

Original Publication

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Evidence-Based Education: Faculty Development Workshop to Promote Critical Thinking Skills in Dental Education

Sophia Saeed, DMD*

*Corresponding author: sophia.saeed@ucsf.edu

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Abstract

Introduction: The Commission on Dental Accreditation emphasizes the importance of teaching critical thinking. If faculty are expected to change the way they teach, training resources that employ the methods of promoting critical thinking must be made available to provide guidance on how to teach critical thinking. A search of MedEdPORTAL showed no peer-reviewed active learning resources for faculty development in the domain of critical thinking. **Methods:** This 90-minute workshop is designed to provide preclinical and clinical dental faculty with strategies to promote critical thinking skills in their students. It includes a presentation on foundational knowledge about critical thinking and knowledge organization, followed by small- and large-group activities. Videos of real teaching encounters are reviewed so that different teaching styles can be seen and discussed. **Results:** This workshop was given at the 2014 American Dental Education Association Annual Session, receiving an overall rating of 3.67 on a Likert-type scale of 1-4, with 4 being the highest score. It was repeated at the University of California, San Francisco School of Dentistry, where it received an overall rating of 4.7 on a Likert scale of 1-5, with 5 being the highest score. **Discussion:** For faculty who learned in teacher-centered curricula, training may be necessary to provide them with skills for contemporary teaching in this new domain of competence. This workshop offers such training.

Keywords

Simulation, Faculty Development, Critical Thinking, Simulation Training, General Dentistry, Preclinical Dentistry, Clinical Dentistry, weTeach

Appendices

- A. Presentation.pptx
- B. Critical Thinking Observation Form.doc
- C. Critical Thinking Key References.doc
- D. Session Evaluation.doc

All appendices are peer reviewed as integral parts of the Original Publication.

Educational Objectives

By the end of this session, learners will be able to:

1. Describe the role of critical thinking in patient care.
2. Discuss how critical thinking skills increase depth of learning.
3. Demonstrate practical ways to incorporate facilitation of critical thinking skills into the preclinical and clinical settings.

Introduction

In 2013, the Commission on Dental Accreditation (CODA) adopted new standards to reflect the American Dental Education Association (ADEA) Competencies for the New General Dentist.¹ One of the new domains that dental schools would be asked to teach and assess was critical thinking.² This skill has become increasingly important as the amount of information in dentistry grows so quickly and it's impossible to teach students everything we know. Further, the current knowledge will become obsolete at some point in their careers. Instead, if we understand how clinicians store and retrieve information on the spectrum from novice to expert,^{3,4} and couple this with what we know about metacognition's role in developing self-directed learners,³ we can better prepare our graduates for the ever-changing health care landscape they are sure to face. Engaging students to continually justify the reasoning behind their

decisions allows them to develop skills in problem solving and critical thinking that will help them grow into lifelong learners.

Most faculty teaching in dental schools today graduated well before these new standards were implemented,⁵ likely from teacher-centered curricula rife with passive learning. Additionally, most dental faculty in the US do not have formal training in pedagogy or andragogy. If we expect these faculty to teach in ways that are different from the way in which they learned, it is imperative to provide them with adequate training. Role-modeling contemporary teaching methodologies for this training would assure alignment of the overt and hidden curricula (i.e., Do as I say and as I do). Consistent with adult learning theory and experiential learning, this workshop includes reasons why faculty should learn this new style of teaching, offers built-in experiences to engage in critical thinking through problem solving, and provides specific suggestions on direct application to teaching.

No peer-reviewed faculty development trainings on the topic of promoting critical thinking could be located in a search of MedEdPORTAL's resources. There is also a paucity of articles providing faculty members with a framework for teaching critical thinking.⁶

There have been some published works on assessing the integration of critical thinking⁷ into various dental school courses such as evidence-based dentistry,⁸ gross anatomy,⁹ and caries risk assessment¹⁰; however, a gap in the literature remains regarding materials to train faculty to teach this skill.

In 2012, the ADEA website posted the Critical Thinking Skills Toolbox,¹¹ which is a resource about critical thinking for individual faculty members to study on their own. It is not peer-reviewed and is not meant for training groups of faculty members together.

