

Learning Cariology in a New Dental Curriculum: Long-lasting Student Learning of Critical Thinking and Problem Solving Skills in the Context of Patient Care

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ABSTRACT

- An emphasis on critical thinking is included in the new accreditation standards for dental education to prepare graduates to be life-long learners.
- Aim: Determine if assessment methods focused on measuring critical thinking and problem-solving in the beginning of the dental curriculum correlate with student performance in subsequent clinical years.
- Assessments that incorporated critical thinking were gathered from courses throughout the four years to be analyzed.
- Results: By the end of the D4 year, 76% of students who performed in the bottom quartile in the beginning of the D1 year improved their analytical reasoning skills.

BACKGROUND

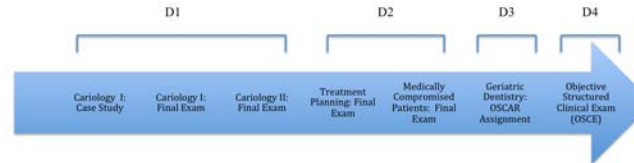
- Critical thinking is defined as intellectually engaged, skillful, and responsible thinking that facilitates good judgment because it requires the application of assumptions, knowledge, competence, and the ability to challenge one's own thinking.¹
- The traditional didactic and skill teaching activities in dental education must be framed within the pedagogy of reflective practice.²
- There is a necessity for more studies that analyze critical thinking assessments longitudinally.³

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METHODS

Critical Thinking Criteria: 1) analyze and evaluate information, 2) apply assumptions, knowledge, and competence, 3) pursue the best possible option for a situation, 4) the ability to give reason for decisions

Analysis: Ranked class into three groups (approximately the top 25%, middle 50%, bottom 25%) based on the D1 Cariology II Final Exam and the D4 OSCE. Analyzed the number and % of students who moved up, stayed the same, or dropped groups.



Year:	D1	D1	D1	D2	D2	D3	D4
Format: Multiple Choice (MC)		✓	✓		✓		✓
MC questions involve high cognitive level questions		✓	✓		✓		✓
Format: Written	✓			✓		✓	✓
Includes development of a Treatment Plan:	✓			✓		✓	
Comments:	First full case for students					oral factors (O), systemic factors (S), capability (C), autonomy (A), reality (R)	Exam prior to graduation

RESULTS

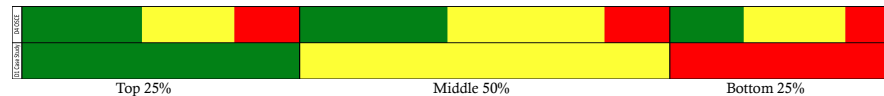


Figure 1. Students in the top 25% (green), middle 50% (yellow) and bottom 25% (red) in the D1 Case Study and the D4 OSCE.

- 75% of students rose to a higher quartile or stayed the same between the D1 Case Study and D4 OSCE.
- 25% of student dropped to a lower quartile between the D1 Case Study and D4 OSCE.

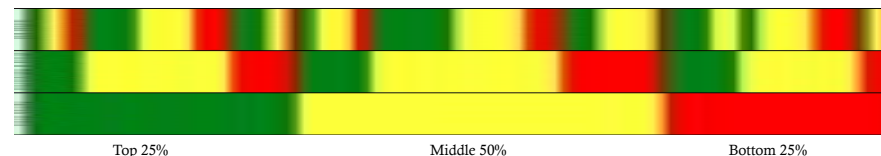


Figure 2. Students in the top 25% (green), middle 50% (yellow), and bottom 25% (red) in the D1 Case Study, Cariology II Final Exam, and the D4 OSCE.

- 27% of students had difficulties with critical thinking based on the Cariology I Case Study
- 84% improved by the end of Cariology (32% moved to the top, 52% moved to the middle)
- 76% showed lasting improvements (32% performed in the top and 44% reached the middle 50% by the D4 year)



Figure 3. Group of students working in Cariology II Course.

IMPLICATIONS

- Although the improvement described cannot be solely attributed to the two term Cariology course, there are measurable gains in students' critical thinking skills from these courses.
- Implementation of critical thinking courses that require higher level MC questions or short answers can foster the capacity to critically thinking in dental students.

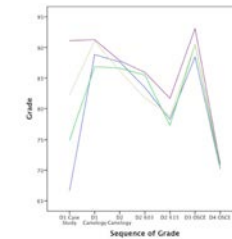


Figure 5. Relationship of four quartiles of students' (based on D1 Case Study grade) performance on the critical thinking assessments through 4 years.

- The class was evenly split into 4 quartiles based on the Cariology I Case Study.
- There was an overall improvement in all quartiles. By the end, students tended to have similar results.
- Top quartile remained at the top throughout the curriculum.

FUTURE DIRECTIONS

- Repeat process in another cohort to determine if trends are similar.
- Challenges: Finding consistent measures of critical thinking to compare.
- Create a plan of assessments in didactic and clinical settings that consistently and methodically measure critical thinking.

REFERENCES

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