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Questioning Skills Demonstrated by Approved Clinical Instructors During Clinical Field Experiences

Mary G. Barnum, EdD, LAT, ATC

Springfield College, Springfield, MA

Context: The current trend in athletic training clinical education places greater emphasis on the quality of interactions occurring between Approved Clinical Instructors (ACIs) and athletic training students (ATSs). Among other attributes, the ability of ACIs to facilitate and direct quality clinical learning experiences may be influenced by the skill with which the ACI is able to use selected teaching strategies.

Objective: To gain insight into ACIs' use of questioning as a specific teaching strategy during the clinical education experiences of undergraduate ATSs.

Design: Qualitative case study design involving initial and stimulated-recall interviews, prolonged field observations, and audio recording of ACI-ATS interactions.

Setting: The primary athletic training facility at one athletic training education program accredited by the Commission on Accreditation of Athletic Training Education.

Patients or Other Participants: The 8 ACI participants included 3 full-time athletic training education program faculty members and 5 graduate-level assistants. The 24 ATS participants included 1 senior, 17 juniors, and 6 sophomores.

Data Collection and Analysis: Transcribed data collected from 8 initial interviews, 23 field observations, 23 audio-recorded ACI-ATS interactions and 54 stimulated-recall interviews were analyzed through microscopic, open, and axial coding, as well as coding for process. The cognition level of questions posed by ACIs was analyzed according to Sellappah and colleagues' Question Classification Framework.

Results: The ACI participants posed 712 questions during the 23 observation periods. Of the total questions, 70.37% were classified as low-level cognitive questions and 17.00% as high-level cognitive questions. The remaining 12.64% were classified as other.

Conclusions: Although all ACIs used questioning during clinical instruction, 2 distinct questioning patterns were identified: strategic questioning and nonstrategic questioning. The way ACIs sequenced questions (their questioning pattern) appeared to be more important than the number of specific cognitive-level questions posed. Nonstrategic questioning appears to support knowledge and comprehension, whereas strategic questioning appears to support critical thinking.

Key Words: athletic training education, clinical education, pedagogy, critical thinking

Key Points

- All Approved Clinical Instructors used questions during clinical instruction. Two distinct patterns were identified: strategic and nonstrategic.
- Strategic questions are fundamental in helping students to develop critical thinking skills, which are the basis for problem solving and clinical reasoning. Nonstrategic questions primarily target low-level cognitive skills and do not build upon base knowledge for understanding complex concepts.
- To develop clinical proficiency, athletic training students must acquire both technical athletic training knowledge and clinical reasoning skills.

The broad question examined within this study was the role of the clinical instructor in assisting athletic training students (ATSs) to acquire, retain, and use professional skills and knowledge during clinical experiences. I specifically investigated the following issues: (1) Do clinical instructors in athletic training use planned and strategic questioning to assist students in acquiring, retaining, and using athletic training skills and knowledge? (2) Is the questioning technique appropriate for the knowledge base and prior experiences of the athletic training student? and (3) What level of cognitive processing do the questions access? Several authors[1–4] have examined the questioning skills of clinical nursing instructors during postclinical conferences, but no researchers have evaluated such skills during the clinical experience. In athletic training, no studies have been published that examined the questioning skills of clinical instructors in athletic training. Thus, a gap remains between the use of questioning in postclinical conferences and the use of questioning during actual clinical experiences.

Clinical experiences provide opportunities for students to synthesize information gained through didactic and laboratory experiences for application in dynamic, contextually rich work-like settings.[5–7] For the student to transition from theoretic knowledge and application of basic skills to skilled clinical knowledge,[8] both experience and critical thinking skills are needed.[9–12]

Critical thinking involves evaluating presented information to test or challenge the claims or concepts within the information. The critical thinker may compare the new theory with similar theories he or she already accepts to be true.[13] Promoting the use of critical thinking provides opportunities for students to process information multiple times and supports the retrieval of information from long-

term memory stores for rehearsal of information while in the working memory.[14] Critical thinking is also thought to be important in the development of clinical reasoning skills.[15] More-experienced learners appear to use different techniques to collect and interpret new information than do their beginning-level or novice counterparts.[15–17]

Educators in athletic training need to be concerned with including learning strategies that promote critical thinking among ATSs.[18] The ability to think critically is an essential skill for certified athletic trainers,[18] yet critical thinking tendencies appear to be weak among athletic training students.[11] Athletic training students cannot develop an innate disposition toward critical thinking if critical thinking is not fostered within their educational experiences.[11,18]

Questions are central to effectively stimulating critical thinking[11,19–22] and facilitating experiential learning.[23–25] Effective questioning occurs through thoughtful planning.[26] Without a clearly conceptualized questioning strategy, the questions may or may not connect to the overall learning objective or enhance and deepen the learner's understanding of the content.[26]

Questions need to be clearly phrased to avoid ambiguity of response, to prevent emphasis from being placed on nonpertinent information, to target specific cognitive processing skills, and to decrease the chance of a correct response by guessing.[26,27] The Bloom taxonomy[28] historically has provided teachers with terminology to phrase questions targeting specific cognitive processing along 6 increasingly complex levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.[28]

Questioning has been described in the teacher education literature as the purposeful use of questions to engage learners in the application of knowledge and in the development of critical thinking skills.[26] Asking questions that require students to analyze situations during clinical experiences assists students in building relationships between conceptual knowledge and application knowledge[2,29] and moves the student toward clinical proficiency.[1,30,31]

