An Educational Curriculum Used to Improve the Knowledge and the Perceptions of Certified Registered Nurse Anesthetist Clinical Educators

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An educational curriculum using adult learning principles in an active learning format was developed for Certified Registered Nurse Anesthetist clinical educators (CRNACEs) to help improve the quality of the clinical learning experiences for student nurse anesthetists (SNAs). This exploratory study sought to determine the extent to which an 8-hour educational course modified the behavioral perceptions and the knowledge of CRNACEs.

The effects of the CRNACE course were measured using a questionnaire that consisted of 22 Likert scale items and 8 open-ended questions. The study population included 33 CRNACEs. Their responses were assessed before the course, after the course, and during a 2-month follow-up.

It was determined that the CRNACE course positively modified participants’ perceived behaviors and knowledge after instruction and at the 2-month follow-up. Additional findings included that information provided during the CRNACE course did not change the perceptions of CRNACEs related to their ability to communicate with students or their willingness to modify their teaching practices.

Providing instruction incorporating principles of adult learning using an active learning format for CRNACEs may improve the clinical learning experiences for SNAs. As a result, SNAs would be better prepared to make the transition to clinical expert.

Keywords: Clinical education, clinical educator development, clinical learning, curriculum development.

The quality of clinical education has a significant impact on the development of adult learners. It has been determined that the behavioral characteristics of clinical educators (CEs) strongly influence the quality of the learning environment. Therefore, it is essential for CEs to strive to improve their individual teaching abilities to increase the level of student learning. Clinical educators in the healthcare field are experts in providing high quality patient care. They have the information and skill needed to excel within their discipline. However, becoming an expert in education requires practical knowledge that may not be the primary focus of CEs. Frequently, CEs have not been exposed to information and ideas as to how adults learn most effectively. An understanding of this information can enhance the quality of clinical education and improve student learning.

There is evidence to suggest that educational programs that target the needs of clinical educators can have a positive effect on teachers and improve the learning environment for students. A teaching program designed for physician CEs increased participants’ knowledge of educational techniques and in time improved student satisfaction with their CEs. According to Wilkerson and Irby, changes in individual teaching behavior can be accomplished by implementing faculty development programs. Other experts in healthcare education believe that clinical instructors need to receive formalized education, which focuses on improving teachers’ abilities as facilitators. If CEs are exposed to information how to best serve the educational needs of adult learners, a positive change in behavior may occur and teachers will be able to better meet the needs of students.

To further support the importance of providing CEs with knowledge related to adult education, at the American Association of Nurse Anesthetists 2004 winter Assembly of School Faculty, a survey of attendees’ interests in future topics included providing education for Certified Registered Nurse Anesthetist CEs (CRNACEs) to help them become more effective teachers. Presently, there are no studies in the nurse anesthesia literature that address the effects of a formalized educational program designed specifically for CRNACEs.

The purpose of this study was to determine if providing education for CRNACEs would create a paradigm shift and positively change their beliefs about clinical education and adult learners. The following research questions guided this study:

• Research Question 1: To what extent, if any, does an 8-hour nurse anesthesia educator course modify the perceived knowledge of CRNACEs?

• Research Question 2: To what extent, if any, does an 8-hour nurse anesthesia educator course modify the perceived behaviors of CRNACEs?
Materials and Methods

Participation in this study was voluntary. A questionnaire was developed and used to collect data. In addition, cognitive interviews, trigger film analysis, opinions of CRNACEs, and an assessment by an independent observer during instruction were incorporated into the methodology.

- **Creation of an Educational Curriculum.** Before instruction, a designer of an educational curriculum should conduct a learner analysis to analyze the needs of the target population, which includes learners, instructors, students, and managers. A learner analysis was conducted to create the CRNACE instructional curriculum. A total of 84 CRNACEs who work at 10 different Southern California hospitals were surveyed. Of the 84 CRNACEs surveyed, 46 CRNACEs responded. They were asked to list specific educational content areas that they believed would help them improve their teaching ability. In addition, they were asked to list the behavioral characteristics of CEs that would be most conducive and least conducive to student learning.

The academic faculty and student nurse anesthetists (SNAs) who attended Kaiser Permanente School of Anesthesia, Pasadena, California, were asked to respond to these questions to further determine which content areas would be important to incorporate into the course curriculum. Last, a panel of 6 experts in the field of nurse anesthesia and nursing education determined the validity of the CRNACE course content. Strict anonymity was maintained throughout this process.

