



ADVANCING EDUCATION
AND ORAL HEALTH

SEE. THINK. LEARN.



ADEE ANNUAL MEETING
BUDAPEST
HUNGARY 2026

Oral Radiology Education

Through Technology-Enhanced Learning

AUGUST | 2026

ADEMA

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Today's Journey



Universitat
de les Illes Balears



1 Why?

Why do undergraduate students struggle with oral radiology?

3 What did we learn?

Learning analytics and educational outcomes

2 How?

Technology-enhanced learning using an interactive educational platform

4 What's next?

Future directions in oral radiology education



Why?

- Oral radiology is fundamental to dental education.
- Students often struggle with anatomical recognition, radiographic orientation, and patient laterality.
- Traditional teaching offers limited opportunities for repeated practice and immediate feedback.
- Technology-Enhanced Learning provides new opportunities for active and personalized learning.

From image recognition to meaningful learning.



Aim

Evaluate the educational use of an interactive learning platform
to support oral radiology education.

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Objectives

- Improve anatomical recognition.
- Develop radiographic orientation skills.
- Reinforce dental development and age estimation.
- Provide AI-assisted feedback.
- Generate learning analytics to improve teaching.



How?

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- Image-based educational environment
- Anonymized intraoral and extraoral radiographs
- Bilingual activities: English and Spanish
- Immediate feedback after each response
- Exportable results for teaching analysis