For example, when dealing with a possible glenohumeral joint subluxation during a clinical rotation, asking a student to list or apply special tests specifically used to assess glenohumeral instability requires the student either to perform retrieval and recitation of basic declarative knowledge or to apply that knowledge; both tasks require lower-level cognitive processing skills. However, by asking the student to determine which special test would be most appropriate in this given situation and why, the clinical instructor is requiring the student to retrieve basic information (anatomy, biomechanics, special tests, injuries) and to consider the contextual cues presented by the current situation. The student must compare what he or she knows to be conceptually true about glenohumeral joint subluxations and related information (textbook knowledge) with what is seen in the current situation in order to respond to the question. When choosing a question's content, phrasing, and complexity, clinical instructors also need to consider the academic level, experience, and knowledge base of the student being questioned to prevent cognitive conflict and frustration.[17]

Researchers[1–4] in clinical nursing education see questioning as an essential clinical teaching skill. Early investigators[1] focused on examining the effectiveness of clinical instructor training strategies to improve the clinical instructor's questioning skills. Authors[1] reported that training sessions did improve the ability of clinical nursing instructors in the treatment group to ask questions that targeted higher-level cognitive processing skills but concluded that additional improvement was needed. Also, the inability of the control group to incorporate questioning for higher-level processing was disconcerting, because it possibly represented the actual state of clinical instructor questioning abilities.[1] Information obtained from the study[1] alerted nursing educators to the need to improve clinical instructor questioning skills and to establish an instrument for classifying questions that would be useful in later studies.[2,3]

Subsequent researchers[2–4] examined not only different clinical instructor training strategies but also additional variables, such as the relationships among academic qualifications, years of clinical experience, years of clinical teaching experience, instructor level (faculty, clinical instructors, or preceptors), and the cognition level of questions posed by participants during postclinical conferences. Overwhelmingly, the types of questions asked in clinical postconferences targeted lower-level cognitive processes.[1–4,32,33] Academic qualifications, years of teaching experience, and type of teaching experience (clinical or classroom) did not appear to enhance the ability of the participant to ask high-level cognitive questions.[2–4]

Authors[1–4,32] examined the questioning skills of clinical instructors in nursing education during the clinical debrief and not when the student and instructor were actively interacting during the actual clinical experience. I found no published studies that examined how clinical instructors in nursing posed questions to students during the actual clinical experience. Although no studies have yet been published on the questioning skills of clinical instructors in athletic training, information presented in the athletic training literature does suggest that ATSs benefit when clinical instructors adapt their teaching styles and techniques to accommodate a variety of learning styles.[5,13,14,30,31] However, a gap remains between the use of questioning during clinical debriefings and the use of questioning during actual clinical experiences.

This study was conducted to gain an understanding of how Approved Clinical Instructors (ACIs) in athletic training facilitate student learning during undergraduate clinical experiences at one undergraduate entry-level athletic training education program. I focused on the ACIs' use of questioning as a specific teaching strategy for facilitating student transfer of information from theory to application to clinical proficiency. By gaining a better understanding of how ACIs use questioning during clinical experiences, I hope to provide a richer and more accurate representation of ACIs' questioning skills.

METHODS

A qualitative exemplar case study design was used to examine the clinical teaching strategies and questioning skills of ACIs at one athletic training education program at a National Collegiate Athletic Association Division III private college. Case studies emerge from the systematic collection and analysis of real experiences within natural

contexts with the intent of enhancing the researcher's understanding of the experience as it naturally exists.[34] Institutional review board approval to conduct this study was granted by the University of Massachusetts Amherst. Participants provided consent to participate with the understanding that aliases would be used to ensure privacy.

Participants

Consistent with exemplar case study methods,[34] a purposeful, nonrandom, small sample identified 8 ACIs and 24 ATSs as participants. To allow optimal opportunity to complete observations of ACIs' interactions with students during clinical experiences, only those ACIs who were supervising ATSs within the primary athletic training facility were included as ACI participants. Those ACI participants who held faculty status had dual responsibilities in academics and athletics. Those ACI participants who held graduate assistant status were actively enrolled in an academic program on campus and provided athletic health care or clinical instruction (or both) in order to meet the responsibilities of the graduate assistant position. Therefore, all ACI participants were considered employees of the institution at which the data were collected, and all held dual responsibilities as clinical instructors and athletic health care providers. Demographic information on each ACI participant is provided in Table 1. Only those ATSs who interacted with 1 of the 8 ACI participants during field observations were considered as ATS participants. One senior-level, 17 junior-level, and 6 sophomore-level ATSs participated in this study.

Data Collection and Analysis

Data collection methods included initial semistructured interviews, field observations, audio recordings of ACI-ATS interactions during field observations, and classifying the cognition level of questions posed by ACIs during their interactions with ATSs. Excerpts from ACI-ATS interactions were played for both the ACI and ATS participants during independent follow-up, stimulated-recall interviews. Both participants were asked questions based on the content of the recordings. Stimulated-recall interviews were conducted after each field observation. Member checking occurred throughout the data collection and analysis process.

Interviews and Observations. Initial interviews were conducted with each ACI participant 2 weeks before field observations began. A semistructured questioning format was used. The semistructured interview format allowed me to respond to and gather information about the participant's clinical teaching philosophies and attitudes toward clinical teaching.[34] Information gathered through the initial interviews was revisited in subsequent stimulated-recall interviews to compare the participant's statements with the actions displayed during the observation periods.

