

Blueprint for Problem-based Learning Implementation and Outcome

Today's Speaker

Chaitanya Puranik (CP), *B.D.S., M.S., M.Dent.Sci, Ph.D.*

Diplomate of American Board of Pediatric Dentistry

Director of Predoctoral Education, Department of Pediatric Dentistry

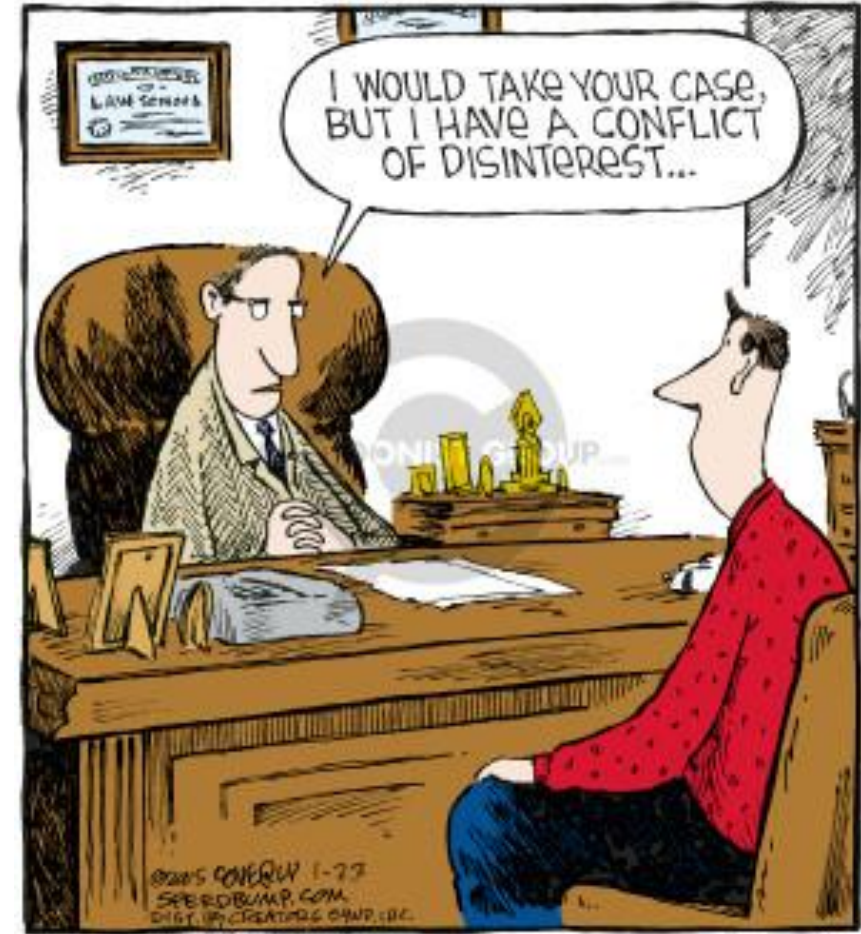
School of Dental Medicine and Children's Hospital Colorado