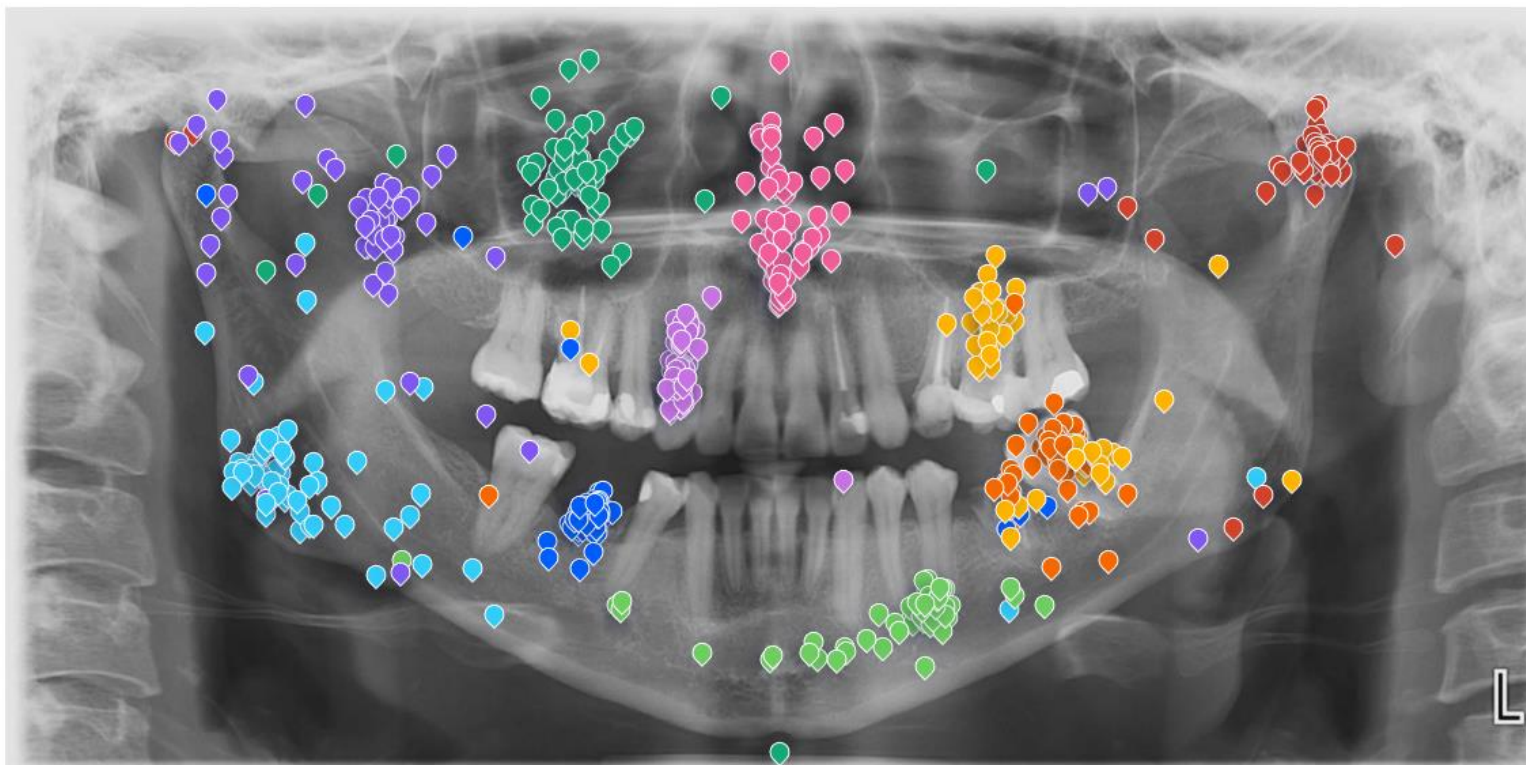


What do students do?

- Identify anatomical structures
- Locate landmarks directly on the image
- Recognize right and left patient laterality



- 1 Seno max Der / Maxillary Sinus Right
- 2 Endo Multiradicular Left Izq
- 3 canal nasopalatino / nasopalatine canal
- 4 Angulo Mand Der/ Right Jaw angle
- 5 Coronoide Der / Right Coronoid
- 6 Resto radicular derecho / Right root remnant
- 7 Condilo Izquierdo / Left condyle
- 8 Foramen mentoniano izquierdo // Left mental foramen
- 9 37
- 10 13



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What do students do?

- Review dental development stages
- Estimate dental age



De acuerdo con la cronología de erupción dentaria observada, ¿cuál es la edad aproximada de este paciente?
/ According to the observed dental eruption chronology, what is the approximate age of this patient?