Three rounds of field observations were conducted over a 39-day period. Observations took place within the primary athletic training facility before and after athletic participation activity sessions. During field observations, each ACI was observed interacting with ATSs during clinical field experiences during 3 different 30-minute periods. Because the team for which ACI participant Jonatha was providing athletic training services ended its

Table 1. Approved Clinical Instructor Participant Demographics

	Approved Clinical Instructor (ACI)							
	Fischer	Grady	Jonatha	Lobo	Mark	Samantha	Susan	Walter
Faculty	No	Yes	No	Yes	Yes	No	No	No
Graduate student	Yes	No	Yes	No	No	Yes	Yes	Yes
Program	MS, athletic administration		MS, athletic training education			PhD, exercise physiology	MS, sport psychology	MS, athletic administration
Highest degree held	BS, physical education	MS, physical education; MS, physical therapy	BS, athletic training	MS, athletic training	MEd, athletic training	MS, physical therapy	BS, athletic training	BS, athletic training
Didactic teaching responsibilities	No	Yes	No	Yes	Yes	No	No	No
Laboratory teaching responsibilities	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Clinical teaching responsibilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Athletic health care responsibilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Administrative responsibilities	No	Yes, program director	No	Yes, rehabilitation coordinator	Yes, head athletic trainer	No	No	No
Years as certified athletic trainer	2	30	2	18	14	14	2	6
Years as Approved Clinical Instructor or clinical instructor	1	28	1	15	7	5	1	1
Teaching credentials	Physical education	Health, physical education	No	No	No	No	No	No
Other credentials	CSCS	PT	None	EMT-P, CSCS	None	PT	None	LMT
Self-identifies (primary/secondary)	ACI/ATC	ACI/ATC	ACI/ATC	ACI/ATC	ATC/ACI	ACI	ATC	ATC

Abbreviations: ACI, Approved Clinical Instructor; ATC, Certified Athletic Trainer; BS, Bachelor of Science; CSCS, Certified Strength and Conditioning Specialist; EMT-P, Emergency Medical Technician, Paramedic; LMT, Licensed Massage Therapist; MS, Master of Science; PhD, Doctorate of Philosophy; PT, Physical Therapist.

competitive season earlier than expected, thus concluding her student's clinical rotation, only 2 field observations were conducted on Jonatha. Therefore, a total of 23 field observations occurred. Visual observations of ACIs' actions and interactions with their students, athletes, and others within the setting were recorded using field notes.

Interactions between ACIs and ATSs were also audiotaped using a personal remote microphone attached to the ACIs during each of the 3 field observations. During each of the observation periods, 3 ACIs wore remote microphones at once, but only 1 ACI was recorded at a time. To decrease the chance that wearing the device changed the ACI's behavior, the ACI participants did not know which ACI wore the live microphone.[35] This process was repeated until all ACIs being observed had worn the live microphone. Participants had the opportunity to listen to and comment on their recorded interactions during stimulated-recall interviews. Recordings also were transcribed into text for purposes of analysis and to classify the cognition level of questions posed by the ACIs.

A total of 54 stimulated-recall interviews were conducted: 23 with ACIs and 31 with ATSs. More ATS interviews occurred than ACI interviews, because all ATSs who interacted with the ACI during the observation period were interviewed. All stimulated-recall interviews took place within 24 hours of the related field observation.[17] Semi-structured and probing questions were used to elicit information from ATS participants regarding how the actions, statements, and questions posed by their ACI during field experiences affected the students' clinical learning experiences. Students also were asked to describe the cognitive processes they undertook to respond to questions posed by ACIs during clinical field experiences. This information was later triangulated with results of the Question Classification Framework.[1,3]

During the ACI stimulated-recall interviews, the researcher played audio recordings for the ACI of his or her interactions with ATSs taken during the previous observation period. The researcher probed the ACI regarding the teaching strategies and questioning skills demonstrated by the ACI during interactions with the students. All stimulated-recall interviews were audiotaped and later transcribed into text for triangulation of data with initial interviews, field observations, and research memos.

Question Classification Framework. Questions posed by ACIs to ATSs during the observation periods were classified by cognition level according to the Question Classification Framework of Craig and Page[1] as adapted by Sellappah et al.[3] Consistent with questioning studies within the nursing literature, questions concerning information, knowledge, application, and comprehension were classified as low-level cognition questions, whereas questions involving analysis, synthesis, and evaluation were classified as high-level cognition questions.[1,3,28] Instructional or command statements that were posed as questions and required a simple *yes* or *no* response and rhetorical and prompting questions were classified as other.[3]

Coding Data. Data collected from initial interviews, field observations, and stimulated-recall interviews were analyzed through microscopic or line-by-line analysis of data.[34–36] After the initial categories were generated, open and axial coding allowed further identification of categories and relationships among categories.[34–39] A third level of analysis occurred through selective coding and coding for process to discover the integration and refinement of the evolving actions and interactions among the categories.[34,39] I then identified common trends, themes, and categories among participants.[34,36,39]

Trustworthiness

Within qualitative research, *trustworthiness* is the term used to confirm that the research methods are valid and reliable[34] and have been competently and ethically conducted.[35] To eliminate potential bias and increase study trustworthiness, the following steps were taken: (1) multiple observations conducted over time, (2) implementation of the peer examination/critical friend concept, (3) use of member checking, (4) retention of research memos, and (5) triangulation of data.[34–36]

The peer examination/critical friend concept requires that an outside expert (in this case, an athletic training educator who holds a terminal degree, has 15 years of experience in athletic training education/service, and is a published researcher) challenge the methods, findings, and conclusions of the research study at each stage of the process.[34,35] Member checking involves sharing interpretations and findings with the participants of the study to seek clarification.[35] Member checking occurred at the beginning of each stimulated-recall interview and was conducted to check emergent interpretations from previous observations and interviews.