The course was initially pilot tested with 16 SNAs. The data were collected and analyzed before and after the course. Course materials, course content, and the data collection instrument were then modified based on suggestions made by a dissertation committee and the student participants.

After this information was obtained and all of the pertinent literature relating to clinical education was reviewed from nursing, medicine, and nurse anesthesia, 5 constructs were created. These constructs formed the curriculum of the CRNACE course and included adult learning principles, conducting student evaluations, promoting effective communication, creating positive teacher-learner relationships, and providing constructive feedback.

Active learning, which is a principle of adult learning, occurs when learners are encouraged to take a participative role in an educational process. It allows learners to integrate concrete experience with opinions from others with different perspectives, which helps in retention and mastery of the subject content. Active learning is a desirable method of instruction that is used with adults because it introduces concepts in a contextual manner that is applicable to real-life situations. Active learning activities were used throughout the CRNACE course.

The teaching method used for the CRNACE course focused on implementing active learning techniques. The course material was presented so that the participants could apply the course information to practical teaching scenarios. Participants were encouraged to discuss their personal teaching experiences. In addition, CRNACEs were divided into small groups and asked to create solutions to real-life teaching dilemmas. The course content was interspersed throughout the various discussions. Last, the participants viewed 3 trigger films and analyzed their content. Trigger film analysis has a profound effect on stimulating learning in regard to the affective domain, which includes values, feelings, and emotions.

- **Participants.** The institutional review boards at Kaiser Permanente healthcare system and Pepperdine University granted permission for this study before participants were enrolled. The participation of CRNACEs in this research study was optional. Invitations to participate in the study were mailed to 324 CRNACEs who work for Kaiser Permanente in Southern California. A sample of convenience was used, and the total study population consisted of 33 CRNACEs.

- **Instrument Development.** Presently, there are no studies of this type published in the medical, nursing, or nurse anesthesia literature. Therefore, an original questionnaire was created to determine whether a change in the perceived behavior and the perceived knowledge of participants occurred before, immediately after, and 2 months following instruction. The survey items were developed to assess the most important principles in each construct and were reflective of the content that was described for the course. Reliability of the questionnaire was examined by using Cronbach alpha item analysis.

The items on the CRNACE questionnaire were closed-ended or open-ended and were divided according to the individual construct. Each of the Likert scale items begins with a personal pronoun, I or my. For this reason, each closed-ended item was reflective of the respondents' perceived behaviors. Each questionnaire, before the course, after the course, and at the 2-month follow-up, was coded to determine each participant's change in behavior over time. The choices to the closed-ended items were based on a 6-point Likert scale and are listed in Table 1.

In addition, participants answered 8 open-ended items that required a written response. The information required for a correct response was presented in the pre-course reading and was included during instruction. Therefore, these questions were a measure of the participants' perceived knowledge. Determination of the quality of the response was accomplished by using interrater reliability. The researcher and 2 observers who are experts in the field of nurse anesthesia education judged the quality, quantity, and appropriateness of each answer based on a rubric that was created by the researcher for

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**Table 1.** CRNACE Questionnaire Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>I believe the course was effective.</td>
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<tr>
<td>2.</td>
<td>I believe I will be able to apply what I learned.</td>
</tr>
<tr>
<td>3.</td>
<td>I believe I will be able to improve my teaching skills.</td>
</tr>
<tr>
<td>4.</td>
<td>I believe I will be able to incorporate new teaching strategies.</td>
</tr>
<tr>
<td>5.</td>
<td>I believe I will be able to adapt to new teaching methods.</td>
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A panel of 6 experts in the field of nurse anesthesia and nursing education determined the validity of all question items present on the CRNACE questionnaire. All question items that appeared on the precourse, postcourse, and 2-month follow-up questionnaires were identical.

- Procedures and Data Collection. Each participant was required to complete the following process: (1) sign and return the informed consent form, (2) complete the precourse CRNACE questionnaire before attending the course, (3) read the course outline and tutorial (mailed to each participant) before attending the course, (4) attend the 8-hour educational course, (5) complete the postcourse CRNACE questionnaire immediately following instruction, and (6) complete the 2-month follow-up CRNACE questionnaire.

After completion, the precourse questionnaires were mailed by participants to the researcher before instruction. The postcourse questionnaires were completed and collected following instruction. The 2-month follow-up questionnaires were mailed to each CRNA with instructions to complete the items and return in the enclosed self-addressed stamped envelope to the researcher. Each of the 33 questionnaires were number coded so that the CRNACEs responses could be accurately tracked over time. Strict anonymity was provided for each participant. All 33 precourse questionnaires and 33 postcourse questionnaires were completed. The total number of participants who returned the 2-month follow-up questionnaire was 28, which is an 85% response rate.