This workshop builds on the content presented in the Critical Thinking Skills Toolbox and also incorporates literature from fields outside of dental and health professions education. Different from the Critical Thinking Skills Toolbox, this workshop makes use of active learning strategies, such as small-group exercises and large-group discussions for groups of faculty to learn about this topic together. This is consistent with cognitivist and constructivist learning theories.¹² Cognitivist learning theory states that learners engage by being prompted to think, reflect, and problem solve.¹² Constructivist learning theory states that the learner constructs a subjective representation of knowledge, building upon his/her own previous knowledge.¹² By utilizing these learning theories, the participants of this workshop are actually engaging in critical thinking while learning how to promote critical thinking in their trainees.

Kern's six-step approach for curriculum development was used for developing this workshop.¹³ The first step asks the developer to identify the health care problem trying to be solved and to conduct a general needs assessment. The problem this workshop aims to address is that critical thinking is a needed competency for today's graduate to provide modern health care. This also aligns with a newer competency from CODA. The second step is a more detailed needs assessment of the learners and their learning environment. In this case, the learners are the faculty. The majority of faculty currently teaching in our curricula did not have the benefit of learning in a curriculum where critical thinking was a key competency.⁵ They learned and largely teach in the "teacher as master" model, passively imparting knowledge to learners. Their learning environment is challenging because there are multiple demands on their limited time, their schedules may not align for a group training, and they may question the need to change. Additionally, the large volume of part-time faculty members may make it necessary to repeat trainings on multiple days so that all have a chance to participate. In lieu of trainings, sometimes memos or emails are sent out with a new protocol or practice; however, memos alone will not change behavior. Finally, the majority of faculty who learned in passive curricula and continue to learn in passive continuing education courses may be pushed outside of their comfort zone by participating in trainings that require active learning. The third step is to state specific goals and learning objectives for the learner. The learning goals for this workshop are listed above in the Educational Objectives. Step four is the teaching and assessment methodologies—creating the actual curriculum. Step five is implementation, and step six is programmatic evaluation. This six-step approach emphasizes a systematic and organized format for creating curricula and builds continuous quality improvement into the framework.

Videos of simulated teaching encounters were created and used in an early version of this workshop delivered at the University of California, San Francisco (UCSF). Attendees indicated on their evaluations that the videos were unrealistic, causing disengagement from the learning material. Therefore, permission was obtained from a broad group of students and faculty to videotape real teaching encounters in both the preclinical simulation lab and student clinic. Videos were reviewed, and examples of teaching that included critical thinking, as well as those with opportunities for incorporating more critical thinking, were selected. Videos were edited, and those with poor audio were subtitled. In a second iteration of the workshop with a new focus group of faculty, audience members were engaged during the video portion of the workshop. The real-life encounters were included in the final workshop, which was given at the 2014 ADEA Annual Session and again at UCSF School of Dentistry in the fall of 2014.

Methods

Target Audience

The target audience is dental faculty who teach general dentistry in the preclinical/simulation and clinical settings. No prerequisite training is needed. This workshop is aimed at faculty who have minimal training in education, regardless of how long they have been teaching or practicing dentistry. It would be too basic for faculty who have formal educational training.

Logistics

The room should be arranged in a way that allows attendees to sit in small groups of four to eight people each. The presenter needs a computer with Microsoft PowerPoint, as well as audio and projection capabilities.

Time Breakdown

- 5 minutes: introductions.
- 30 minutes: didactic.
- 5 minutes: hand out Appendix B, orient audience, watch video 1 (included in Appendix A).
- 15 minutes: small-group discussion.
- 15 minutes: report back to large group.
- 5 minutes: watch video 2 (included in Appendix A).
- 5 minutes: large-group discussion.
- 5 minutes: didactic summary, hand out Appendix C.
- 5 minutes: action plan and session evaluation, Appendix D.

The presenter begins with introductions and didactic material, including discussion of a case to engage the audience. The case comes from my own clinical care, and the discussion is intended to demonstrate that expert clinicians rely almost entirely on pattern recognition in their clinical reasoning. This point is revisited on slide 9 (included in the presentation in Appendix A). There is then a discussion on what critical thinking means, followed by an image on slide 10 that illustrates the point of expert clinicians relying on pattern recognition. As part of this emphasis, the presentation explains that experts often lose the foundational didactic knowledge informing their reasoning skills because they have seen so many patient cases that they have developed an ability to look at a case and quickly categorize it within their framework of possible problems and solutions.⁴ This is distinct from novice clinicians, who rely almost entirely on didactic knowledge in their reasoning.⁴ Experienced clinicians thus may find it challenging to walk a student through the reasoning process if they no longer have the foundational knowledge base that the novice is heavily relying on.