University of Colorado Anschutz Medical Campus



Disclosure

The presenter declare
NO conflicts of interest

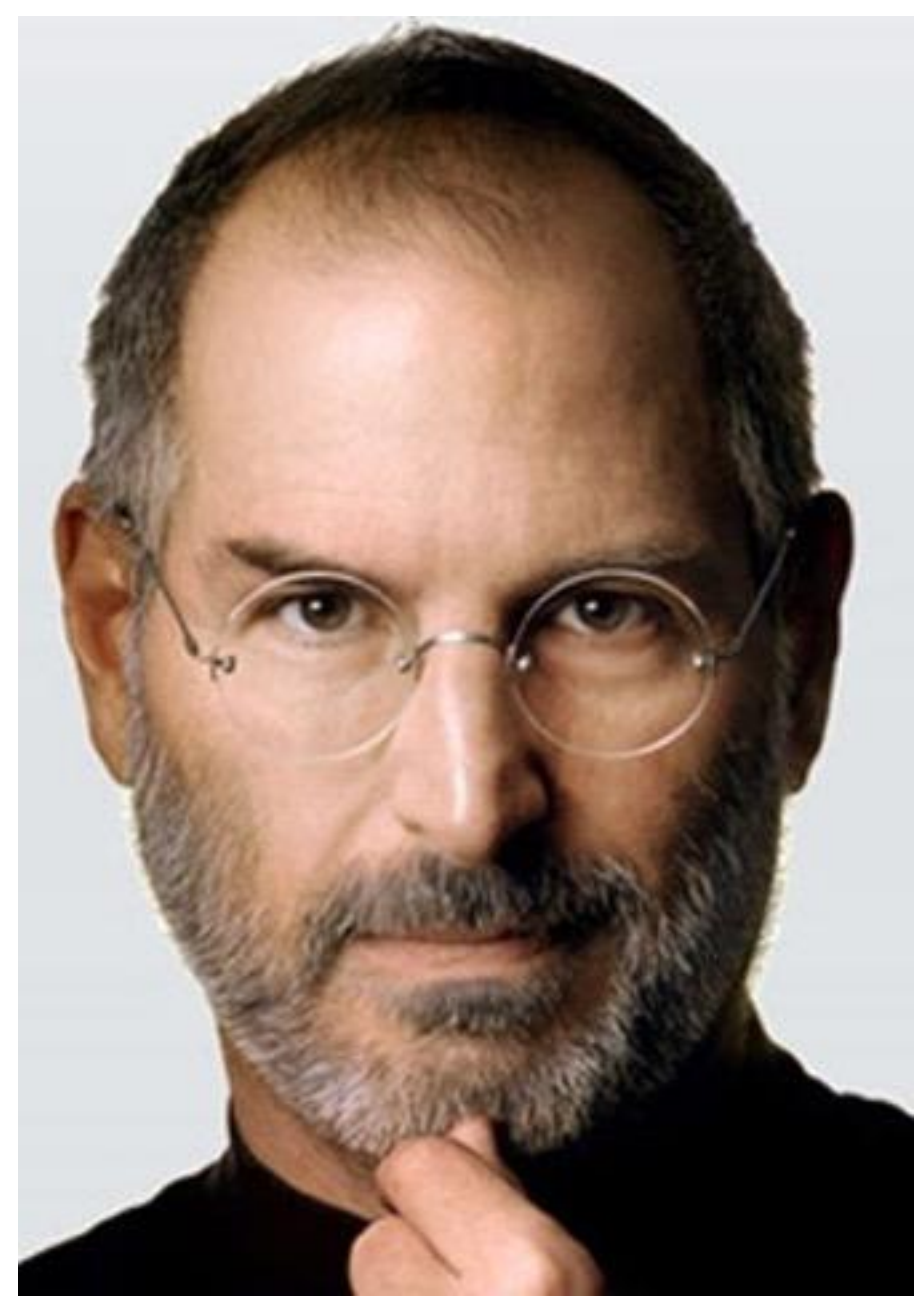


Objectives

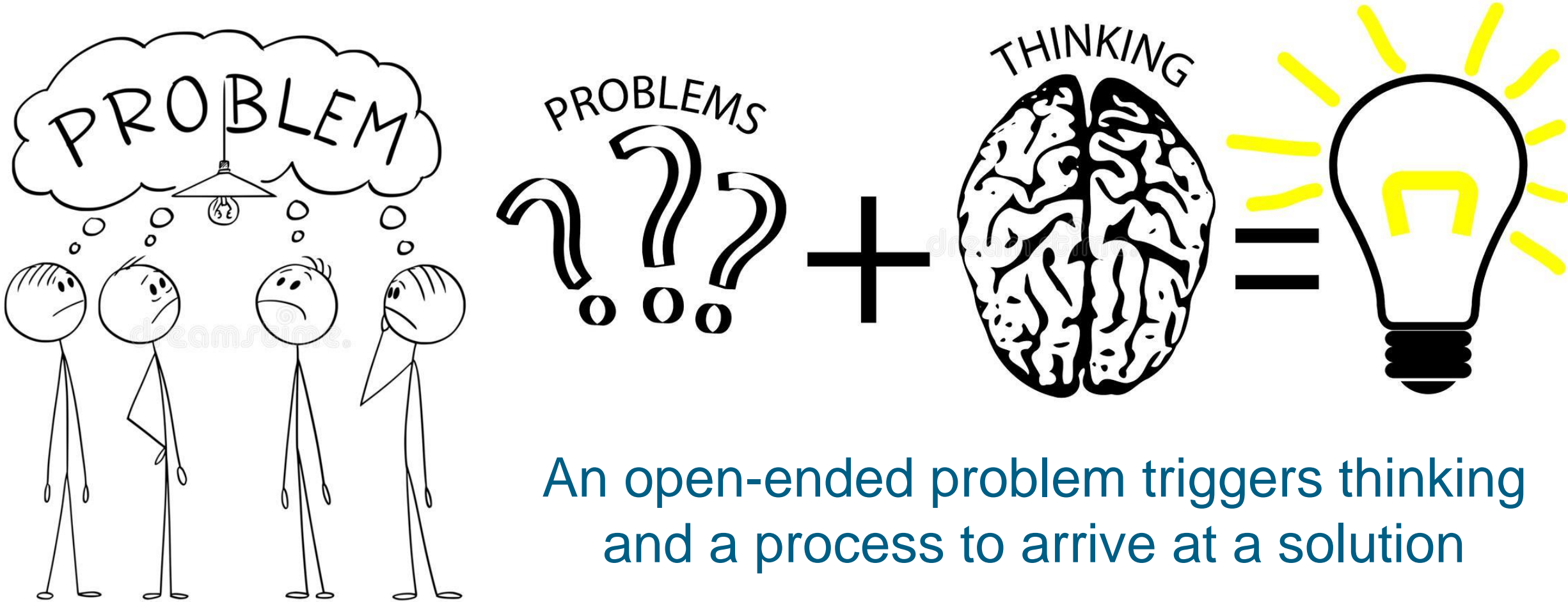
- Discuss detailed planning and implementation of PBL in a predoctoral dental program.
- Analyze a video example of a PBL student assessment from a predoctoral dental program.
- Discuss the outcomes of PBL implementation in a predoctoral dental program.

“If you can define the problem correctly you can almost have the solution.”

-Steve Jobs



What is a problem-based learning (PBL)?



An open-ended problem triggers thinking
and a process to arrive at a solution

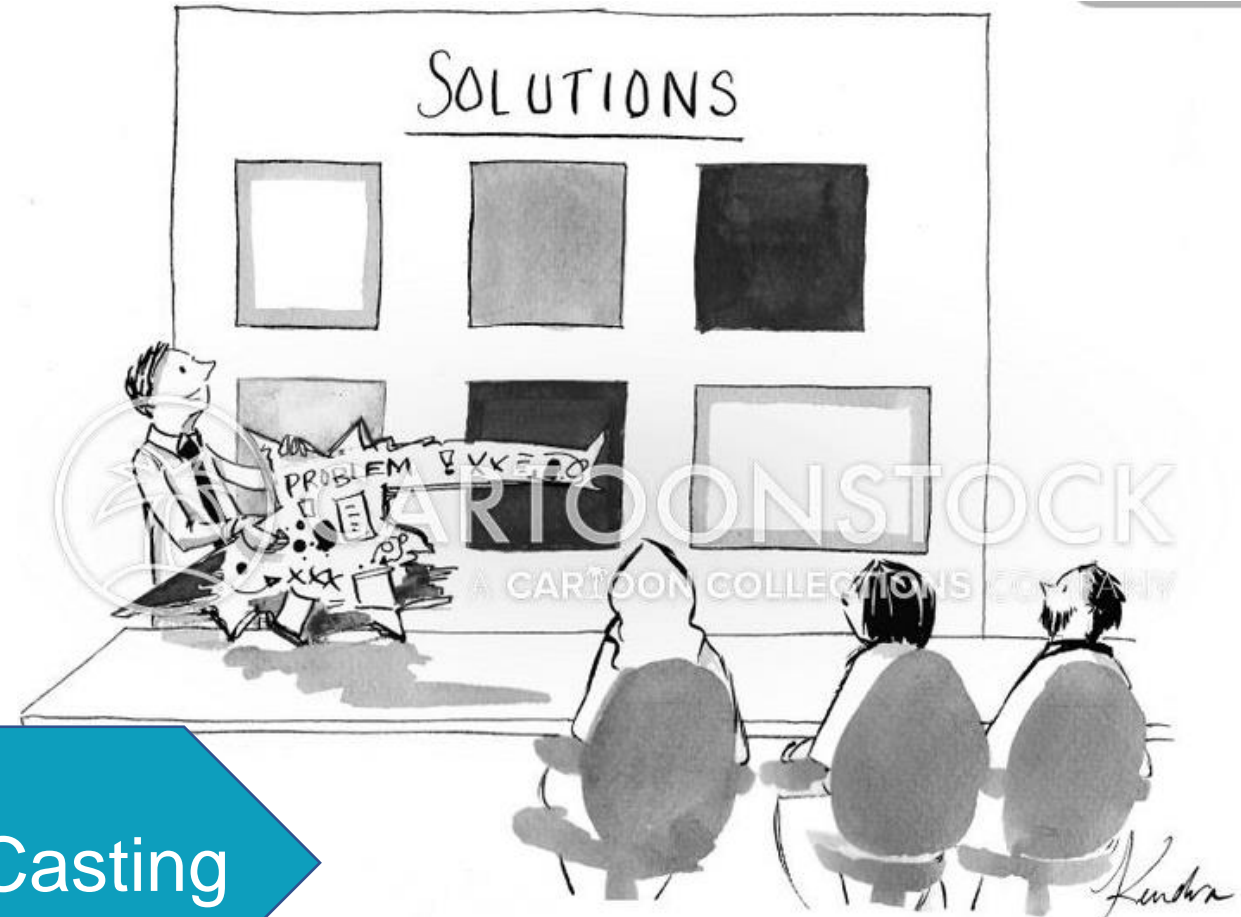
Traditional dental education model

An overview of traditional education (the 3C model)

Communication

Cerebration

Casting



How can we make out problem to fit to one of the solutions?

Improved dental education model

Newer models for student-centered and autonomy-based approaches (the 4C model)



"I want you to think 7.048239 inches outside of the box."