Research memos are kept throughout the research process for recording a variety of information that the researcher will use later in triangulation of data.[34,35] For example, after a stimulated-recall interview, a research memo might be used to record the researcher's immediate interpretation of what was said during the interview. Later, the information is compared with multiple data sources to determine the accuracy of the interpretation. Other examples of research memos include noting that the environment within the data collection site was "charged due to activities around homecoming" or that a participant's behavior seemed inconsistent with previous observations. Comparing data gathered through the stimulated-recall interviews with data collected from field observations and initial interviews is an example of data triangulation.

Triangulation of data involves using 3 or more data points to establish validity and confirm findings.[34] Triangulation occurred among data collected from initial interviews, stimulated-recall interviews, field observations, research memos, and the Question Classification Framework to confirm the emerging findings.[17,34–36]

RESULTS

The ACI participants posed a total of 712 questions during the 23 observation periods. Of the total questions, 70.37% (501/712) were classified as low-level cognitive questions and 17.00% (121/712) as high-level cognitive questions. The remaining 12.64% (90/712) were classified as other. Results of the Question Classification Framework are presented in Table 2. All ACIs used questioning during clinical instruction, yet the way the ACIs integrated the low-level and high-level cognitive questions differed among ACIs by purpose and pattern.

Table 2. Cognitive Classification of Questions Posed by Approved Clinical Instructors[a]

Approved Clinical Instructor	Total Questions	Low Level (%)[b]	High Level (%)[c]	Other (%)[d]
Fischer	90	54 (60.00)	23 (25.55)	13 (14.44)
Grady	225	160 (71.11)	55 (24.44)	10 (4.44)
Group totals	712	501 (70.37)	121 (17.00)	90 (12.64)
Jonatha[e]	20	8 (40.00)	9 (45.00)	3 (15.00)
Lobo	117	82 (70.00)	6 (5.12)	29 (24.78)
Mark	52	46 (88.46)	0 (0)	6 (11.53)
Samantha	111	87 (78.37)	14 (12.61)	10 (9.00)
Susan	26	18 (69.23)	3 (11.53)	5 (19.23)
Walter	71	46 (64.78)	11 (15.49)	14 (19.71)

[a] According to Sellappah and colleagues' (1998) adaptation of Craig and Page's (1981) Question Classification Framework.[1,3]
[b] Indicates information, knowledge, application, and comprehension.
[c] Indicates analysis, synthesis, and evaluation.
[d] Indicates yes/no, rhetorical.
[e] Jonatha was observed twice; all other participants were observed 3 times.

Based on the way the ACI participants (1) incorporated cognition-specific questions, (2) phrased and sequenced their questions, (3) adapted their questions based on ATS academic level, knowledge, and ability, and (4) stated the intended purpose of their questions, 2 distinct questioning patterns were identified: strategic questioning and nonstrategic questioning. Certain participants exclusively used strategic questioning, whereas other participants used nonstrategic questioning only. The remaining participants used a combination of strategic and nonstrategic questioning. Participant questioning skills are presented in the Figure.

Strategic Questioning

Strategic questioning occurred when ACIs consciously adapted the timing, sequencing, and phrasing of questions to facilitate ATS processing of information at increasingly complex cognition levels. Although ACI participants Grady, Samantha, Fischer, Lobo, and Jonatha all used strategic questioning, Grady and Samantha were identified as the most skilled in strategic questioning and will be used to exemplify same.

During stimulated-recall interview 1, Samantha (a second-year doctoral-level graduate student studying exercise physiology, an athletic trainer, and a physical therapist) was asked to describe and clarify the questioning technique she used during field observation 1. She stated:

> Depending on the student and which grade level and what the expectations are, I try to gear the questions toward what the student should know. If they do know it, I try to take the student beyond that point and maybe learn something new. I use a "what, how, why" approach when asking questions. "What" questions