1 5 años 3 meses

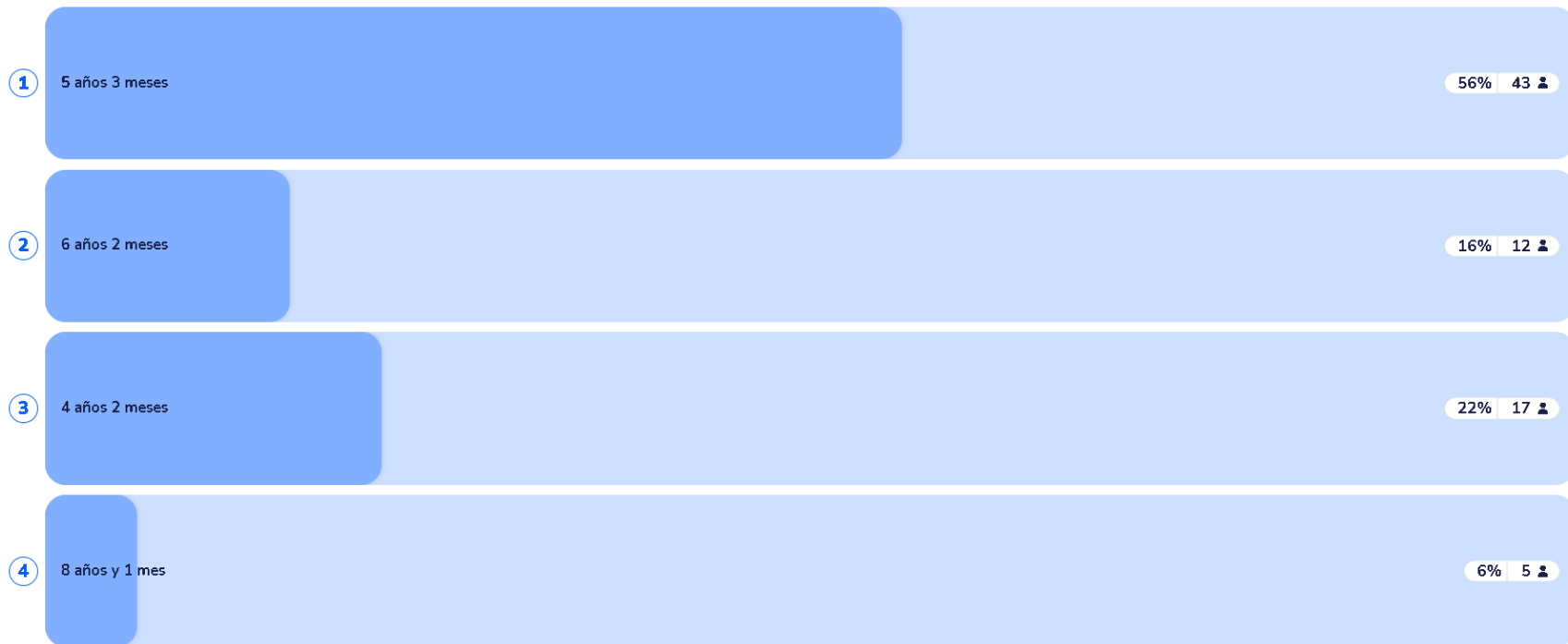
2 6 años 2 meses

3 4 años 2 meses

4 8 años y 1 mes



RESULTS



An 11-year-old male patient presents for evaluation of an impacted tooth #21. Based on the panoramic radiograph provided, analyze the radiographic findings and establish the most likely diagnosis.

Paciente masculino de 11 años de edad acude a consulta para la evaluación de la pieza 21 retenida. Con base en la radiografía panorámica presentada, analice los hallazgos radiográficos y establezca el diagnóstico más probable.

lack
maxillia
tooth#21 radiopac
Odontomacom
broken Image
Odontoma complex borde
break isa Comple
Inflammation benign 11
Odontoma copond obstruc
border Area imagen
called pieza tis
impaction unilocular inside qu
another #21 falta
lession
cro
S

