



Using Asynchronous, Limited-facilitation Case-based Exercises to Enhance Dental Student Learning

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ABSTRACT

Case-based learning strategies have been used in education for decades. Studies suggest case-based learning can promote a deeper understanding of material and better retention. However, traditional case-based learning has several disadvantages including increased faculty time requirements and student scheduling challenges. **Objectives:** The aim of this study is to assess if asynchronous, limited-facilitation cases are a potentially viable method to enhance dental students' perceived understanding of pediatric dentistry. **Methods:** 9 novel, distinct clinical cases were created to cover integrated topics including anatomy, physiology, pharmacology, cariology, diagnosis and treatment planning for the pediatric patient. Students enrolled in the pediatric dental clinic were required to take a survey consisting of Likert scale questions prior to completing each case and immediately after the case. The cases were completed during clinic rotations in pediatric dentistry, either alone or in small groups, in PowerPoint slideshow mode. Faculty provided guidance when questions arose. The baseline and immediate post-survey results were summarized and Wilcoxon rank sum tests were used to compare matching questions with a 5% significance level. **Results:** 120 third year dental students and 109 fourth year dental students participated in at least one case exercise. Baseline survey results showed that the average confidence of the students generally ranged between a 3.5 and a 4.0 on a 5 point scale, although the range of averages was between 2.3 and 4.3 depending on the subject of the question. The Wilcoxon rank sum tests showed that for 58 of the 62 questions there was a statistically significant increase from the baseline survey to the immediate post-exercise survey. 6-month post survey data results are pending. **Conclusion:** Asynchronous, non-facilitated cases may be beneficial as an adjunct to dental student perceived understanding of integrated dental concepts.

RESULTS

- 229 students participated in the baseline pre-survey (BPS), case exercises and immediate post-survey (IPS)
 - 120 D3s completed Cases 1-8
 - 109 D4s completed Case 10 (Data not shown)
 - 60 D4s completed the 6-month post-survey (6MPS)
- Baseline survey results showed average confidence of 3.5-4.0 on a 5 point scale
 - Range: 2.3-4.3
- 58 of 62 questions resulted in a statistically significant ↑ from BPS to IPS

DISCUSSION

- Students felt more confident immediately after completing the cases
 - This confidence does not seem to continue after 6 months, directly prior to graduation
- Cases offer a unique opportunity for content review directly prior to a patient encounter or challenging a national board exam
- Overall, students enjoyed the case exercises and thought there were appropriately difficult
- More work is needed to ensure long term retention of knowledge
 - Continued reinforcement of concepts presented in the case may increase the success

BACKGROUND

- Case-based learning (CBL) promotes deeper learning
 - Prepares students for clinical practice through guided, controlled cases¹⁻⁶
 - **Knowledge benefits:** better recall, improved application and more effective synthesis and application to new situations
 - Transforms novice thinking patterns to expert level thinking patterns⁷
 - Lower risk than in live patient encounters
 - Fosters higher order thinking skills (i.e. analysis, synthesis, evaluation)
 - **Disadvantages:** High faculty time requirement, finding time and space that students and faculty are available
- Asynchronous case-based learning (A-CBL)⁸⁻¹⁰
 - Groups participating in CBL are not all present at the same time
 - Learners and facilitators participate using online forums or message boards
 - Still requires faculty time
- **Project Aims:** Create A-CBL cases with facilitation built into the cases
 - Gain the benefits of CBL without greatly increased faculty time requirements

STUDENT FEEDBACK

- Positive
 - “This case was honestly very useful for me. It was not complex but I learned a lot including indications for anterior occlusal radiographs, identifying occlusion, and a good refresher that a general age.”
 - “This case was pretty easy and basic, but not a waste of time. I gained more confidence after reviewing this case.”
 - “The case is a good way to hit home major clinical points we discussed in lecture second year. It is a useful way to hit the high points we need in clinic.”
 - “These modules are great because they review things that we probably do know, but perhaps don't feel confident in our answers prior to reviewing these.”
 - “Not having a crazy medical history helped isolate the learning to just a few points to focus on which I appreciate.”
 - “Overall I think these cases were helpful and very informative.”
- Feedback/Suggestions
 - “It was nice that a doctor went over this case with us. It allowed me to see what the doctor's thought process.”
 - “This was a really useful case, but a bit too long.”
 - “Too long, and too hard.”
 - “This case was really long and I was distracted by switching 'topics'.”