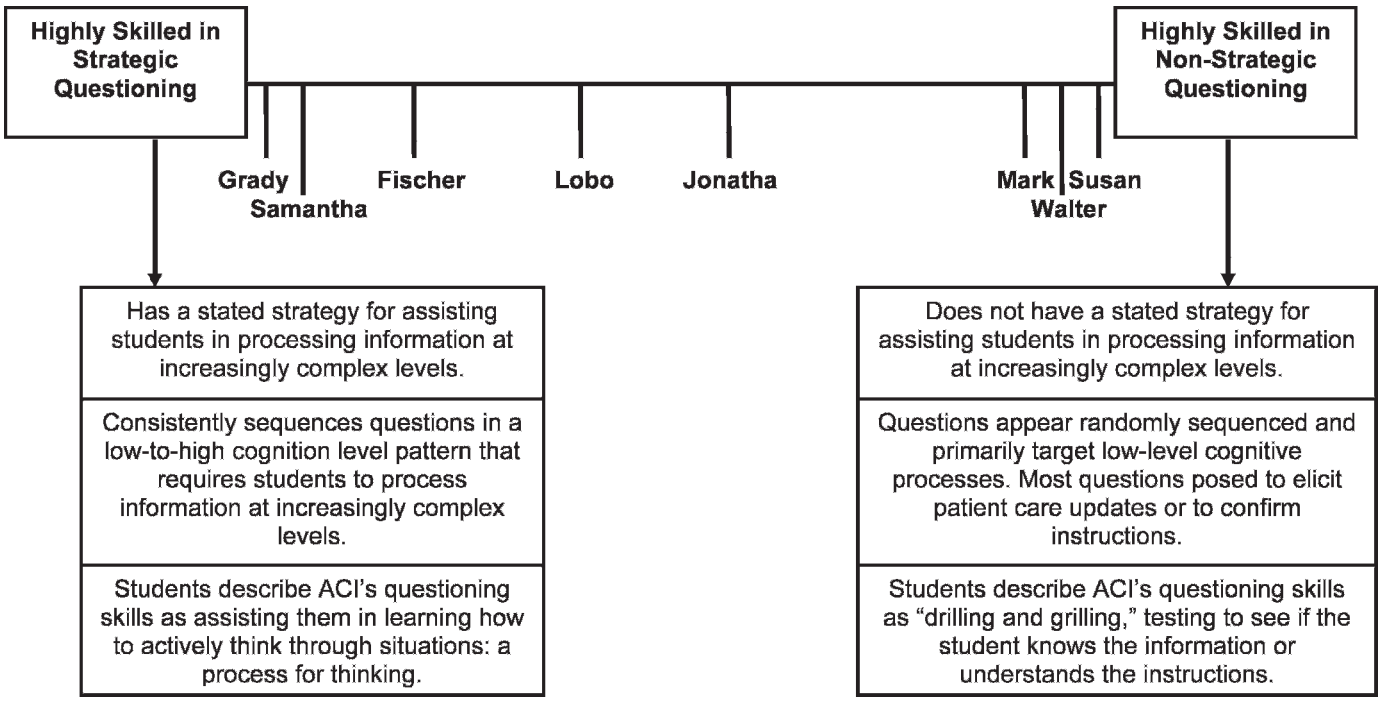

Figure. Questioning skills demonstrated by Approved Clinical Instructors (ACIs) during clinical learning experiences. Although all participants used questioning during clinical instruction experiences, some demonstrated greater skill in one type of questioning pattern than in the other.

are to make the student regurgitate basic facts they already know. ''How'' questions are to make the students apply what they know. I use ''why'' questions to help the student synthesize and analyze the situation; make the student problem solve and figure out what they should do, why they should do it and how it is going to be done.

Within the response Samantha provided, she (1) described a strategic questioning plan, (2) demonstrated an understanding that information is processed through different levels of cognitive processing skills, and (3) recognized that questions need to be adapted to meet the needs of the learner and the situation. Over the 3 field observations, Samantha posed a total of 111 questions, of which 78.37% (87/111) were classified as low-level cognitive questions, 12.61% (14/111) as high-level cognitive questions, and the remaining 9.00% (10/111) as other. Samantha strategically sequenced her questions to stimulate cognitive processing abilities associated with identification, application, comprehension, analysis, synthesis, and evaluation. By gradually increasing the complexity of the questions, Samantha was able to establish the student's knowledge base, support the student's confidence level, and gradually stimulate the student to critically think and problem solve through the situation. Samantha consistently ended all interactions with ATSs with 1 or 2 complex, high-level cognitive questions. Student comments supported the concept that Samantha's questioning approach facilitated active cognitive engagement and that what the student gained from the interaction was a process for thinking. For example, Elanna, a second-semester junior, gave this example:

She asks me questions that make me see it. She doesn't let me get away with saying ''I don't know.'' She makes *me* do it, she makes *me* go through the process of figuring it out by thinking about what *else* it could be or *why* it is one thing and not another thing. Her questions help me think about what I should look for, and what I should do. She doesn't tell me what to look for but she makes me realize what I know and what I have to figure out.

Grady, who was also skilled in strategic questioning, was an athletic trainer, physical therapist, and full-time faculty member with more than 30 years of experience as a clinical instructor. Grady had completed all but the dissertation portion of his doctoral program in sport psychology at the time the current study was conducted. Just as Samantha did, Grady posed questions that first allowed a student to gain confidence and to feel secure in the discussion and allowed Grady to judge the student's knowledge base. Grady then proceeded to quickly increase the complexity level of questions posed, often asking 3 or more high-level cognitive questions. Grady posed 225 questions, of which 71.11% (160/225) were classified as low-level cognitive questions and 24.44% (55/225) as high-level cognitive questions. Grady posed only 10 questions, or 4.44% (10/225), that did not target a specific cognitive processing level.

Ashton, a second-semester junior-level ATS whom Grady supervised, was asked to describe a typical interaction between him and Grady. Ashton stated:

[Grady] is not just going to give you the answer. He is going to ask you any number of questions and keep asking you questions until you come up with the answer. He won't just feed you the answer but maybe he gives you clues. It really is a lot better way to learn, because it keeps me more active in thinking because it makes me work through it to get the answer.

Junior student Chrissy described Grady's questioning style as ''making her think in a different way.'' When asked to describe what she meant by ''different way,'' Chrissy explained:

When I am going through the injury evaluation and I don't know what it is, he will ask me questions that help me narrow it down, draw different conclusions and try and figure out what it could or couldn't be. It is more meaningful for me when I am made to work through the process on my own and not just be told what to do.

Students of ACIs who used strategic questioning all gave very similar responses. Analysis of data obtained from initial interviews, stimulated-recall interviews, field observations, research memos, and the Question Classification Framework supported the concept that Grady, Samantha, Fischer, Lobo, and Jonatha attempted to use strategic questioning more often than nonstrategic questioning. Both Fischer and Jonatha were second-year graduate assistants in the second year of experience as certified athletic trainers and first year of experience as ACIs. Both stated a strong interest in education and both enjoyed their role as clinical instructors. Lobo was a faculty member in the athletic training education program with 18 years of experience as a certified athletic trainer and 15 years of experience as a clinical instructor/ACI.

Nonstrategic Questioning

Nonstrategic questioning occurred when ACIs asked questions to stimulate student thought but without purposefully adapting the timing, sequence, or phrasing of questions in order to specifically stimulate complex cognitive processing skills or when they asked apparently randomly sequenced questions. The goal of nonstrategic questioning appeared to be to assist students in recalling and applying information during authentic or simulated problems encountered during clinical experiences and not to develop critical thinking skills. Walter, Susan, and Mark were found to use nonstrategic questioning almost exclusively.