The correct answer was

Odontoma compuesto

Compound odontoma

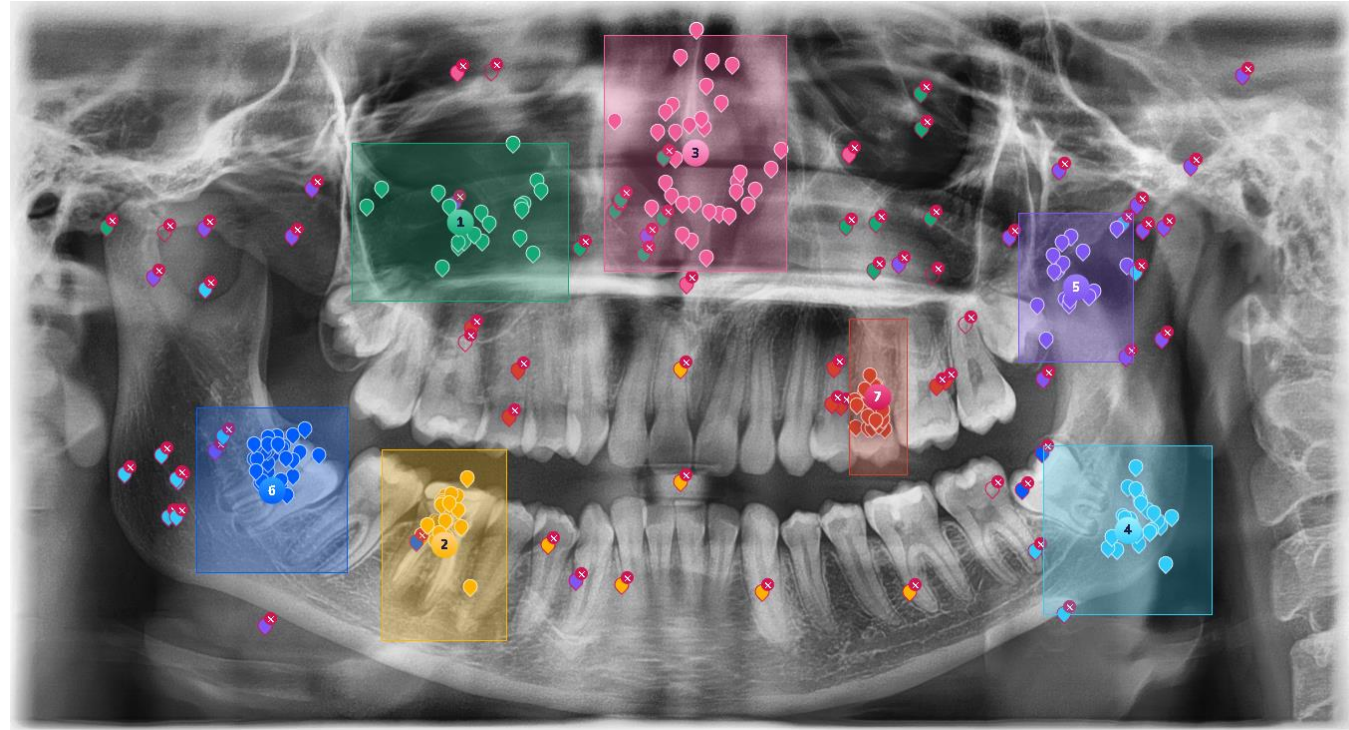
Odontoma

34%
of participants have answered correctly

midline
amelogranuloma
te gingival infantil uniloclar
rd definidos little hard cyst
Bone Possible root OPG unable
tilocular central due bubbles
paque Maybe granuloma
esto tumors
maligno Age presents
ado structure (tumor part Trauma
or benigno enamel surrounds
benigno) coming corticated
patients
loma of the tooth #21
pping

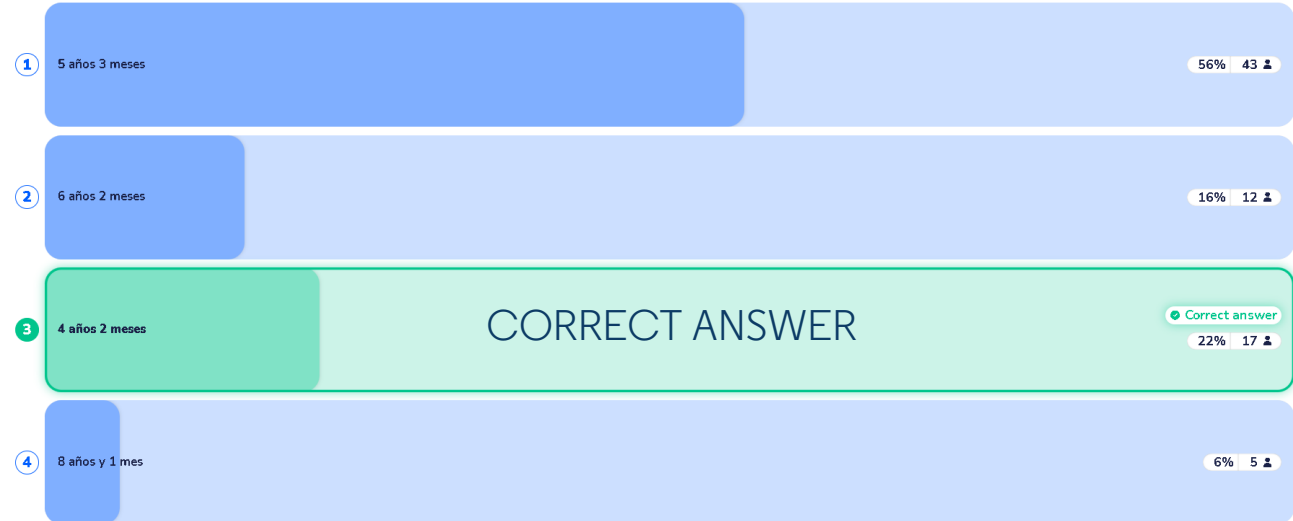
AI as an Educational Tutor

- Explains correct and incorrect answers
- Highlights common misconceptions
- Reinforces anatomical concepts