Communication

Cerebration

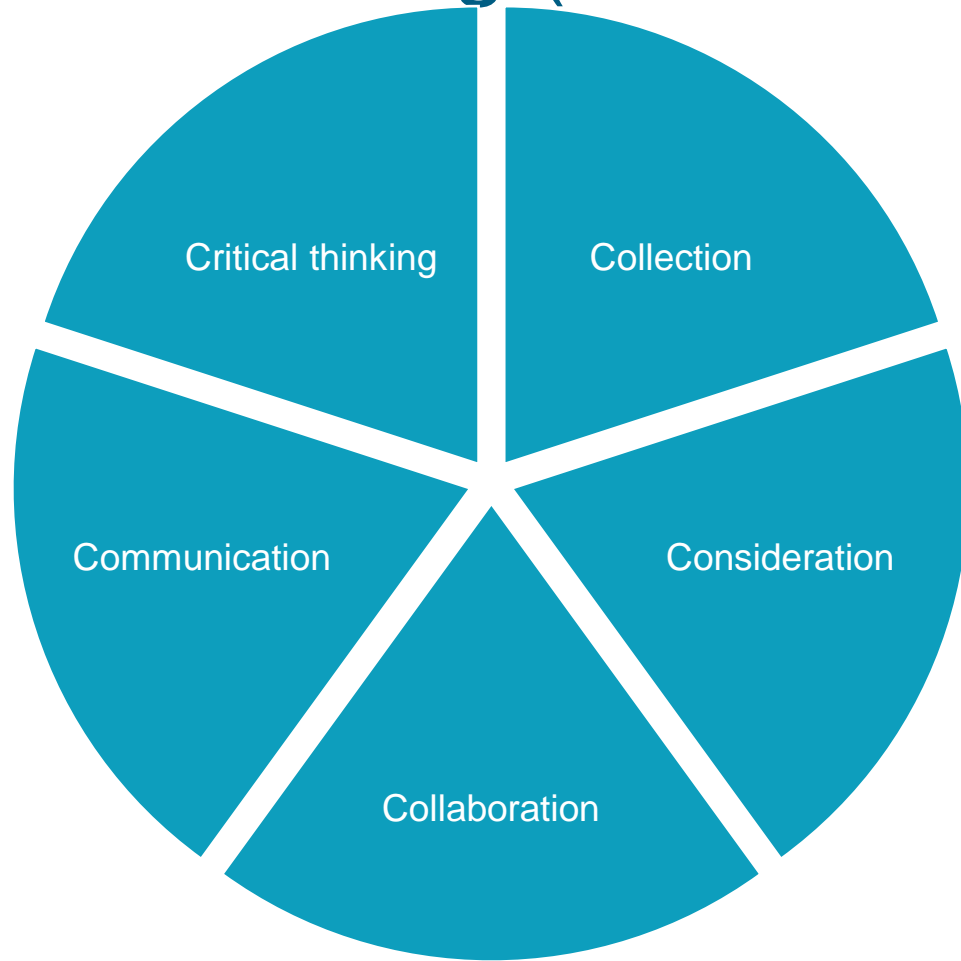
Creativity

Casting

Image: www.glasbergen.com

PBL in dental education

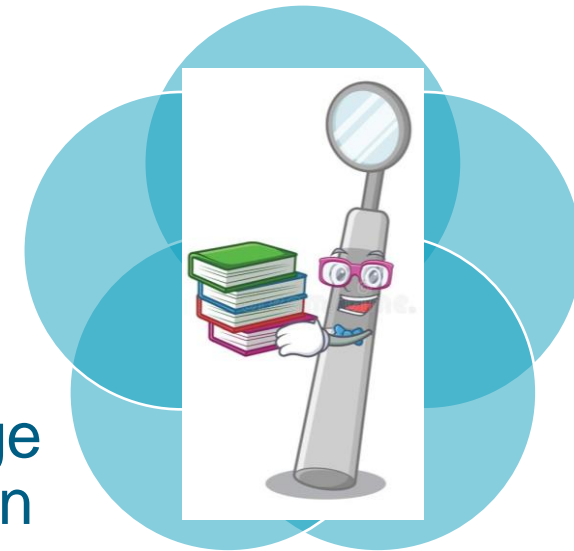
PBL learning (the 5C model)



Realistic
problem

Knowledge
integration
and
application

Student-
centered

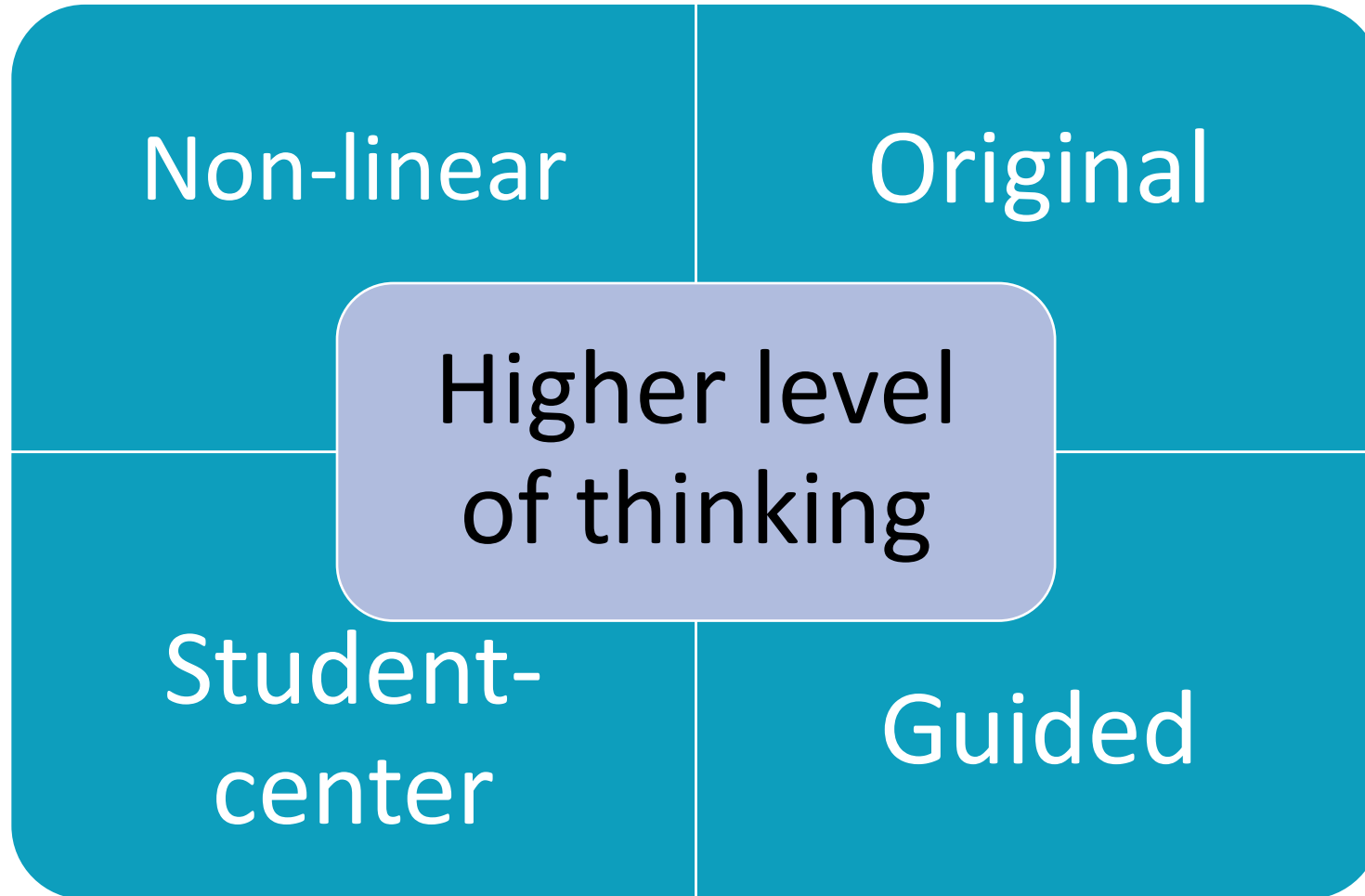


Active
learning

Critical
thinking

Images: www.dreamstime.com

What are the advantages of PBL?



PBL experience: A Blueprint



School of Dental Medicine
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

DENTAL. INTEGRATED FOR HEALTH.



