corrected item-total correlations, which is a discrimination index measure.³¹ The *Knowledge Assessment Instrument* is a cognitive measure, therefore, the unrelated errors assumption indicates that one's ability to guess well on one item should not influence how well he or she

guesses on another item.³¹ We met the unrelated errors assumption for the *Participant Satisfaction Survey* by using stratified randomization in the research design.³¹

CHAPTER 3

RESULTS

Learning Strategy Preferences

As shown in Table 1, there was no significant difference in the proportion of the three learning strategy preferences ($\chi^2_{2,46} = 1.217, p = 0.544$). In our sample of 46 subjects, 17 (37.0%) were navigators, 16 (34.8%) were problem-solvers, and 13 (28.2%) were engagers. A small Cramer's V effect size was noted ($V = 0.11$) indicating a weak association among the learning strategy preferences. The Chi Square assumption of independence of scores was met through the research design utilizing randomization. The Chi Square distribution assumption was met given the presence of three groups and 80% of the categories having a frequency ≥ 5 .

Knowledge Acquisition and Retention

As shown in Table 2, the three-way factorial ANOVA indicated a significant main effect of treatment ($F_{2,70} = 6.02, p < 0.004$). Subjects in the lecture format CPE program acquired and retained more knowledge than the subjects in the interactive format regardless of learning strategy preference. A large effect size measure ($\eta_p^2 = 0.15$; small = 0.01, medium = 0.06, large = 0.14) was noted indicating that a large proportion of variability was accounted for by the treatment effect. As shown in Table 3, there was no significant loss in knowledge observed one-month following the CPE program regardless of learning strategy preference or treatment (lecture or interactive CPE format). There were no significant between-subject interactions. Levene's test was examined for Homogeneity of Variance, which was satisfied for each of the three data collection time points (pretest, $p = 0.28$, posttest₁, $p = 0.54$, posttest₂, $p = .62$).

Level of Satisfaction

The two-way factorial ANOVA indicated no significant differences in level of satisfaction by treatment (lecture or interactive CPE format) or by learning strategy preference (navigators, problem-solvers, or navigators). No significant difference was noted in level of satisfaction of the subjects attending the CPE format that matched their learning strategy preference (interaction between treatment and learning strategy preference). Of the 46 subjects, 13 (28.3%) reported an excellent level of satisfaction (mean satisfaction score of 4.0) and 31 (67.4%) reported an above average level of satisfaction (mean satisfaction scores of 3.0 to 3.88) with the CPE program. Only 2 subjects (4.3%) reported an average level of satisfaction (mean satisfaction scores of 2.67 and 2.88) and no subjects reported a poor satisfaction level following the CPE program. The two-factor ANOVA indicated a medium effect size ($\eta_p^2 = 0.07$; small = 0.01, medium = 0.06, large = 0.14), which indicates a relationship may be observed between satisfaction, treatment, and learning strategy preference with more subjects.

Instrumentation Reliability

Cronbach's α reliability coefficient (r) ranges between 0 and 1.0 with values closer to 1.0 signifying greater internal consistency of the items ($r > 0.9$ = excellent, $r > 0.8$ = good, $r > 0.7$ = acceptable, $r > 0.6$ = questionable, $r > 0.5$ = poor, and $r < 0.5$ = unacceptable).³³ The Cronbach's α estimates of reliability for the *Knowledge Assessment Instrument* at pretest ($r = 0.429$, Correct item-total correlation range = -0.111 to 0.426) and posttest₁ ($r = 0.372$, Correct item-total correlation range = -0.295 to 0.386) were unacceptable indicating a lack of internal consistency in scores for baseline and knowledge acquisition, respectively.^{31, 33} The Cronbach's α estimate of reliability at

posttest₂ was $r = 0.754$ (Correct item-total correlation range = -0.041 to 0.571), which suggests that knowledge retention scores were reasonably reliable for the participants in this study.^{31, 33} The Cronbach's α estimate of reliability for the *Participant Satisfaction Survey* was $r = 0.794$ (Correct item-total correlation range = 0.419 to 0.653), which suggests that the satisfaction scores were reasonably reliable for the participants in this study.^{31, 33}

CHAPTER 4

DISCUSSION

Society expects competent healthcare services and is requiring greater accountability from healthcare providers. As a result, regulated healthcare professions, including athletic training, have developed, implemented, evaluated, and mandated CPE requirements to assure professional competence.³⁴ Given that adults prefer interactive instructional techniques¹³ and that lecture format is the most commonly utilized CPE program,³⁵⁻³⁸ this present study examined the efficacy of a CPE program offered in either lecture or interactive format.