Critical thinking is considered to be a component of clinical reasoning; however, the two terms are often used interchangeably. Slide 6 shows the parallels between the clinical reasoning framework that the audience is already familiar with, and critical thinking. If the audience is not yet convinced of the importance of teaching critical thinking skills, the required standard from CODA is reviewed. For individuals familiar with the evidence-based dentistry framework, parallels are then drawn to it. This is

meant to show that we can achieve several of the CODA requirements by using a framework of teaching that works for critical thinking, clinical reasoning, and evidence-based dentistry.

Before watching video 1 (included in Appendix A), each individual receives the Critical Thinking Observation Form (Appendix B) and is oriented to its sections. The whole group then watches video 1, after which the small groups discuss the three sections of the observation form to assess how well the instructor created an environment for and stimulated critical thinking. Each small group reports back to the large group for broader discussion. Next, video 2, which shows a much different example of teaching, is watched. The large group discusses the differences. The presenter then finishes the didactic material and summary. The didactic material includes practical tips on how to incorporate critical thinking into daily teaching. In the last few minutes, the attendees are asked to commit to one change they will make in their teaching. They then talk with a neighbor who will be an accountability partner. The pair is asked to exchange email addresses or phone numbers to check in with each other in a month or 2.

The handout called the Critical Thinking Key References (Appendix C) is given to each attendee in case she or he wishes to engage in further reading. This handout lists the major readings on the topic. Finally, the Session Evaluation (Appendix D) is passed out to each attendee, who is asked to complete it and turn it in.

Equipment and Supplies

The following equipment and supplies are needed:

- Computer with Microsoft PowerPoint and audio capabilities.
- PowerPoint presentation (Appendix A).
- Index cards or half-sheets of paper.
- Printouts or digital copies of the Critical Thinking Observation Form (Appendix B), Critical Thinking Key References (Appendix C), and Session Evaluation (Appendix D).

Preparation

The presenter should review the six Critical Thinking Key References listed in Appendix C ahead of the presentation, although the speaker notes in the PowerPoint may be adequate. Audio should be checked ahead of the presentation to assure that the videos will work.

If an avenue already exists for faculty development within your institution, work with that office or committee to have this training approved and advertised through the proper channels. If no such committee or office exists, gain buy-in from key stakeholders who can help advertise the workshop. Department/division chairs who oversee faculty development and teaching evaluations and/or individuals responsible for preparing the institution for CODA site visits may be invested in supporting this type of workshop.

Deployment and Lessons Learned

The first version of this workshop was 3 hours long, used videos of simulated teaching experiences, and included role-plays and more small-group discussion with the attendees. At the same time that the early sessions were being given at UCSF, the school was undergoing a pilot peer observation program, so there was a secondary goal of creating a culture of observing and evaluating peers, even if only on video.

Evaluations showed that the audience preferred real teaching experiences, as the simulated ones were not believable or relatable. I then obtained permission from faculty and students in preclinical and clinical courses to record real teaching sessions with a video camera. This was done for approximately 6 hours, after which teaching clips that effectively demonstrated the points were selected and edited. Consent for videography was initially obtained from all parties who were captured in all the videos. Additional MedEdPORTAL consent was obtained from the individuals whose clips are used in this publication.

This session was accepted as a 90-minute workshop for the 2014 ADEA Annual Session; therefore, the role-play sections and some additional didactic information were removed. After the presentation, colleagues asked for it to be shared so they could deliver it at their home institutions. The slide deck was shared with representatives from the University of Manitoba, Pima Medical Institute (which has training

programs for dental auxiliaries), University of Dammam in Saudi Arabia, Seoul National University School of Dentistry, Nemours Children's Hospital (which has a pediatric dentistry residency), and the University of Connecticut Health Center.