A. BACALL

"Experience has taught me all I know, and many things I never wanted to know."



"Why do you need my advice, my son?
You're on top of the world!"

PBL in Predoctoral Pediatric Dentistry

2019-2020

Frist class to take INBDE 2023

JCNDE

JOINT COMMISSION
ON NATIONAL
DENTAL EXAMINATIONS



Integrated National Board
Dental Examination (INBDE)

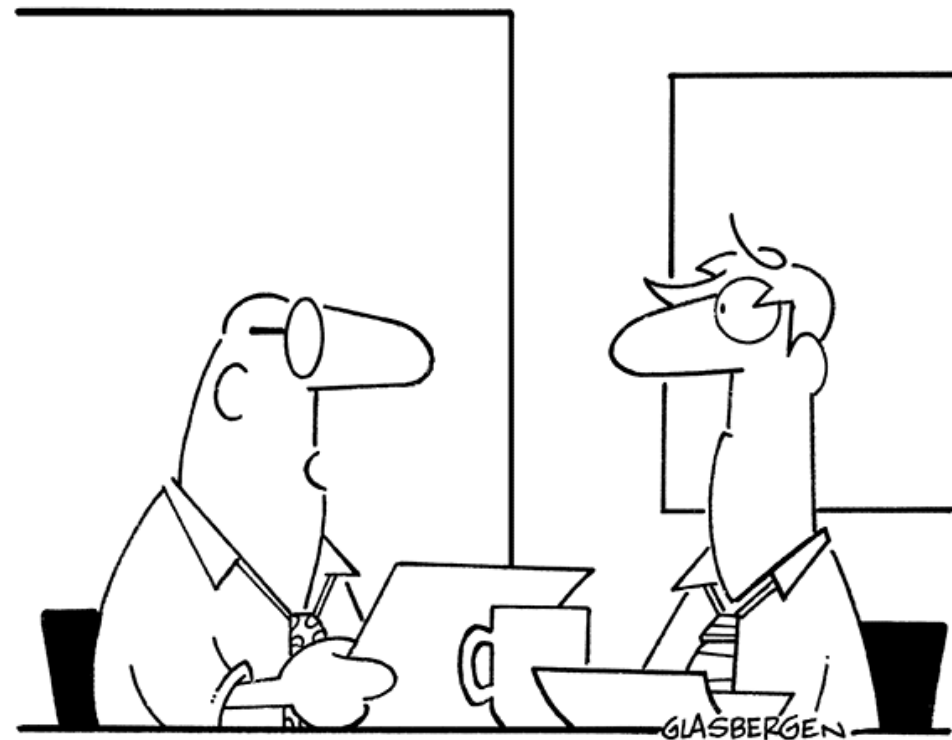
Student's ability to...

- Perform a comprehensive evaluation
- Recognize normal and abnormal growth and pathologic conditions
- Determine caries risk status and develop a treatment plan
- Communicate treatment plan and anticipatory guidance effectively
- Guide and manage anxiety and pain
- Understand management traumatic injuries of various dentition
- Recognize malocclusion and the need for space management
- Recognize need for consultation or referral

PBL format

- PBL integrated in traditional curriculum
- Pediatric component:
 - Didactic: PD1
 - Preclinical: PD2
 - Clinical: PD3 (PBL integration)**
- Implementation: 2019-2020 cohort
- Compare with 2018-2019 cohort

© Randy Glasbergen / glasbergen.com



**"We need to make some big changes around here.
The kind of changes where many decisions are
made but nothing actually happens."**

Scope of PBL application

- Pediatric cases (*Avatars*) from age 1 day-18 years
- Focus was general dental practice
- Three main topic for case development
 - **Odontogenic pain or infection**
 - **Pediatric pathology**
 - **Traumatic dental injuries**
 - Orthodontic cases (not included)
 - 6-8 cases on each main topic

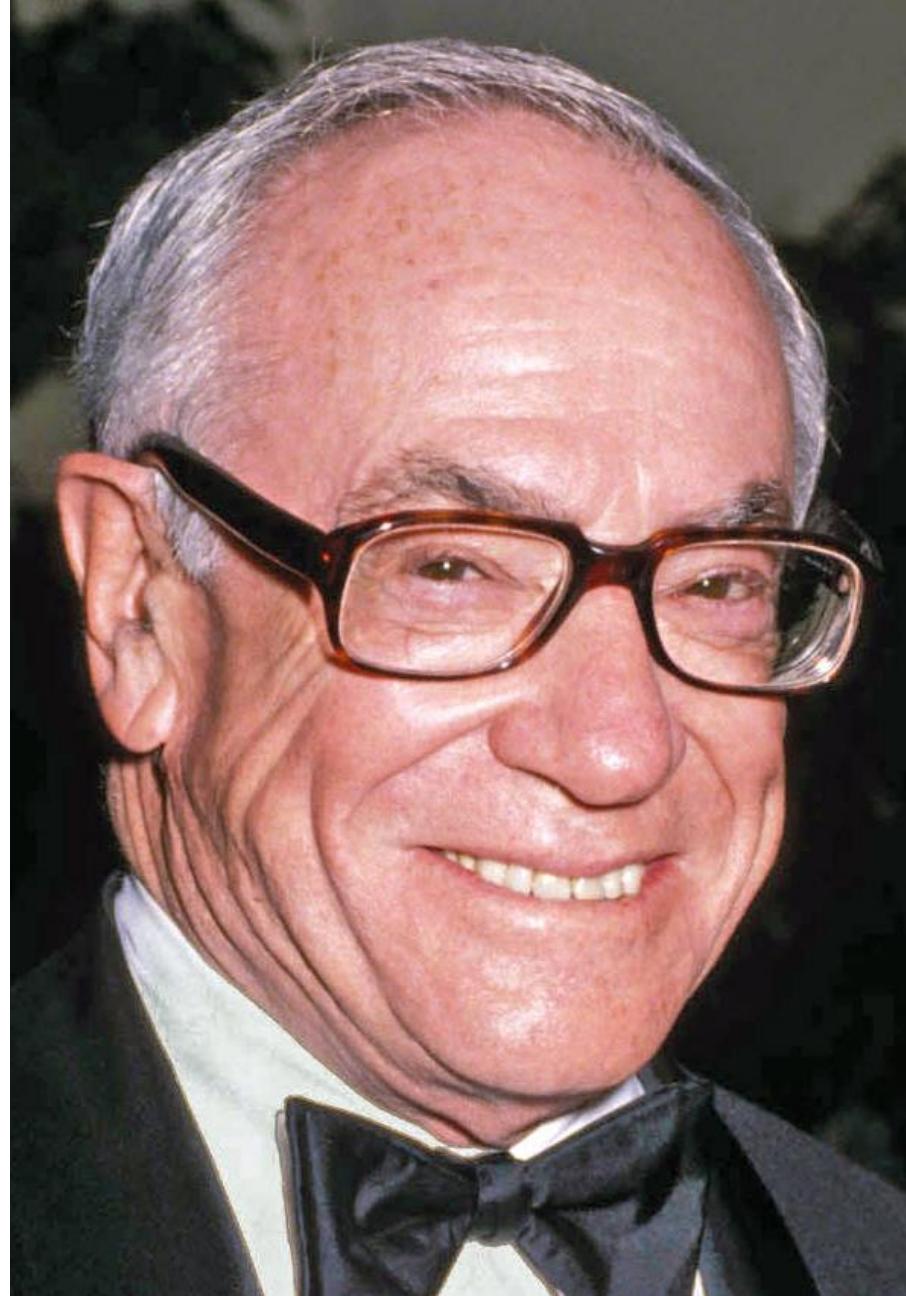
Faculty moderator
6-8 students in a group



shutterstock.com • 1747650053

What was included with a case?

