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COLUMN: EDUCATIONAL LITERATURE

Current Literature Summary

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Introduction: The clinical integration proficiencies in the 5th edition of the Athletic Training Education Competencies require students to demonstrate the ability to synthesize and incorporate their knowledge and skills to make appropriate decisions in clinical practice. Research suggests that critical thinking promotes appropriate clinical decision-making and improves clinical practice. We will provide brief synopses of current research on critical thinking and discuss possible applications to athletic training education, research, and practice.

Morey DJ. Development and evaluation of webbased animated pedagogical agents for facilitating critical thinking in nursing. *Nurs Educ Perspect.* 2012;33(2):116-120.

Reviewed by Cailee W. McCarty, A.T. Still University

Summary of research context and methods: Over the past decade, rapid advances in technology have begun to increase the types of educational learning mechanisms available for didactic settings. In particular, educators of various disciplines have begun to incorporate animated pedagogical agents (APA) into the curriculum. An APA is a lifelike computerized character that incorporates numerous instructional strategies to provide learners with feedback and encouragement. Unlike avatars that are commonly used in computer gaming software, APAs have anthropomorphous features (ie, human characteristics) and a unique social presence. The aim of utilizing APAs is to engage learners and provoke both affective and cognitive responses to enable critical thinking. Additionally, APAs are able to engage learners by asking questions and providing immediate feedback. Recent research suggests that the use of APAs elicits increases in problem-solving transfer and retention among students. Therefore, the purpose of this study was to examine the effectiveness of web-based APAs on critical thinking among nursing students.

This researcher conducted a mixed-methods pre-test, post-test study. Fifty nursing students in their final year of an associate nursing degree program were randomly assigned to an intervention (APA) or control group. Students' critical thinking was measured prior to and following a 16-week semester and both groups were evaluated on three identical case studies that were integrated throughout the course curriculum. Quantitative critical thinking scores were obtained via the nursing-specific Critical Thinking Process Test (CTPT) and critical thinking was qualitatively evaluated via a "think-aloud" protocol that provoked episodes of thought sequences and cognitive processes during the performance of a task (ie, solving a problem). Throughout the semester, students in the control group were given the three case studies to read and during individual testing sessions an examiner asked each stu-

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dent to answer questions pertaining to each case. Students in the APA group were given the same three case studies to read; however, the APA also narrated the case at the beginning of each testing session. The student was then asked a series of progressive questions and the APA provided responses, feedback, and necessary information to mimic a real-life clinical evaluation. Quantitative data were analyzed using an ANCOVA while qualitative data were coded for concepts and strategies utilized by the students.

Summary of research findings: There was no significant difference in CTPT critical thinking scores between the APA and control group. Additionally, although 46% of students in the APA group improved on the total number of cognitive processes from the pre-think aloud to the post-think aloud protocols compared with only a 38% improvement in the control group, there was no significant differences between groups regarding appropriate evaluation choices, appropriate nursing diagnoses, correct conclusions, or attainment of expected critical thinking levels. These results suggest that although some improvements of critical thinking processes were noted among students in the APA group, overall critical thinking ability did not differ between groups despite the incorporation of an APA. Furthermore, these findings revealed that over a 16week semester some students improved their critical thinking processes, some students remained the same, and some students actually showed a decrease in processes used.

Implication for athletic training education/research:

Historically, critical thinking has been considered an extremely difficult concept to evaluate. While the incorporation of APAs into coursework to promote athletic training students' critical thinking abilities may be a unique educational mechanism, literature regarding how effective this educational strategy is for athletic training students is sparse. Furthermore, the resources necessary for the development and implementation of an APA may be unrealistic to most athletic training educators. Since critical thinking is a multifaceted process, educators should consider the incorporation of numerous strategies to promote critical thinking among athletic training students. Additionally, it is important to recognize that a majority of evaluation instruments that are available are singular and do not capture the full spectrum of critical thinking. Future research should continue to investigate the cognitive processes athletic training students use during the clinical-decision making process as well as identify the

most effective mechanisms to successfully evaluate students' critical thinking abilities.

Atay S, Karabacak I. Care plans using concept maps and their effects on critical thinking dispositions of nursing students. *Int J Nurs Pract.* 2012;18(3):233-239.