Learning Strategy Preferences

In the general population (non-ATs), adults are expected to be equally distributed across the three categories of learning strategy preferences: navigators, problem-solvers, and engagers.¹² Our data revealed no significant differences in the proportion of navigators, problem-solvers, and engagers among ATs. This supports the equitable distribution of learning strategy preferences observed in the general population of non-ATs. In contrast, Hughes³⁹ examined the learning strategy preferences of 252 ATs of similar gender and education demographics and reported a significantly lower proportion of engagers compared to navigators and problem-solvers. Given the disparate results and the fact that these are the only two studies conducted on learning strategy preferences in ATs, more research is warranted.

Knowledge Acquisition and Retention

Although adults prefer and learn more in interactive environments,¹³⁻¹⁹ subjects in the lecture format CPE program acquired and retained more knowledge than subjects in

the interactive format independent of learning strategy preference. This is the first study to demonstrate the greater efficacy of a lecture format CPE program in increasing knowledge acquisition and retention compared to an interactive format. These results differ from the majority of literature reporting greater knowledge acquisition and retention following interactive CPE programs.

There may be several reasons for superior results using the lecture CPE program. Although evidence suggests an adult preference toward interactive environments, lecturing is the predominant instructional format in CPE programs.³⁵⁻³⁸ Thus, it seems plausible that ATs are more familiar and comfortable with the lecture-oriented learning process, which may have positively impacted knowledge acquisition and retention independent of learning strategy preference. Also, one study has reported that time of day may impact knowledge acquisition and retention.⁴⁰

In this study, neither the lecture nor interactive group demonstrated a significant decline in knowledge observed one-month following the CPE program independent of learning strategy preference. Interestingly, at one-month following the CPE program there was a significant increase in knowledge observed in the lecture group above that achieved immediately after the CPE program. Furthermore, this was observed independent of learning strategy preference. In contrast, this was not the case for the interactive group in which no further evidence of knowledge gain was observed one-month following the CPE program. While other research studies have demonstrated maintenance of knowledge acquired following a CPE program,^{2, 7, 9, 28} no known, published research exists demonstrating further increases in knowledge one-month following a CPE program. Given that adults are motivated to learn information and skills

that apply to real-life tasks or problems in an effort to increase competence,^{13, 41, 42} one could speculate that ATs may have sought ancillary information outside of the CPE program to sustain or enhance their knowledge.

Level of Satisfaction

It seems logical to assume that participant satisfaction would increase if one's learning strategy preference was compatible with the instructional format utilized in a CPE program. Results, however, indicated that participant satisfaction was not influenced by the congruency between learning strategy preference and CPE program format. Interestingly, 95.7% (n = 44 out of 46) of the subjects reported an excellent or above average level of satisfaction regardless of learning strategy preference or CPE program format. Research suggests that professionals participate in CPE programs due to interest in the content presented. If the program meets the expectations of participants, a high level of participant satisfaction is generally achieved.⁴³ The homogeneity of responses, with most being very positive, decreased the ability to discern the influence of learning strategy preference and format on participant satisfaction.

Instrumentation

Error in cognitive measurements is primarily due to guessing.³¹ Therefore, it is plausible to expect a low estimate of reliability in the *Knowledge Assessment Instrument* at pretest because the participants are completing a multiple-choice questionnaire to assess cognitive levels in a content area, peripheral joint mobilization techniques, that is yet to be learned. One might expect the estimate of reliability in the *Knowledge Assessment Instrument* to increase at posttest₁ given that participants completed a CPE program on the content examined. Results; however, indicated unacceptable reliability at

posttest₁ when knowledge acquisition was assessed. Unacceptable reliability at posttest₁ is likely due to participants guessing and selecting incorrect answers and the presence of distracter choices that make it difficult to discern the correct answer.³¹ One month following the CPE program when knowledge retention was examined, results indicated reasonable reliability in the *Knowledge Assessment Instrument*. Improved reliability at posttest₂ may be attributed to the participants seeking additional information related to peripheral joint mobilization techniques in an effort to improve the job-related cognitive level and application of these skills, which is aligned with adult learning theory. Improving the cognitive level in the content area examined could reduce guessing and improve the ability to discern correct answers in the presence of distracter choices.

Limitations

There are several limitations that should be noted. The CPE program was instructor-oriented in that content and format were both developed without obtaining information regarding the learning needs of participants. This approach to CPE development dovetails with current expectations that the instructor is responsible for determining what is to be learned, when it is to be learned, how it is to be learned, and if it has been learned.¹³ Although the CPE program was offered in both the lecture and interactive formats, testing was conducted using only pencil-and-paper multiple-choice methods. This is a commonly used assessment technique to observe knowledge acquisition and retention.^{7-10, 29, 44, 45} Future assessments of knowledge acquisition and retention may incorporate interactive assessment techniques, such as psychomotor testing, which may provide more information regarding CPE effectiveness.

Assessing participant knowledge prior to, immediately following, and one-month following a CPE program is an accepted evaluation protocol;^{7-9, 27-29} however, a lack of experimental control exists during the one-month following the CPE program. During this time, participants may seek ancillary information which may impact knowledge retention. This may explain the higher knowledge scores one month following the present study. Future research may employ methods to reduce the influence of confounding variables during the one-month following the CPE program.