- Clinical information (HIPAA compliant)
- Deidentified extra- or intra-oral photographs
- Deidentified intra-oral, extra-oral, and soft tissue radiographs
- Biopsy results
- CBC with differential
- INR, PT PTT values
- Cardiac or other medical notes
- Medical consults

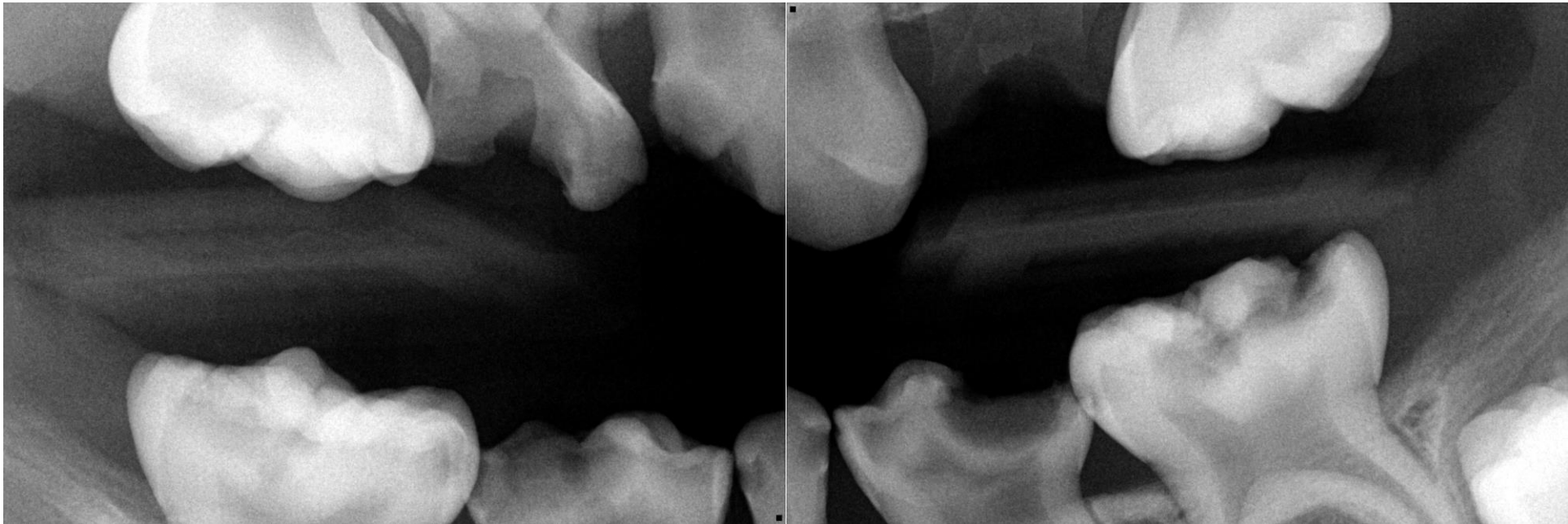


***“It is so much easier
to suggest solutions
when you don’t know
too much about the
problem.”***

-Malcolm Forbes

Sample Case

- 3-year-old male patient reported to your general dental clinic for NPE



What do the students learn during PBL sessions?

Methodical approach

Comprehensive planning

Evidence-base knowledge

Higher cognition

Communication

Wholistic view of care



First PBL publication in Pediatric Dentistry

Wiley Online Library

Search

AMERICAN DENTAL EDUCATION ASSOCIATION

JOURNAL *of* DENTAL EDUCATION

ORIGINAL ARTICLE

Perception and outcomes after implementation of problem-based learning in predoctoral pediatric dentistry clinical education

Chaitanya P. Puranik BDS, MS, MDentSci, PhD ✉, Kaci Pickett MS, Japneet Randhawa BDS, Tracy de Peralta DMD, PhD, MCLinEd

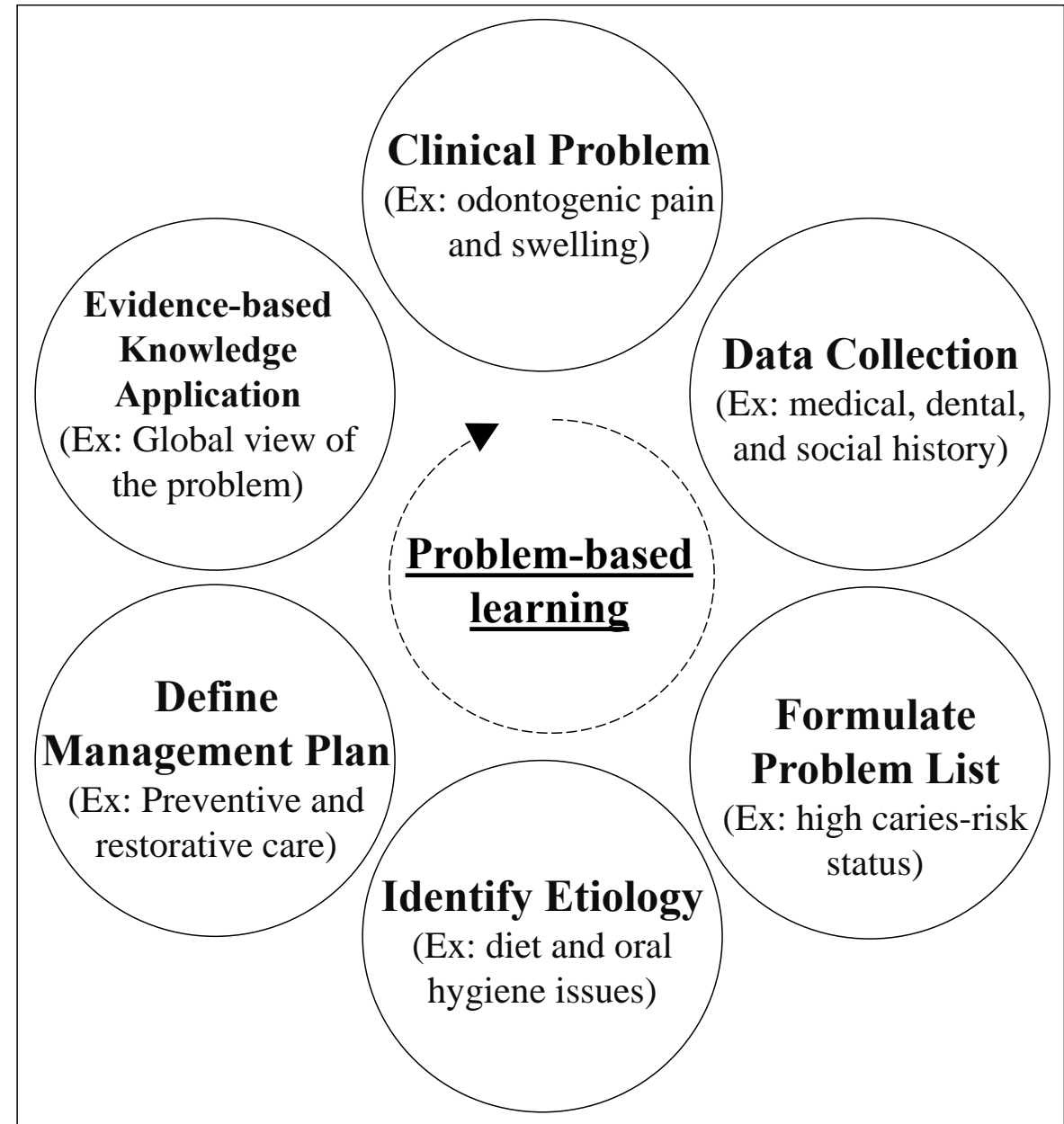
First published: 01 October 2021 | <https://doi.org/10.1002/jdd.12796>



PBL Blueprint



Won't get any info unless you ask for!