Limitations

This is one workshop and cannot, by itself, change the culture of teaching within an institution. Although the primary assessment shows satisfaction; pre- and postassessments of knowledge and attitude were not conducted. Additionally, the cases used in this presentation focus on general dentistry but could be replaced with alternate cases for faculty in other disciplines within dentistry and potentially other health professions.

Results

This workshop was attended by faculty from across the world at the 2014 ADEA Annual Session. Multiple attendees asked for the resource to be shared so it could be used in their home institutions. The overall session rating was 3.67 on a scale of 1-4, with 4 being the highest possible score. The mean score for all educational sessions at the 2014 ADEA Annual Session was 3.50, the median was 3.53, and the range was 2.54 to 3.88. The evaluation included a question about how well the objectives were met; however, those data could not be located at this stage.

The workshop was subsequently given to eight faculty members in the Department of Preventive and Restorative Dental Sciences at the UCSF School of Dentistry, with an overall rating of 4.7 on a scale of 1-5, with 5 being the highest score. Faculty were asked to rate the likelihood that they would make changes to their practice as a result of the workshop, with a result of 4.2 on a scale of 5. When asked what aspects of the workshop were most valuable, multiple respondents felt the observation of real teaching videos, followed by discussion, were effective. When asked how the workshop could be improved, respondents requested more opportunities to observe various teaching scenarios. A comment was also received that the workshop was "too formal." This is attributed to the fact that previous faculty development offerings in that department were passive learning lecture-style sessions, rather than structured workshops with specific learning objectives and a time line.

Discussion

While data on achieving objectives could not be obtained from the ADEA Annual Session, the overall rating was high. Given the number of institutions that requested the learning materials, it can be deduced that at least some audience members felt the workshop achieved its purpose. The UCSF School of Dentistry session showed that attendees were likely to make changes to their practice based on the workshop. Further assessment—either by administering a posttest or through peer observation of teaching—of knowledge, skills, and behavior changes would more clearly demonstrate effectiveness.

A scholarly approach was taken in developing this resource, building off previous resources and incorporating evidence from the education literature. At the time of submission, no other resource providing an interactive and experiential training on this topic could be located. This workshop is designed for dental education, which has some distinctions from medical education in that student dentists provide direct care to patients during their predoctoral training. There are some frameworks for critical thinking in medical education, such as the One-Minute Preceptor and SNAPPS. The One-Minute Preceptor model is aimed at teaching medical students, whose primary role is to apply foundational knowledge to deducing a differential diagnosis. There are five distinct steps:

1. Get a commitment.
2. Probe for supporting evidence.
3. Teach general rules.
4. Reinforce what was right.
5. Correct mistakes.¹⁴

The SNAPPS model includes six steps and again is focused on differential diagnosis and learning:

1. Summarize briefly the history and findings.
2. Narrow the differential diagnosis to two or three relevant possibilities.
3. Analyze the differential by comparing and contrasting possibilities.
4. Probe the preceptor by asking questions about uncertainties, difficulties, or alternative approaches.
5. Plan management for the patient's medical issues.
6. Select a case-related issue for self-directed learning.¹⁵

These models have utility in teaching diagnosis, treatment planning, and triaging of dental emergencies. However, they are not as applicable to more in-depth clinical teaching, which involves the further steps of offering treatment options for diagnoses; discussing risks, benefits, and alternatives of treatment options; managing the patient; interacting with the faculty member; executing treatment; troubleshooting throughout the treatment; and reflecting on the outcome of the care provided. Because of this broad spectrum of skills that dental students are taught, a more general framework for promoting critical thinking is useful for dental educators. Some aspects of this workshop may be extrapolated or adapted to fit the needs of other health professions educators.

This workshop alone can change the hearts and minds of individual faculty members, but broader culture change will likely require additional steps. For example, if institutions truly value the promotion of critical thinking in their teaching, a question could be added to teaching evaluations whereby students would attest to an instructor's skill in this area. Peer observations may also allow faculty to self-assess, in addition to getting individualized feedback on what they are doing well and specific suggestions for improvement.

Sophia Saeed, DMD: Associate Clinical Professor, Department of Preventive and Restorative Dental Sciences, University of California, San Francisco School of Dentistry

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Prior Presentations

Presented at the 2014 American Dental Education Association Annual Session.

Ethical Approval

Reported as not applicable.

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