Reviewed by Donald Fuller, Life University

Summary of research context and methods: Nursing programs are expected to improve students' ability to make decisions, solve problems, and think critically in hopes that this will carry over into their professional practice skills. Although there are several methods of teaching critical thinking, concept mapping facilitates the organization and attainment of knowledge. In the clinical setting, nursing care plans are used to apply nursing concepts and outline the patient-specific health requirements provided by the caregiver. The purpose of this study was twofold: (1) to examine the difference in the critical thinking disposition of students who prepared a care plan using concept mapping to those who used a column format, and (2) to determine if a relationship exists between the critical thinking disposition and concept map care plan evaluation criteria mean scores of the experimental students.

These researchers conducted a pre-test, post-test control group experimental design with 80 freshman and sophomore nursing students. They were equally divided into the experimental group (EG) and control group (CG) by random sampling. The EG was trained on concept map care plans in three 4-hour sessions: (Session 1) the definition of concept mapping and its elements, (Session 2) the different types of concept maps and the differences among them, and (Session 3) the creation of concept map care plans for assigned cases for which students received feedback. Care plans written by the EG students were assessed using the Concept Map Care Plan Evaluation (CMCPE). The CG prepared care plans using the column format. A valid and reliable Turkish version of the California Critical Thinking Disposition Inventory (CCTDI) was used during pre-test and post-test to assess students' critical thinking disposition. The t-test was used to analyze the data.

Summary of research findings: There was no significant difference in the pre-test CCTDI mean scores between the EG and CG. However, there was a significant difference between the two groups in the posttest CCTDI mean scores and all six sub-scale categories: open-mindedness, truth-seeking, analyticity, systematicity, self-confidence, and inquisitiveness. With the EG students who utilized the CMCPE tool, there was a significant difference in the mean scores of their four care plans. At the end of the semester, students had higher critical thinking skills. Furthermore, students who used concept mapping had higher critical thinking abilities than those who did not use it.

Implication for athletic training education/research:

Concept mapping is an effective teaching method for students to apply and practice critical thinking skills. Athletic training students may find concept mapping useful in acquiring more critical thinking skills. Future research on critical thinking in athletic training education is essential, as well as a variety of teaching methods. Concept mapping is one such method that has shown to be effective. The learning curve for such methods is not too challenging for students and faculty. Likewise, nursing care plans are similar to SOAP or progress notes, which are used in both athletic training academia and clinical practice. To be an effective health care provider, athletic trainers need to write SOAP and progress notes that result from higher problem solving, decision making, and critical thinking skills.

Huang Y, Chen H, Yeh M, Chung Y. Case studies combined with or without concept maps improve critical thinking in hospital-based nurses: a randomized-controlled trial. *Int J Nurs Stud.* 2012;49(6):747-754.

Reviewed by Jennifer Doherty-Restrepo, Florida International University

Summary of research context and methods: Critical thinking is essential for appropriate clinical decision-making and, hence, professional judgment. The development of critical thinking skills is a desired learning outcome and a primary goal of nursing education. To provide effective and safe care, nurses must be able to assess problems independently, formulate possible solutions, and exercise professional judgment. Nurse educators should provide ample opportunities for students to acquire and develop critical thinking skills as well as the disposition to utilize these skills in clinical practice. Teaching strategies, such as case studies and concept maps, may improve critical thinking skills. The purpose of this study was to evaluate the effects of a program of case studies, alone (CS) or combined with concept maps (CSCM), on nurses' critical thinking skills.

These researchers conducted a randomized controlled trial of nurses working in a medical, surgical, obstetrics and gynecology, pediatric, long-term care, or intensive care unit. Participants were randomly assigned to the experimental group or control group. The experimental group participated in a 16-week CSCM educational program whereas the control group participated in a 16-week CS educational program. Both educational programs had the same objectives and content. Critical thinking skills were measured using the 34-item (multiple choice format) California Critical Thinking Skill Test (CCTST) with five subscales: analysis, evaluation, inference, deductive reasoning, and inductive reasoning. Affective dispositions toward critical thinking were measured using the 75-item (six point Likert scale with anchors agree and disagree) California Critical Thinking Disposition Inventory (CCTDI) with seven subscales: truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity. Data were collected before and after the educational programs. The independent t test, dependent t test, and ANCOVA statistical procedures were utilized to analyze the data.

Summary of research findings: There were no significant difference between the experimental and control groups for the overall CCTST score and all subscales scores prior to the educational program. After the educational program, the experimental group demonstrated a significantly higher overall CCTST score as well as significantly higher subscale scores in analyticity, evaluation, and deduction from pretest to posttest. After the educational program, the control group demonstrated a significantly lower overall CCTST score as well as lower subscale scores in analyticity and deductive reasoning from pretest to posttest.