Grading rubrics

- Data collection and Med. consults
 - Radiographic reco. and diagnosis
 - Formulation of problem list
 - Tx, behavior management, and referral
 - Prescription or lab script writing
-
- 0 point: critical error
 - 1 point: student possesses basic knowledge
 - 2 points: student's knowledge clinically acceptable
 - 3 points: outstanding diagnostic and planning skills



"I love my teacher. She doesn't give numerical or letter grades. She gives emoticons."

Critical errors

- Direct actual or potential harm to the virtual patient
- Overdosing of medications
- Not collecting information on allergies
- Not addressing systemic signs of odontogenic infection
- Not knowing pediatric tooth numbers
- Recommending excessive number of radiographs (ALADA)
- Not recommending advanced behavior management
- Not evaluating oral airway before recommending sedation

Triple Jump Assessment

In addition to MCQ and OSCE



DEFINITION OF
PROBLEM



SEEKING
INFORMATION

SEEKING INFORMATION



SYNTHESIS AND
FORMULATION

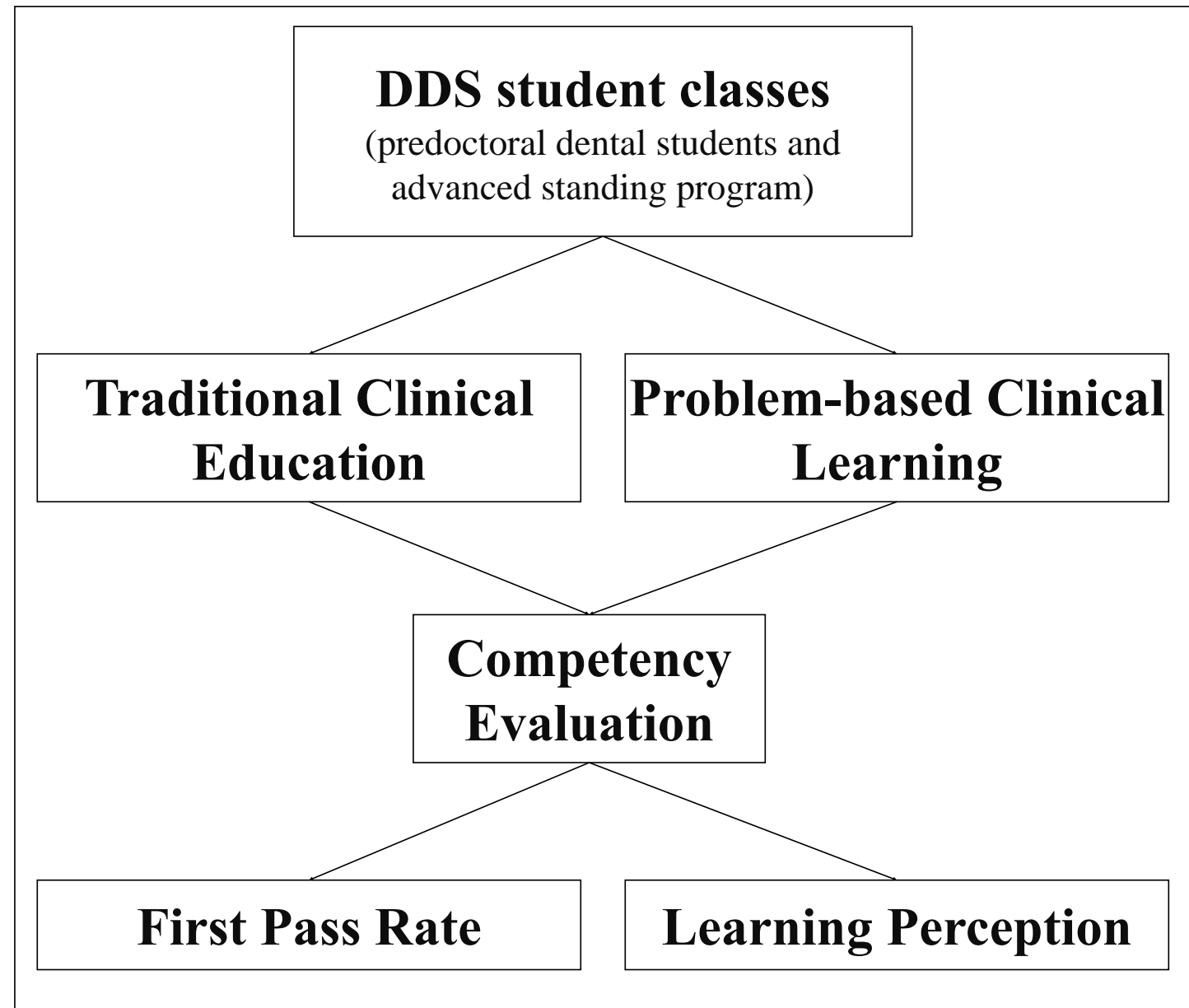
Triple Jump Assessment Recording

The screenshot displays a Microsoft PowerPoint application window titled "Exam Case 1". The ribbon at the top includes tabs for Home, Insert, Draw, Design, Transitions, Animations, Slide Show, Review, View, and Tell me. The "Home" tab is active, showing options for Paste, New Slide, Layout, Reset, and Section. The main slide area features a background image of a pair of black-rimmed glasses resting on a stack of papers. The text "OSCE EXAM" is centered at the top of the slide in a large, white, sans-serif font. A yellow rectangular banner is positioned at the bottom of the slide, containing the text "FERPA and HIPAA compliant" in a blue, sans-serif font. On the right side of the presentation, there are two video feeds. The top feed shows a man in a blue shirt, and the bottom feed shows a man in a dark sweater. The bottom of the window shows a video player interface with a play button, a progress bar at 0:00 / 19:05, and a settings gear icon.

Study overview (retrospective)

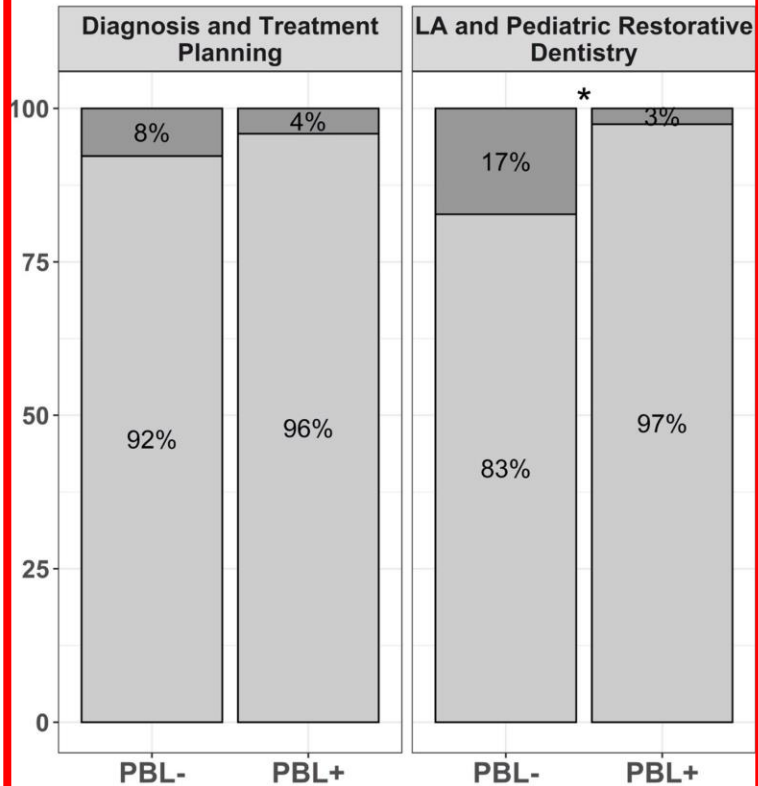


(n=120)