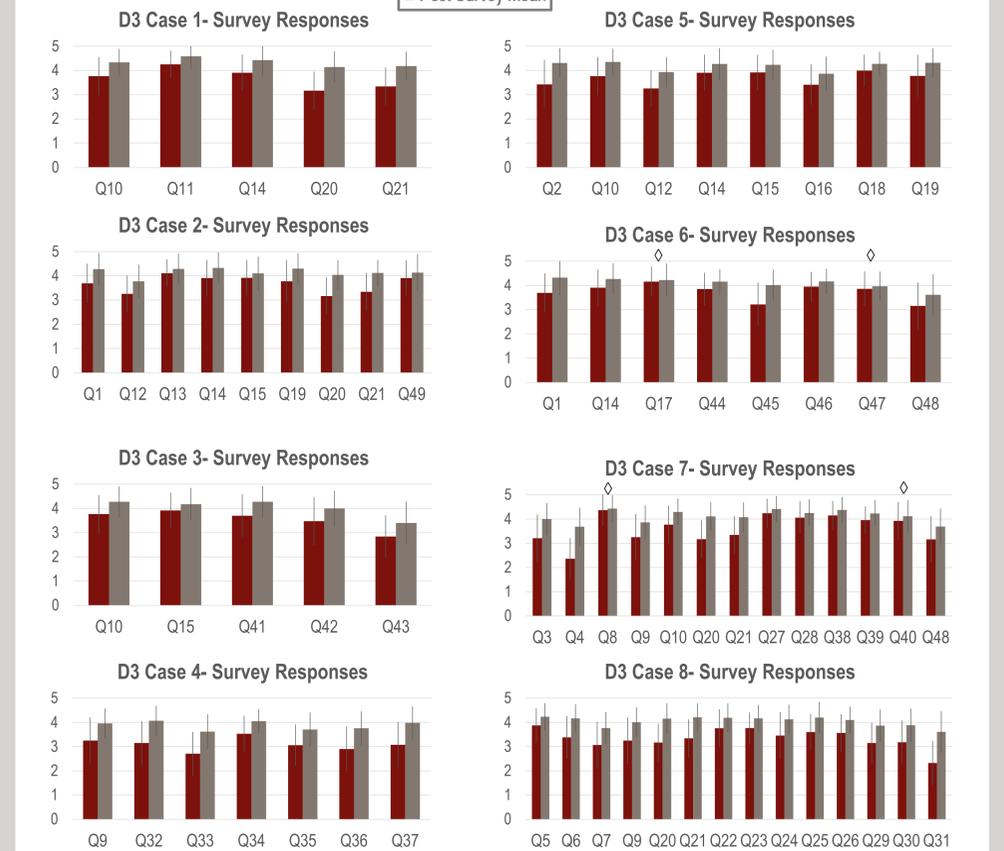
MATERIALS and METHODS

- Cases constructed in Microsoft PowerPoint 2010
 - Data gathered from patient cases seen in resident and predoctoral clinics
- Each case includes
 - Relevant medical, dental and social history
 - Radiographs, photographs as available, extraoral and intraoral descriptions
 - Questions relevant to the learning objectives for each case
 - Physiology, pharmacology, anatomy, cariology, radiology, diagnosing, treatment planning, anticipatory guidance and when to refer
 - **Animations within PowerPoint allow the students to think about and discuss answers to the questions prior to being shown the correct answer**
- Assessment
 - Pilot data- quantitative and qualitative assessments
 - Pre-survey data and post-survey data (Likert Scale and free response)
 - Measured students' perceived readiness for practicing dentistry for children



- Requests
 - “It would be nice to see the treatment guidelines on the other types of injury the patient may have received.”
 - “This case was again helpful in learning space maintainers. I still need more practice with treatment planning for them.”
 - “Would like a more comprehensive list of when to use which space maintainer.”
 - “I need a guide to how to read a panoramic radiograph to avoid missing anything.”

TABLES AND FIGURES



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