AI as an Educational Tutor

- Supports self-assessment
- Promotes independent learning





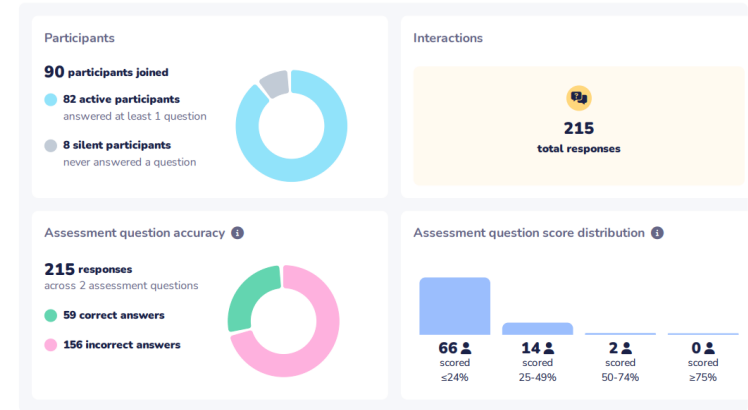
What did we learn?

Learning analytics and educational outcomes

Engagement And Task Completion

- 91 students joined the dental chronology activity
- 87 students actively participated — 95.6%
- 388 of 435 possible responses were submitted — 89.2%
- Completion varied according to activity format and complexity

Lesiones

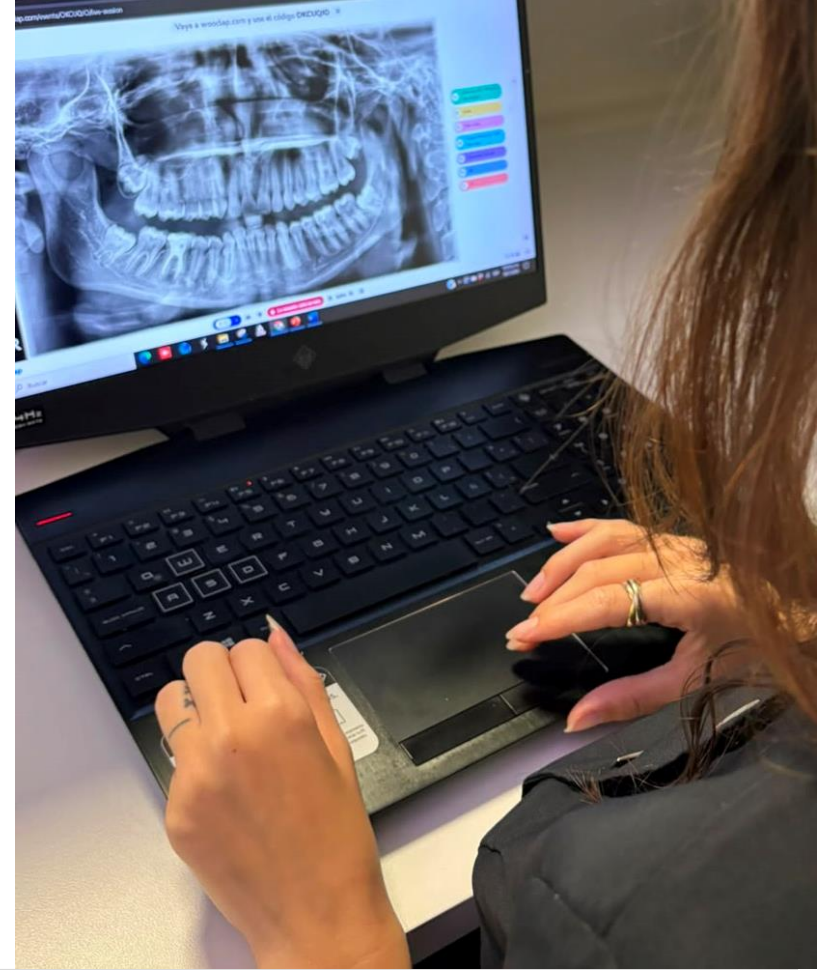


Radiology 1



Performance And Error Patterns

- Dental chronology: 32.0% of submitted responses were correct
- Performance across chronology cases ranged from 1.3% to 71.2%
- Adult dentition knowledge: 94.8% correct
- Condyle localisation: 54.1% correct among respondents
- Multi-label image task: 70.3% mean item score, but only 15.8% identified all seven targets correctly