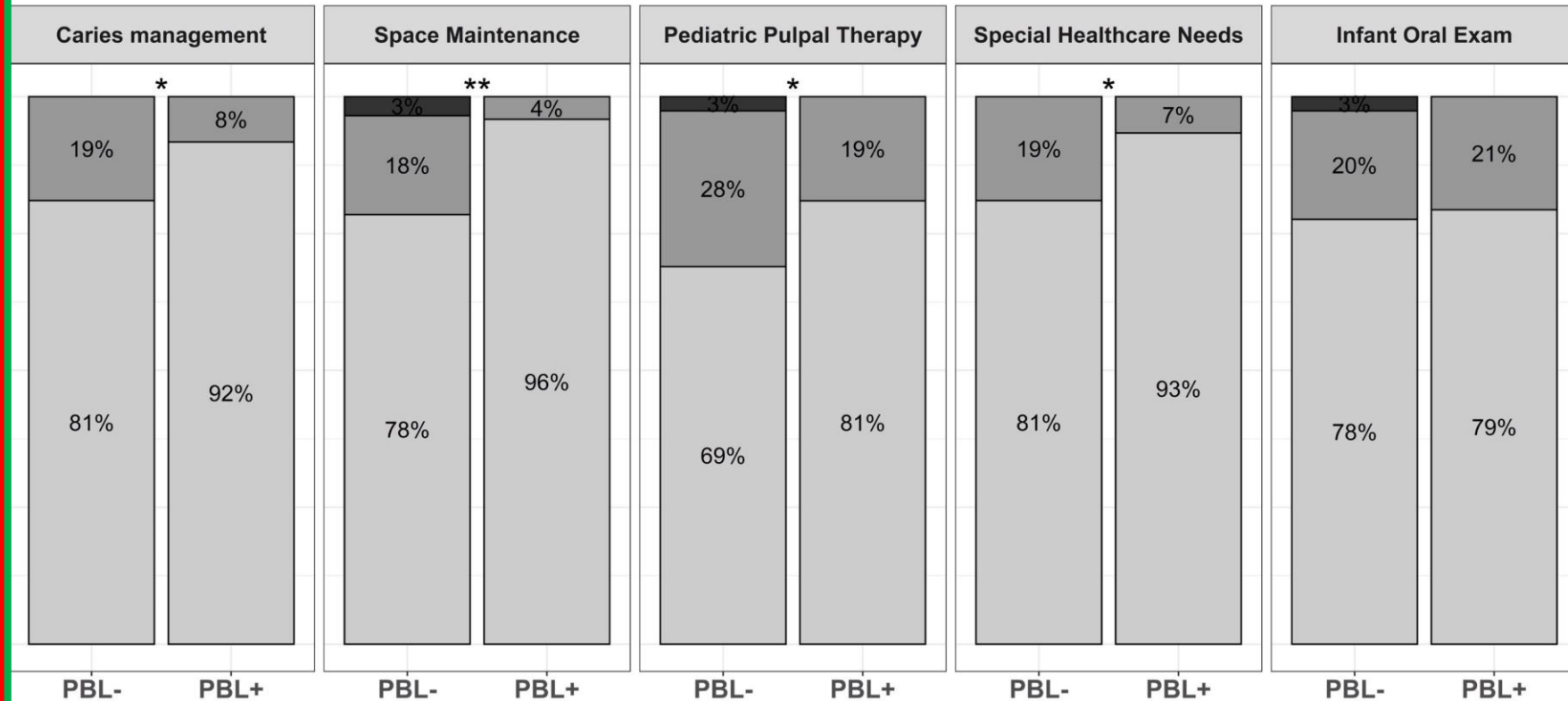


First pass rate

Patient-based

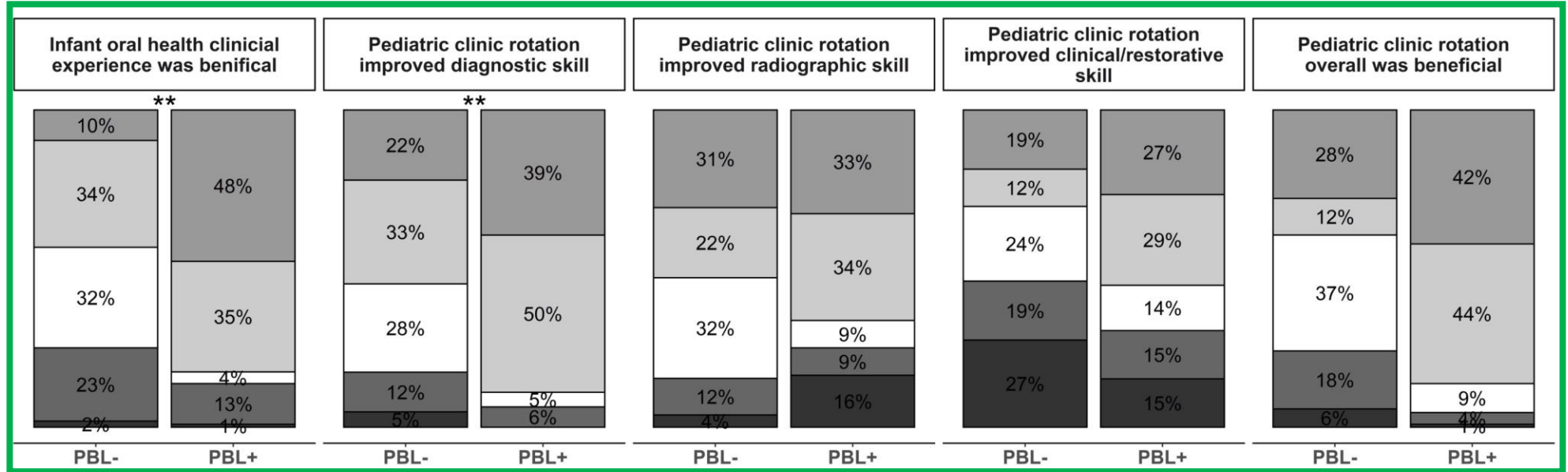
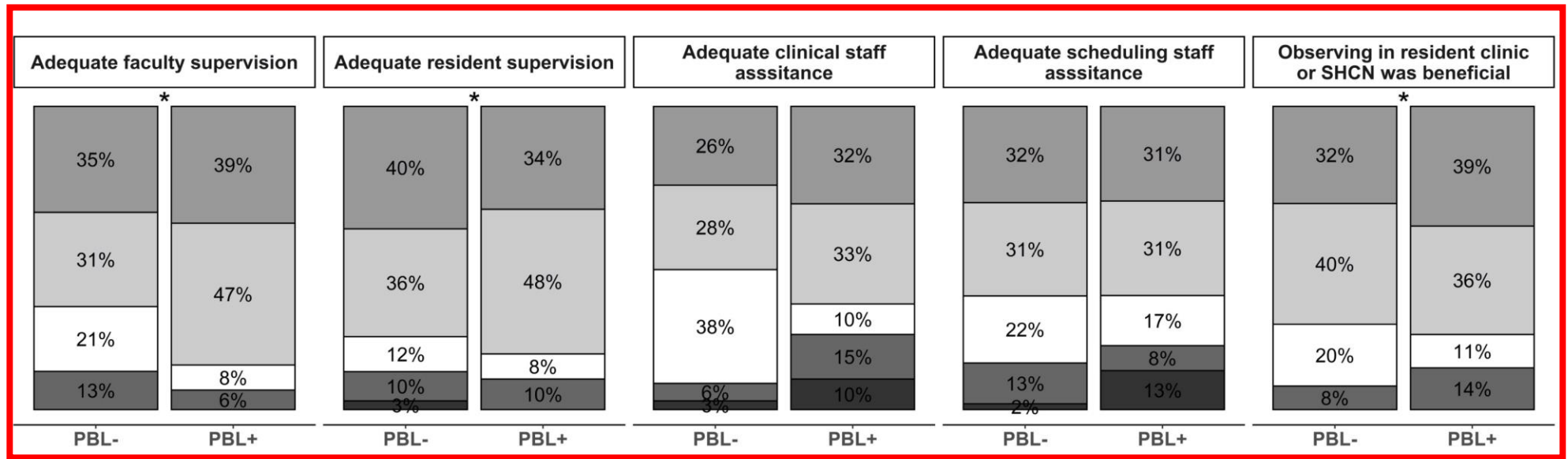