When asked to describe his questioning strategy, Mark, a full-time faculty member with 14 years of experience as a certified athletic trainer and 7 years of experience as a clinical instructor/ACI, stated: ''Oh, why do I ask questions? Just because!'' During stimulated-recall interview 1, Mark explained how he used questioning to establish student knowledge base and comprehension level:

I just drill the students about things. I want to make sure that they know what they are doing. I lead them along through each step of the protocol to make sure they know how to do it. I try to make them understand which placement method to use. The way I am asking them the question puts the answer out in front of them, so they have a 50/50 chance of getting it right. I also think out loud so the

students can hear the question and the answer. That way I know that they have been told the correct way to do it.

Mark's response illustrated his understanding that information must be processed as part of the student learning experience and suggested that Mark saw the application and comprehension level of cognitive processing as the most important cognitive skill to develop during the student's clinical learning experience. Even though Mark described a questioning strategy, and he was able to identify a very specific goal, his response did not describe strategic questioning. Higher-level and more complex cognitive skills associated with critical thinking were not addressed in his response, nor did Mark pose any high-level questions to students during the data collection period. Student comments confirm this finding. Denish, a junior-level ATS, described Mark's use of questioning in this manner:

> I was having a hard time understanding muscle energy technique and Mark would just keep showing me it again and again. His questions were like, ''do you understand why I am doing this'' or ''do you understand what we are doing''? The questions he asks don't help me figure things out, it's just like either I understand it or I don't and that is what he wants to know. That's pretty much all he ever asks. He doesn't really ask us for our thoughts or opinions.

When ATSs' comments regarding Mark's use of questioning were compared with data collected from the Question Classification Framework, analysis supported the view that Mark primarily targeted low-level cognitive processing skills and favored nonstrategic questioning. Of the 712 questions posed by ACIs during field observations, Mark only asked 52 (7.30%). A total of 88.46% (46/52) of questions Mark posed were classified as information-level, knowledge-level, application-level, or comprehension-level questions, with the remaining questions classified as other. Mark did not pose any questions that targeted high-level cognitive processing skills.

Susan, a first-year master's-level graduate student in her second year of experience as a certified athletic trainer and first year as an ACI, described her questioning strategy by stating, ''I come from the old school of let's get it done and if there are questions, ask them later.'' This questioning strategy was confirmed during field observations and supported by student statements. During stimulated-recall interview 2, Elanna, a junior-level ATS, described Susan's questioning style in this manner:

> [Susan] makes it seem like the questions that she asked aren't all that important. Sometimes it doesn't even seem like she really cares about the answer, like she is just asking questions because she knows she is supposed to.

And Walter, a second-year master's-level graduate student with 6 years of experience as a certified athletic trainer in his first ACI position, was described by a student as not really having a questioning strategy. Owen, a junior-level student, described Walter's question strategy in this way:

> I don't believe [Walter] has a well-designed or well-thought-out strategy. He just seems to ask questions out of the blue, like more off the top of his head. What he does most of the time is along the lines of quick-fired questions, telling us what to do, and giving us directions.

Examples of questions posed by Walter, Mark, and Susan included: ''Notch it for the final strip. You got that?'' (Walter, field observation 3); ''Hey, Rodger, do you want to make sure he is getting a good hamstring stretch?'' (Mark, field observation 3), and ''All right, do you want to write it up in the report now and then we can put it in her file tomorrow?'' (Susan, field observation 1). When ATSs were asked to describe the way his or her ACI used questioning, ATSs' responses revealed that the questions posed by Mark, Walter, and Susan did not stimulate complex cognitive processing skills and did not cognitively challenge the students.

DISCUSSION

The majority of questions posed by ACIs as a group were classified as information-level, knowledge-level, application-level, and comprehension-level questions, which target lower-level cognitive processing skills. These findings are consistent with those reported by researchers[1–4,32] in the field of nursing education on the cognition level of questions posed by clinical nursing instructors during clinical debriefings. Although previous authors[1–4,32] primarily relied on the quantitative data obtained from the cognitive Question Classification Framework,[1,3] analysis of data obtained by the additional qualitative methods in the current study suggests that the ACI's questioning pattern appears to be more important in stimulating the cognitive processing of information and in developing clinical proficiency than is the ACI's ability to ask cognition-specific questions.

When ACIs used a strategic questioning pattern, questions were sequenced to first target basic application and comprehension knowledge and allow the ACI to gauge the students' knowledge and skill base. Follow-up questions targeted higher-level cognitive processes appropriate for the students' academic knowledge and skill level and assisted students in developing a process for thinking that allowed them to critically analyze the situation.

The ACIs who were most skilled in strategic questioning within this study primarily used a funnel method for posing questions, a technique commonly used in the experiential outdoor education setting.[23,25,40,41] Funneling seeks to assist the student in processing information in a very specific sequence. The learner is first asked to characterize what is known about a given situation or experience and then to extract the relevant from the nonrelevant information in phase 2 in order to identify conclusions, inferences, and possibilities in the final phase of questioning.[25] The funneling method of questioning is thought to assist the student in developing problem solving and critical thinking skills.[23,25,40,41]

The ACIs using a nonstrategic questioning pattern could not identify why they sequenced their questions as they did and did not often sequence questions in a way that allowed the student to process the basic information that was needed to respond to the higher-level questions. When high-level cognitive questions were posed by ACIs using nonstrategic questioning, the questions appeared to be

added randomly to the conversation. Most questions appeared to serve as methods for collecting information from the student on patient care issues or to confirm that the student understood the instructor's directions. Sellappah et al[3] termed such questions as *informational*, because the instructor is seeking base information and not attempting to stimulate cognitive processing.