The CPE program presented only one content area, peripheral joint mobilization techniques. One instructor, with collegiate teaching experience in both the classroom and laboratory setting, was utilized to present the information. In this study, knowledge acquisition demonstrated a mean increase of 24.0% and 16.0% for subjects in the lecture and interactive CPE programs, respectively. The average knowledge increase of the subjects from both CPE programs is 20.0%, which is very similar to the 20.8% average knowledge increase calculated from the literature.^{7, 29, 44, 46} Different results may be obtained if knowledge acquisition, knowledge retention, and participant satisfaction are examined using a different content area or instructor. Future research may utilize instructors with advanced training in curriculum and instructional techniques who possess expertise in a variety of instructional strategies.

The lecture CPE program was offered in the morning from 9:00am to 12:00pm while the interactive CPE program was offered in the afternoon from 1:00pm to 4:00pm. Given that short and long-term memory may be affected by time of day, future research should attempt to evaluate knowledge acquisition and retention keeping time of day consistent across protocols.

Although statistical significance was achieved, the sample size for this study was small. Twenty six (36.2%) subjects registered for the CPE program but did not attend. Therefore, future studies should recruit more subjects to account for a significant drop-out rate in attendance.

The estimates of reliability for the *Knowledge Assessment Instrument* were unacceptable for the assessment of baseline and knowledge acquisition while reasonable reliability was achieved for the assessment of knowledge retention. Future research should refine the *Knowledge Assessment Instrument* by creating an item bank through pilot testing, focus groups, and content validation procedures to increase internal consistency of test items.

Conclusions

This is the first study using ATs to assess both knowledge acquisition and retention as well as participant satisfaction following a CPE program. Within the context of the aforementioned limitations, our data indicate that lecture format CPE programs may be optimal for knowledge acquisition and retention, independent of learning strategy preference. Knowledge retention did not decrease regardless of learning strategy preference or CPE format and actually demonstrated a further increase using the lecture format. Finally, our results suggest that participant satisfaction may be independent of the relationship between learning strategy preference and CPE format. More research is recommended to expand our understanding of knowledge acquisition, retention, and participant satisfaction using larger samples across a diversity of CPE subject areas and presenters in the athletic training population.

APPENDIX: TABLES

Table 1. Subject Demographics

Demographic Variable	Traditional, lecture-oriented CPE program		Interactive CPE program		Total	
	n	%	n	%	n	%
Learning strategy preference						
Navigator	11	42.3	6	30.0	17	37.0
Problem-Solver	7	26.9	9	45.0	16	34.8
Engager	8	30.8	5	25.0	13	28.2
Total	26	100.0	20	100.0	46	100.0
Sex						
Male	13	50.0	10	50.0	23	50.0
Female	13	50.0	10	50.0	23	50.0
Total	26	100.0	20	100.0	46	100.0
Highest degree earned						
Bachelor	7	26.9	6	30.0	13	28.3
Master	18	69.2	11	55.0	29	63.0
Doctorate	1	3.8	3	15.0	4	8.7
Total	26	100.0	20	100.0	46	100.0

Table 2. Knowledge Acquisition and Retention of Athletic Trainers (n = 41) using the *Knowledge Assessment Instrument*[†]

	Traditional, lecture-oriented CPE program		Interactive CPE program	
	Mean Score	SD	Mean Score	SD
Pretest Score	14.46	± 0.67	15.99	± 0.85
Posttest ₁ Score	18.07	± 0.64	17.03	± 0.81
Posttest ₂ Score	18.60	± 0.56	16.61	± 0.71
Knowledge Acquisition [‡]	3.61*	± 0.67	1.04	± 0.84
Knowledge Retention [§]	0.53*	± 0.63	- 0.42	± 0.79

*Indicates significant mean difference (p < 0.05)

†Maximum score is 30, based on 30 items at a maximum of 1 point per item.

‡ posttest₁ – pretest; § posttest₂ – posttest₁

Table 3. Knowledge Acquisition and Retention according to Learning Strategy Preference in Athletic Trainers (n = 41) using the *Knowledge Assessment Instrument*[†]

	Traditional, lecture-oriented CPE program		Interactive CPE program	
	Mean Score	SD	Mean Score	SD
Navigators				
Posttest ₁ Score	18.50	± 2.37	16.75	± 2.36
Posttest ₂ Score	18.80	± 2.10	15.75	± 2.63
Problem-Solvers				
Posttest ₁ Score	18.29	± 4.07	18.33	± 3.28
Posttest ₂ Score	17.71	± 3.09	19.33	± 2.40
Engagers				
Posttest ₁ Score	17.43	± 2.70	16.00	± 3.56
Posttest ₂ Score	19.29	± 2.43	14.75	± 4.50

[†]Maximum score is 30, based on 30 items at a maximum of 1 point per item

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