Case-based



Attempts ■ 3 ■ 2 ■ 1

Survey



Response Strongly Agree Agree Neutral Disagree Strongly Disagree

Caveats of PBL

- Clinical hand skills (needs more investigation)
- Long-term impact on education is undetermined
- Small group discussion framework may not be viable

Caveats of PBL-study

- Faculty perceived effectiveness was not evaluated
- Impact on NBDE scores not evaluated
- Impact on performance in other courses not evaluated

References

1. MD HSB, BScN RMT. *Problem-Based Learning: An Approach to Medical Education*. Springer Publishing Company; 1980.
2. Bassir SH, Sadr-Eshkevari P, Amirikhorheh S, Karimbux NY. Problem-based learning in dental education: a systematic review of the literature. *J Dent Educ*. 2014;78(1):98-109.
3. Nadershahi NA, Bender DJ, Beck L, Lyon C, Blaseio A. An overview of case-based and problem-based learning methodologies for dental education. *J Dent Educ*. 2013;77(10):1300-1305.
4. Azer SA, Azer D. Group interaction in problem-based learning tutorials: a systematic review. *Eur J Dent Educ*. 2015;19(4):194-208.
5. Alrahlah A. How effective the problem-based learning (PBL) in dental education. A critical review. *Saudi Dent J*. 2016;28(4):155-161.
6. Amin M, Zulla R, Gaudet-Amigo G, Patterson S, Murphy N, Ross S. Dental Students' Perceptions of Learning Value in PBL Groups with Medical and Dental Students Together versus Dental Students Alone. *J Dent Educ*. 2017;81(1):65-74.
7. Winning T, Townsend G. Problem-based learning in dental education: what's the evidence for and against...and is it worth the effort? *Aust Dent J*. 2007;52(1):2-9.
8. Thammasitboon K, Sukotjo C, Howell H, Karimbux N. Problem-based learning at the Harvard School of Dental Medicine: self-assessment of performance in postdoctoral training. *J Dent Educ*. 2007;71(8):1080-1089.
9. Slaven CM, Wells MH, DeSchepper EJ, Dormois L, Vinall CV, Douglas K. Effectiveness of and Dental Student Satisfaction with Three Teaching Methods for Behavior Guidance Techniques in Pediatric Dentistry. *J Dent Educ*. 2019;83(8):966-972.
10. Costa PM de C, Castro GFB de A. Aprendizagem Baseada em Problemas como ferramenta para o ensino da Odontopediatria em nível de especialização. *Rev ABENO*. 2018;18(4):169-175.
11. Harden RM, Stevenson M, Downie WW, Wilson GM. Assessment of clinical competence using objective structured examination. *Br Med J*. 1975;1(5955):447-451.
12. Donner RS, Bickley H. Problem-based learning: An assessment of its feasibility and cost. *Human Pathology*. 1990;21(9):881-885.
13. Fincham AG, Baehner R, Chai Y, et al. Problem-based learning at the University of Southern California School of Dentistry. *J Dent Educ*. 1997;61(5):417-425.

References

14. Rohlin M, Klinge B. The “Malmö-model”. A new approach to the undergraduate dental education at Lund University, Sweden. *EDS Mag.* 1991;3(3):7-13.
15. Lundegren N, Jönsson A, Lindberg P. An upgrade of the Malmö model by implementing case-based teaching and learning, in an undergraduate dental education. *Eur J Dent Educ.* Published online December 12, 2020.
16. Chowaniec JA, Doubleday AF, LeHew CW, Salzmänn LB, Koerber A. Timing of Case-Based Discussions and Educational Outcomes for Dental Students. *J Dent Educ.* 2018;82(5):510-514.
17. Suksudaj N, Townsend GC, Kaidonis J, Lekkas D, Winning TA. Acquiring psychomotor skills in operative dentistry: do innate ability and motivation matter? *European Journal of Dental Education.* 2012;16(1):e187-e194.
18. Nendaz MR, Tekian A. Assessment in Problem-Based Learning Medical Schools: A Literature Review. *Teaching and Learning in Medicine.* 1999;11(4):232-243.
19. Zheng JW, Zhang SY, Yang C, Zhang ZY, Shen GF. Creating an effective PBL case in oral and maxillofacial surgery at a Chinese dental school: a dental education primer. *J Dent Educ.* 2011;75(11):1496-1501.
20. Samuelson DB, Divaris K, De Kok IJ. Benefits of Case-Based versus Traditional Lecture-Based Instruction in a Preclinical Removable Prosthodontics Course. *J Dent Educ.* 2017;81(4):387-394.
21. Sukotjo C, Thammasitboon K, Howell H, Karimbux N. Students’ perceptions of prosthodontics in a PBL hybrid curriculum. *J Prosthodont.* 2008;17(6):495-501.
22. Yiu CKY, McGrath C, Bridges S, et al. Self-perceived preparedness for dental practice amongst graduates of The University of Hong Kong’s integrated PBL dental curriculum. *Eur J Dent Educ.* 2012;16(1):e96-e105.
23. Rich SK, Keim RG, Shuler CF. Problem-based learning versus a traditional educational methodology: a comparison of preclinical and clinical periodontics performance. *J Dent Educ.* 2005;69(6):649-662.
24. Hoskin ER, Johnsen DC, Saksena Y, et al. Dental Educators’ Perceptions of Educational Learning Domains. *J Dent Educ.* 2019;83(1):79-87.
25. Shuler CF, Fincham AG. Comparative achievement on National Dental Board Examination Part I between dental students in problem-based learning and traditional educational tracks. *J Dent Educ.* 1998;62(9):666-670.
26. Lantz MS, Chaves JF. Implementing a new predoctoral curriculum with a PBL component at Indiana University School of Dentistry. *J Dent Educ.* 1998;62(9):675-679.

Questions

chaitanya.puranik@childrenscolorado.org

Statistical analysis support:

Center for Research Outcomes in Children's Surgery (ROCS),
Children's Hospital Colorado, Aurora, CO.



Thank You!

- ✓ Please complete the post-event survey
- ✓ Recording available within a few business days at adea.org/eLearn
- ✓ Stay tuned for ADEA Micro-credentialing (March 2022)!