The literature within general education[42–44] supports the premise that the way questions are sequenced may be more important in promoting student understanding than the cognition level of the question. Appropriate sequencing of questions allows the instructor and student to focus first on the fundamental aspects of the challenge, conflict, or content being discussed.[42] Guided by student response and content complexity, instructors are then able to expand the conversation through strategic questioning to engage students in stimulating discussion.[42] Strategic questioning as described in the current study is similar to the concept of effective questioning.[26] Effective questioning occurs only through thoughtful planning and a clearly conceptualized questioning strategy that allows the instructor to vary the complexity of questions to stimulate processing of information at multiple levels.[26,44]

Researchers[1–4,8,16,19] in the nursing literature support the use of strategic questioning as a method for fostering critical thinking during clinical experiences. Authors in both athletic training[17] and nursing[8,16] education recommended increasing the complexity level of questions as student content and experience base expand. Strategically transitioning from low-level to high-level cognitive questions moves the learner through the stages of remembering and using information[14] to possessing and using perceptual awareness during clinical experiences.[8,16]

Investigators in athletic training education[5,14,17,18] and nursing education[16,24,29] agreed that in order to promote the development of clinical proficiency and critical thinking, the instructor needs to be adept at selecting and using a variety of questioning styles and teaching strategies to better assist the student in clarifying, identifying, and evaluating information gained from experiences. My findings are consistent with findings reported by researchers[1–4] in the clinical education field of nursing: clinical instructors do pose more low-level cognitive questions than high-level cognitive questions. However, I believe that the cognition level of the question alone cannot be the sole basis for considering how questions are used to assist students in processing information. Instead, I suggest that it is how questions are sequenced, in combination with cognition level, that is important in assisting students with developing skills needed for critical thinking and clinical reasoning. The use of strategic questioning as the primary teaching strategy for facilitating learning is supported by researchers in the general education,[26–28,42–44] experiential learning,[23,25,41] and critical thinking[9,12,18] literature who see learning as a cycle, driven by asking questions. When clinical instructors use strategic questioning, the student is stimulated to actively pull information from long-term memory stores and to manipulate that information within the working memory.

RECOMMENDATIONS

The focus of this study was on ACI questioning skills and abilities. As such, repeated observations and interviews were conducted over time with the same ACIs. A longitudinal study should be conducted, following not the ACIs but the ATSs as they progress through different clinical experiences and interact with different ACIs to examine how ACIs' questioning skills affect student learning. Those findings would better inform the discussion on how to match students and instructors over the entire length of a student's clinical experiences.

The ACIs from 1 athletic training education program were the participants for this study. Further research should be conducted to verify if the current findings are consistent with how ACIs from different athletic training education programs use questioning to facilitate ATS learning during clinical experiences. Replicating the current study across several program curricula and increasing participant numbers would provide a means for comparing findings.

Only clinical instructors who were recognized as ACIs were included as participants. Replicating this study with other clinical instructors may yield valuable information for comparing clinical instructors' questioning skills with ACIs' questioning skills. Also, field observations were not conducted during game or practice times. Extending data collection methods to include ACIs' questioning skills during times of low patient volume and increased intensity of experience may yield different findings.

Although the participants' educational degrees, teaching responsibilities and experiences, position within the athletic training education program, years of experience as a certified athletic trainer, and self-perceived primary role during clinical experiences were reported, examining the relationship among these variables and ACIs' questioning skills was beyond the scope of the current study. Further research should be conducted to examine how these variables may influence clinical instructor questioning skills.

CONCLUSIONS

Athletic training students need to develop both technical athletic training knowledge and clinical reasoning skills in order to develop clinical proficiency as defined by the *Athletic Training Educational Competencies*.[6] Data collected in my study serve to highlight the fact that ACIs who use nonstrategic questioning target primarily low-level cognitive skills associated with the technical aspect of the formula and do not build upon base knowledge as a catalyst for tackling complex concepts. Strategic questioning is fundamental in assisting students with the development of critical thinking skills, which are the basis for problem solving and clinical reasoning. Those ACIs who are skilled in strategic questioning are able to assist students in developing both technical and clinical reasoning skills.