- Data Analysis. To determine if a change in the participants’ perceived behavior and perceived knowledge had occurred, the precourse questionnaire mean values were compared with the postcourse mean values and the 2-month follow-up mean values for each item. The Wilcoxon matched pairs test, used in this study, is a non-parametric measure used to compare the mean values of groups, calculate the differences between each set of paired data, and analyze the list of differences.

During the CRNACE course, an independent observer recorded the interactions between the researcher and the participants and among the participants themselves. The purpose of this process was to determine which instructional techniques were perceived by participants as most effective and least effective. The observer was not an expert in the field of education or nurse anesthesia, and he was chosen to decrease any bias that could have occurred. This information was analyzed by the researcher to determine if common themes were present. Last, each participant was encouraged to evaluate the CRNACE course information, course materials, effectiveness of the presenter, appropriateness of the environment, and the overall presentation. Since this was an exploratory study, the level of significance for the Likert scale items and the open-ended items was set at the \( P = .10 \) level.

Results

The results of this study can be summarized as follows:

- Research Question 1. To what extent, if any, does an 8-hour nurse anesthesia educator course modify the perceived behaviors of CRNACEs?

The 22 Likert scale items measured a change in the perceived behaviors of the participants. In relation to precourse to postcourse data, 16 of 22 items indicated a statistically significant increase. In addition, from precourse to 2-month follow-up data, 18 of 22 items indicated a statistically significant increase. Table 3 includes the results from the closed-ended items from the CRNACE questionnaire that indicate a statistically significant increase for the postcourse and 2-month follow-up assessments.

- Research Question 2. To what extent, if any, does an 8-hour nurse anesthesia educator course modify the perceived knowledge of CRNACEs?

The 8 open-ended items were used to measure a change in the perceived knowledge of CRNACEs. In relation to precourse to postcourse data, 8 of 8 items indicated a statistically significant increase. In addition, from the precourse to 2-month follow-up assessment, 8 of 8 items indicated a statistically significant increase. Table 4 includes the results from the open-ended items from the CRNACE questionnaire that indicate a statistically significant increase.

| 1 = Completely disagree – Occurs in 0 out of every 5 SNA teaching experiences |
| 2 = Strongly disagree – Occurs in 1 out of every 5 SNA teaching experiences |
| 3 = Disagree – Occurs in 2 out of every 5 SNA teaching experiences |
| 4 = Agree – Occurs in 3 out of every 5 SNA teaching experiences |
| 5 = Strongly agree – Occurs in 4 out of every 5 SNA teaching experiences |
| 6 = Completely agree – Occurs in 5 out of every 5 SNA teaching experiences |

Table 1. Likert Scale Items on CRNACE Questionnaire

CRNACE indicates Certified Registered Nurse Anesthetist Clinical Educator; SNA, nurse anesthesia student.

To determine if a change in the perceived knowledge of CRNACEs?

Table 2. Graded Responses to Open-ended Items on CRNACE Questionnaire

CRNACE indicates Certified Registered Nurse Anesthetist Clinical Educator.

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CRNACE indicates Certified Registered Nurse Anesthetist Clinical Educator.
Adult learning principles

1. I help SNAs identify their clinical deficits.  
   Pretest: 4.12  
   Posttest: 5.09<sup>a</sup>  
   Follow-up: 5.14<sup>a</sup>  

2. I allow SNAs to make suggestions regarding anesthetic management.  
   Pretest: 4.73  
   Posttest: 5.03<sup>b</sup>  
   Follow-up: 5.32<sup>b</sup>  

3. I help motivate SNAs by providing positive reinforcement.  
   Pretest: 4.64  
   Posttest: 5.09<sup>c</sup>  
   Follow-up: 4.96<sup>c</sup>  

4. I tell the SNA what anesthetic plan to use for each patient.  
   Pretest: 3.88  
   Posttest: 4.36<sup>c</sup>  
   Follow-up: 4.25<sup>c</sup>  

5. I discuss the advantages and disadvantages of an anesthetic technique with  
   the SNA.  
   Pretest: 4.27  
   Posttest: 4.76<sup>c</sup>  
   Follow-up: 4.93<sup>c</sup>  