3 What did we learn?

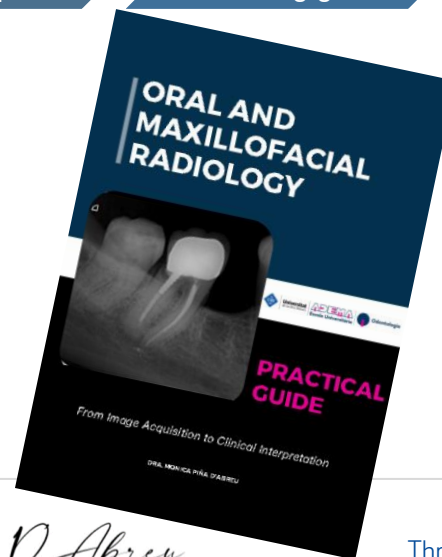
What Did the Learning Analytics Reveal?

- Students sometimes recognized the correct structure but selected the contralateral side
- The left coronoid process was the most challenging target — 44.4% correct
- Right maxillary sinus identification reached 63.9%
- Left mandibular angle identification reached 66.7%
- Nasal fossa and tooth 48 identification reached 91.7%

From Learning Analytics to Teaching Action



- Knowledge gaps
- Anatomical localization errors
- Right-left laterality errors
- Difficulties linked to activity format



Take-home Message

- Interactive image-based activities reveal more than overall accuracy
- Learning analytics identify specific difficulties in anatomical localization, radiographic orientation and patient laterality
- The platform supports student self-assessment and evidence-informed teaching

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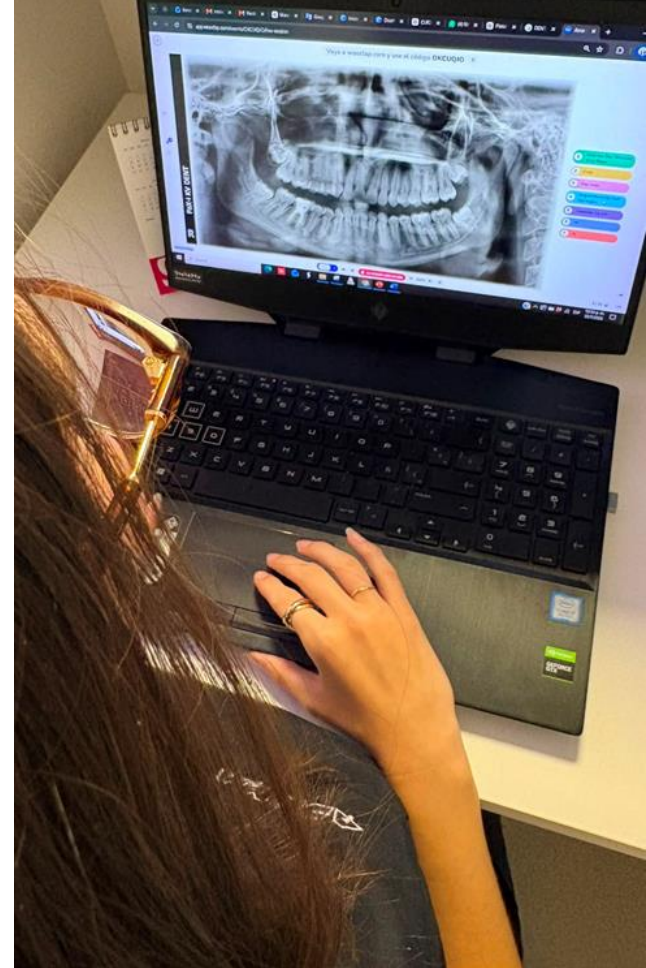
WHAT'S NEXT?

Future directions in oral radiology education

WHAT'S NEXT?

- Reinforce the concepts associated with lower performance
- Evaluate learning gains through a pre- and post-intervention study
- Refine the bilingual English–Spanish learning modules
- Progress from anatomical recognition to radiographic interpretation and diagnostic reasoning

From student responses to more targeted teaching.



Thanks

Does anyone have any questions?

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