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REFERENCES

1. Craig JL, Page G. The questioning skills of nursing instructors. *J Nurs Educ.* 1981;20(5):18–23.

2. Phillips N, Duke M. The questioning skills of clinical teachers and preceptors: a comparative study. *J Adv Nurs*. 2001;33(4):523–529.
3. Sellappah S, Hussey T, Blackmore AM, McMurray A. The use of questioning strategies by clinical teachers. *J Adv Nurs*. 1998;28(1): 140–148.
4. Wink D. Effect of a program to increase the cognitive level of questions asked in clinical postconferences. *J Nurs Educ*. 1993;32(8):357–363.
5. Mensch JM, Ennis CD. Pedagogic strategies perceived to enhance student learning in athletic training education. *J Athl Train*. 2002;37(suppl 4):199S–207S.
6. National Athletic Trainers' Association. *Athletic Training Educational Competencies*. 3rd ed. Dallas, TX: National Athletic Trainers' Association; 1999.
7. Starkey C, Koehneke P, Sedory D, et al. National Athletic Trainers' Association Education Council information Web site. Evaluation of the athletic training clinical proficiencies: a modular approach. http://www.cewl.com/clined/acpm/acpm.html. Accessed March 28, 2002.
8. Benner P, Wrubel J. Skilled clinical knowledge: the value of perceptual awareness, part 1. *J Nurs Admin*. 1982;12(5):11–14.
9. Behar-Horenstein LS, Dolan TA, Courts FJ, Mitchell GS. Cultivating critical thinking in the clinical learning environment. *J Dent Educ*. 2000;64(8):610–615.
10. Facione NC, Facione PA, Sanchez CA. Critical thinking disposition as a measure of competent clinical judgment: the development of the California Critical Thinking Disposition Inventory. *J Nurs Educ*. 1994;33(8):345–350.
11. Leaver-Dunn D, Harrelson GL, Martin M, Wyatt T. Critical-thinking predisposition among undergraduate athletic training students. *J Athl Train*. 2002;37(suppl 4):147S–151S.
12. King A. Designing the instructional process to enhance critical thinking across the curriculum. *Teach Psychol*. 1995;22(1):13–17.
13. Fuller D. Critical thinking in undergraduate athletic training education. *J Athl Train*. 1997;32(3):242–247.
14. Clark R, Harrelson GL. Designing instruction that supports cognitive learning processes. *J Athl Train*. 2002;37(suppl 4):152S–159S.
15. Tichenor C, Davidson J, Jensen G. Cases as shared inquiry: model for clinical reasoning. *J Phys Ther Educ*. 1995;9(2):57–62.
16. Benner P. *From Novice to Expert: Excellence and Power in Clinical Nursing Practice*. Menlo Park, CA: Addison Wesley; 1984.
17. Guyer MS. *Factors That Influence Athletic Training Students' Cognition and Problem Solving Abilities* [dissertation]. Springfield, MA: Springfield College; 2003.
18. Walker SE. Active learning strategies to promote critical thinking. *J Athl Train*. 2003;38(3):263–276.
19. Baker CR. Reflective learning: a teaching strategy for critical thinking. *J Nurs Educ*. 1996;35(1):19–22.
20. Colucciello ML. Relationships between critical thinking dispositions and learning styles. *J Prof Nurs*. 1999;15(5):294–301.
21. Davies E. Reflective practice: a focus for caring. *J Nurs Educ*. 1995;34(4):167–174.
22. 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(suppl 4):189S–198S.
23. Borton T. *Reach, Touch, and Teach*. New York, NY: McGraw Hill; 1970.
24. Perciful EG, Nester PA. The effect of an innovative clinical teaching method on nursing students' knowledge and critical thinking skills. *Nurs Educ*. 1996;35(1):23–28.
25. Priest S, Gass M. *Effective Leadership in Adventure Programming*. Champaign, IL: Human Kinetics; 1997.
26. Wilen WW. *Questioning Skills for Teachers*. 2nd ed. Washington, DC: National Education Association; 1986.
27. Dillon JT. *The Practice of Questioning*. London, England: Routledge; 1990.
28. Bloom BS. *Taxonomy of Educational Objectives, Handbook One: Cognitive Domain*. London, England: Longmans; 1956.
29. Dreyfus HL, Dreyfus SE. The relationship of theory and practice in the acquisition of skill. In: Benner P, Tanner CA, Chesla CA, eds. *Expertise in Nursing Practice:Care, Clinical Judgment and Ethics*. New York, NY: Springer; 1996:29–48.
30. Harrelson GL. Techniques and models to teach clinical instruction. 2003 Athletic Training Educators' Conference. http://nata2003edconferenceproceedings.humankinetics.com. Accessed March 15, 2003.
31. Harrelson GL, Leaver-Dunn D. Using the experiential learning cycle in clinical education. *Athl Ther Today*. 2002;7(5):23–27.
32. Wink DM. Using questioning as a teaching strategy. *Nurse Educ*. 1993;18(5):11–15.
33. Rossignol M. Relationship between selected discourse strategies and student critical thinking. *J Nurs Educ*. 1997;36(10):467–475.
34. Merriam S. *Qualitative Research and Case-Study Applications in Education*. San Francisco, CA: Jossey Bass; 1998:94–111.
35. Rossman GB, Rallis SF. *Learning in the Field: An Introduction to Qualitative Research*. Thousand Oaks, CA: Sage; 1998:43–53.
36. Quinn M. *Qualitative Evaluation and Research Methods*. Newbury Park, CA: Sage; 1990.
37. Pitney WA, Parker J. Qualitative research applications in athletic training. *J Athl Train*. 2002;37(suppl 4):168S–173S.
38. Whalley Hammell K, Carpenter C, Dyck I. *Using Qualitative Research: A Practical Introduction for Occupational and Physical Therapists*. London, England: Churchill Livingstone; 2000.
39. Strauss A, Corbin J. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 2nd ed. Thousand Oaks, CA: Sage; 1988:163–179.
40. Joplin L. On defining experiential education. In: Warren K, Sakofs M, Hunt JS Jr, eds. *The Theory of Experiential Education*. Dubuque, IA: Kendall Hunt; 1995.
41. Kolb DA. *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice Hall; 1984.
42. Brophy J, Good T. Teacher behavior and student achievement. In: Wittrock M, ed. *Third Handbook of Research on Teaching*. Cited by: Berliner DC, Rosenshine BV, eds. *Talks to Teachers*. New York, NY: Random House; 1987:189–193.
43. Brophy J. On motivating students. In: Berliner DC, Rosenshine BV, eds. *Talks to Teachers*. New York, NY: Random House; 1987: 201–245.
44. Clegg AA. Why questions? In: Wilen WW, ed. *Questions, Questioning Techniques and Effective Teaching*. Washington, DC: National Education Association; 1987.

Mary G. Barnum, EdD, LAT, ATC, provided conception and design; acquisition and analysis and interpretation of the data; and drafting, critical revision, and final approval of the article.

Address correspondence to Mary G. Barnum, EdD, LAT, ATC, Physical Education Complex R-115, Springfield College, 263 Alden Street, Springfield, MA 01109. Address e-mail to mbarnum@spfldcol.edu.