6. I allow SNAs to implement a plan of care that they have constructed.  
   Pretest: 4.18  
   Posttest: 4.67<sup>c</sup>  
   Follow-up: 4.71<sup>c</sup>  

7. I ask the SNA to discuss his/her ideas about a patient’s condition before  
   suggesting an intervention.  
   Pretest: 4.15  
   Posttest: 4.82<sup>c</sup>  
   Follow-up: 5.07<sup>d</sup>  

8. I implement adult learning principles during clinical instruction.  
   Pretest: 4.03  
   Posttest: 5.00<sup>a</sup>  
   Follow-up: 4.89<sup>c</sup>  

Promoting effective communication

14. I form an opinion of the SNA based on other CRNA clinical educators’ comments.  
   Pretest: 3.52  
   Posttest: 4.21<sup>c</sup>  
   Follow-up: 4.25<sup>c</sup>  

Creating positive teacher-learner relationships

17. I establish a positive rapport with each SNA.  
   Pretest: 4.61  
   Posttest: 5.03<sup>d</sup>  
   Follow-up: 4.89<sup>d</sup>  

18. I create an environment that promotes learning.  
   Pretest: 4.46  
   Posttest: 5.09<sup>d</sup>  
   Follow-up: 4.96<sup>d</sup>  

19. I provide unconstructive feedback when the SNA makes a mistake.  
   Pretest: 4.18  
   Posttest: 5.12<sup>c</sup>  
   Follow-up: 4.86<sup>c</sup>  

Providing constructive feedback

22. I provide feedback by means of a verbal and a written evaluation.  
   Pretest: 4.39  
   Posttest: 4.97<sup>c</sup>  
   Follow-up: 5.07<sup>c</sup>  

23. I complete each item and provide comments on the evaluation form.  
   Pretest: 4.36  
   Posttest: 5.12<sup>c</sup>  
   Follow-up: 5.18<sup>b</sup>  

Conducting student evaluations

26. I evaluate the SNA’s performance based on the semester’s objectives.  
   Pretest: 4.09  
   Posttest: 4.79<sup>c</sup>  
   Follow-up: 5.04<sup>b</sup>  

28. I evaluate an SNA’s performance based on a comparison with other SNAs.  
   Pretest: 3.48  
   Posttest: 4.85<sup>a</sup>  
   Follow-up: 4.57<sup>b</sup>  

Table 3. Mean Values of Likert Scale Items Appearing on the CRNACE Questionnaire That Indicate a Statistically  
Significant Increase on Posttest and Follow-up Results  
CRNACE indicates Certified Registered Nurse Anesthetist Clinical Educator; SNA, nurse anesthesia student.  
Data are given as the mean (percentage increase in the mean) from pretest to posttest and from posttest to follow-up. Data for pretest to posttest differences in mean values are for 33 respondents and for pretest to follow-up, for 28 respondents; P values are by the  
Wilcoxon matched pairs test.  
<sup>a</sup> P = .001.  
<sup>b</sup> P ≤ .10.  
<sup>c</sup> P ≤ .01.  
<sup>d</sup> P ≤ .05.

• Additional Findings. During the presentation of the course material, CRNACEs preferred teaching methods  
that used an active learning style such as case studies, class discussion, role playing, and trigger film analysis as  
compared with a traditional lecture format. This finding is supported after interpretation of the observer’s notes  
and by the participants’ evaluation of the course.  

In summary, there was a statistically significant increase in the participants’ perceptions from before the  
course to after the course and from before the course to the 2-month follow-up, which suggests that the  
instruction produced a sustained change. The results are consistent with the findings reported by Nasmith et al.,  
who determined that a positive change in attitude, increased knowledge, and improved teaching behaviors occurred  
after a faculty development workshop.

Discussion

Based on the findings from this study, the following conclusions were made. An 8-hour educational course provided  
for CRNACEs positively modified the participants’ perceived behaviors and perceived knowledge toward  
clinical anesthesia education after instruction and at 2 months following instruction. The 4 constructs discussed  
during the course that had the most significant impact on the perceived behaviors of CRNACEs included adult  
learning principles, establishing positive teacher-learner relationships, providing positive feedback, and  
conducting student evaluations. Furthermore, the overall quality and quantity of the written responses dramatically improved and demonstrated a level of comprehension that was not present after the precourse assessment. These results indicate that participants not only gained knowl-
edge during the CRNACE course, but also recalled the information needed to appropriately answer these items 2 months after instruction.