Prior to the educational program, the experimental group demonstrated a significantly higher overall CCTDI score as well as significantly higher subscale scores in inquisitiveness and maturity compared to the control group. After the educational program, the experimental group demonstrated a significantly higher overall CCTDI score as well as a higher subscale score in open-mindedness compared to the control group. Both groups demonstrated significantly higher overall CCTDI scores and subscale scores in openmindedness, analyticity, systematicity, self-confidence, and inquisitiveness from pretest to posttest.

Implications for athletic training education/ research: Nursing, like athletic training, is an applied discipline. Therefore, nursing and athletic training education must provide theory and practice together to cultivate practitioners who possess the necessary critical thinking skills to exercise sound professional judgment. The findings of this research study suggest that case studies combined with concept maps are a valuable teaching/learning strategy for developing critical thinking skills and dispositions. Athletic training educators and preceptors should consider using this teaching/learning strategy to promote students' critical thinking skills. Effective teaching strategies may accelerate the acquisition and development of critical thinking skills, so this is an area that warrants further research in athletic training. Furthermore, research is needed on the long-term effects of critical thinking teaching strategies particularly as it relates to clinical practice.

Wangensteen S, Johansson IS, Björkström ME, Nordström G. Research utilisation and critical thinking among newly graduated nurses: predictors for research use. A quantitative cross-sectional study. *J Clin Nurs.* 2011;20(17/18):2436-2447.

Reviewed by Dorice A. Hankemeier, Ball State University

Summary of research context and methods: Health care professionals are increasingly being asked to be consumers of research while also critically thinking through problems. Many new health care professionals have positive attitudes towards research, but often lack the time and support to effectively utilize research during patient care. Socialization with colleagues and into the health care profession plays a significant role in developing research skills as well as building confidence in making evidence-based decisions. New graduates often lack the confidence and experience necessary to initiate changes in practice. Positive correlations have been found between research utilization and critical thinking, but little research has investigated if critical thinking can predict the research use of healthcare practitioners. Therefore, the purpose of this study was to describe research utilization among newly graduated nurses and to additionally explore critical thinking dispositions as possible predictors for research use.

These researchers conducted a cross-sectional study of Norwegian nurses who had graduated in the previous six months to a year. Participants (N=1900) were asked to complete both the Research Utilization Questionnaire (RUQ, 29 Likert scale items) and the California Critical Thinking Disposition Index (CCTDI, 75 Likert scale items). Paper-based surveys were sent to all participants along with an additional two reminders. A total of 617 participants completed the RUQ and 614 participants completed the CCTDI (33% response rate). Subscale data from each instrument were calculated and Pearson χ^2 was used to assess the differences in proportions between groups. Forward multiple linear regression and simple linear regression were used to identify predictor variables.

Summary of research findings: Participants stated that research was interesting (88%), that clinical practice should be based on research (85%), and that understanding research helps them professionally (83%). Additionally, 57% indicated they base their practice on research and they have access to research findings at work (44%). However, only 15% indicated that they have time to read research while at work. Participants were dichotomized into research users (24%) and nonresearch users (76%) and the research users reported significantly higher critical thinking scores. Variables related to attitude (ie, clinical practice should be based on research, research is stimulating, understanding research helps me professionally) explained the largest amount of the variance (18%) in the predictors for research use in daily practice. The total CCTDI score explained approximately 11% of the variance of research use.

Implication for athletic training education/research: The findings of this research study suggest that new graduates understand and value the use of research, but the majority of individuals would be classified as non-research users. Critical thinking and attitude toward research proved to be one of the most significant predictors of research utilization. Athletic training educators should continue to create opportunities for students to engage in critical thinking in both didactic and clinical settings. The use of evidence-based teaching strategies such as problem-based learning, practice reflection, and critical questioning could better equip students to make decisions and find opportunities to utilize research in their patient care post- graduation. Additionally, students need to see research further utilized by their preceptors so they can better understand how to apply the conceptual research background they are learning as part of the curriculum. The transition from valuing research to implementing research will be fostered through clinical integration and experience. Faculty and preceptors need to work together to provide students consistent and ample opportunities to be independent critical thinkers while also allowing them to improve their clinical confidence. Athletic Training Education Journal provided by National Athletic Trainers' Association. Copyright © 2006 - 2011. All rights reserved. Athletic Training Education Journal is a trademark of National Athletic Trainers' Association.