The information provided to participants during presentation of the topic “promoting effective communication” did not consistently modify the perceived behaviors of CRNACEs after instruction and at 2 months following instruction on the Likert scale items. One potential explanation for these results is that CRNACEs believe that their existing patterns of communication used during clinical teaching are appropriate and did not warrant change.

Before the CRNACE course, a poll of CRNACEs, senior SNAs, and junior SNAs was conducted to determine which preceptor behaviors were least conducive to student learning. All of the groups unanimously responded that the primary behavior that was least conducive to student learning was degrading or demeaning behavior that was communicated verbally or nonverbally by CRNACEs. These results are consistent with the inadequacies exhibited by clinical teachers as reported by adult learners in the healthcare field.12 The CRNACEs perceived that their methods of communication are effective during their interactions with SNAs. However, there is a discrepancy between this result and the beliefs held by SNAs regarding the effectiveness of the CRNACE communicative abilities during clinical education. Therefore, it is recommended that during future CRNACE educational courses, this topic be discussed in greater depth using active learning educational techniques.

In reference to the topic “adult learning principles,” it was determined that CRNACEs were not receptive to changing or to individualizing their teaching practices based on the students’ needs. Furthermore, the participants were not willing to change their teaching practices based on evaluations of their performance by SNAs. One of the Likert scale items did not achieve statistical significance during the postcourse assessment but showed a statistically significant increase during follow-up. This result suggests a change in the opinion of CRNACEs and willingness to modifying their teaching practices after instruction had been completed.

The CRNACEs are confident in their abilities. However, every learner’s level of expertise, rate of learning, and individual ability varies, and the importance of tailoring the teaching plan to the needs of the individual SNA was discussed during instruction. In addition, this topic was further explored by having a group of 6 CRNACEs analyze and present their approach to a hypothetical educational dilemma to all participants. Applying this concept in a practical sense may have changed their perceptions regarding the validity of customizing their teaching practices according to the SNAs’ abilities and needs. A change in a participant’s opinion can occur after practical application of an educational principle.13

Instructors who will be planning and facilitating future CRNACE courses should integrate active learning techniques such as precourse reading, case studies, group discussion, trigger film analysis, and role playing. This con-

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<th>Table 4. Summary of Mean Values of Open-Ended Items Appearing on the CRNACE Questionnaire That Indicate a Statistically Significant Increase on Posttest and Follow-up Results</th>
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<tr>
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</tr>
<tr>
<td>Pretest</td>
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<tr>
<td>Pretest</td>
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<td>-----------------------------------------------</td>
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<tr>
<td>Adult learning principles</td>
</tr>
<tr>
<td>10. List one clinical example that could be used in a problem based learning scenario.</td>
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<tr>
<td>11. Provide one example of an active learning technique.</td>
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<td>Promoting effective communication</td>
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<tr>
<td>15. List one method that can be used to enhance your listening skills.</td>
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<td>16. List two barriers that can inhibit your ability to communicate effectively.</td>
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<tr>
<td>Creating positive teacher-learner relationships</td>
</tr>
<tr>
<td>20. List two CRNA clinical educator behaviors that promote SNA learning.</td>
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<tr>
<td>21. List two CRNA clinical educator behaviors that detract from SNA learning.</td>
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<tr>
<td>Providing constructive feedback</td>
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<tr>
<td>25. List one clinical example of how to provide constructive feedback.</td>
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<tr>
<td>Conducting student evaluations</td>
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<tr>
<td>30. List one positive outcome that can occur as a result of a thorough SNA evaluation.</td>
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clusion is supported by the interpretation of the field notes that were recorded during the class, participants’ evaluations of the class, and observations made by the researcher. Adult learning principles support the use of active learning techniques. The course developed for this study is learner-centered, interactive, promotes critical thinking, encourages discussion, and values differing opinions.

The participants were not as interested in principles of educational theory, but they were engaged during discussion of the application of the course material as it related to their practice. They valued discussing their opinions with the researcher and with their colleagues. They wanted to hear how other CRNACEs felt during specific teaching situations. One possible explanation for the sharing of ideas is that at the beginning of the class, the researcher made multiple attempts to ask questions and respond to the participants’ comments with courtesy and respect. The CRNACEs also appeared to value viewing trigger films and participating in the analysis of the scenarios, which further allowed participants to be active in a discussion. The use of active learning techniques enhances the learner’s ability to retain information as it is more meaningful and applicable to practice. A program such as the one described could be integrated into the professional aspects portion of a nurse anesthesia curriculum.

REFERENCES

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