Using VR for Dental Anatomy

1. **Title of the lesson:** Using VR for dental anatomy with gnathology
2. **Class/Department:** 2nd grade/ Dental technician (adult education program)
3. **Duration:** 150 minutes
4. **Description:**
    1. Understanding the basic concepts and structures of the jaw and teeth.
    2. Getting to know the physiological processes related to the jaw and teeth.
    3. Application of theoretical knowledge to practical scenarios through interactive activities.

5. **Specific learning objectives**

Knowledge: Understand the principles and procedures related to teeth.

Skills : Develop knowledge about teeth through the use of VR technology.

Application: Apply theoretical knowledge on simulated scenarios using VR technology

Evaluation: To evaluate the effectiveness of different strategies and techniques in repairing teeth using VR

6. **Advantages of using VR:**

Safe and controlled environment: VR provides a safe, controlled environment for trainees to practice skills without risk.

Increasing engagement and motivation: interactive VR scenarios increase the engagement and motivation of participants.

Real-time feedback: VR simulations offer real-time feedback, allowing trainees to learn from their mistakes and improve their skills.

Diverse Scenario: Allows trainees to experience different scenarios that may not be readily available.

7. **Required materials:**

VR headsets with software: Ensure a sufficient number of VR sets with pre-installed software.

VR software module for specific topics: install and prepare modules that cover the topics of teeth, traction physiological process of jaws and teeth.

Provide safety guidelines: provide safety guidelines for the use of VR equipment.

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Projector/Demonstration Screen: Set up a projector and screen to demonstrate the content in front of the whole group.

Worksheets and digital tools: prepare worksheets and digital quizzes for knowledge testing and evaluation

Relevant physical models/tools for hands-on teaching: provide jaw and tooth modules for hands-on demonstration and handling.

8. Lesson:

Basic characteristics of human teeth (60 minutes)

- Types of teeth (incisors, canines, premolars, molars)
- Functional differences between teeth
- VR activity: virtual examination of teeth and jaw anatomy in 3D

https://giantlazer.com/project/vr-educational-app-for-dental-students/

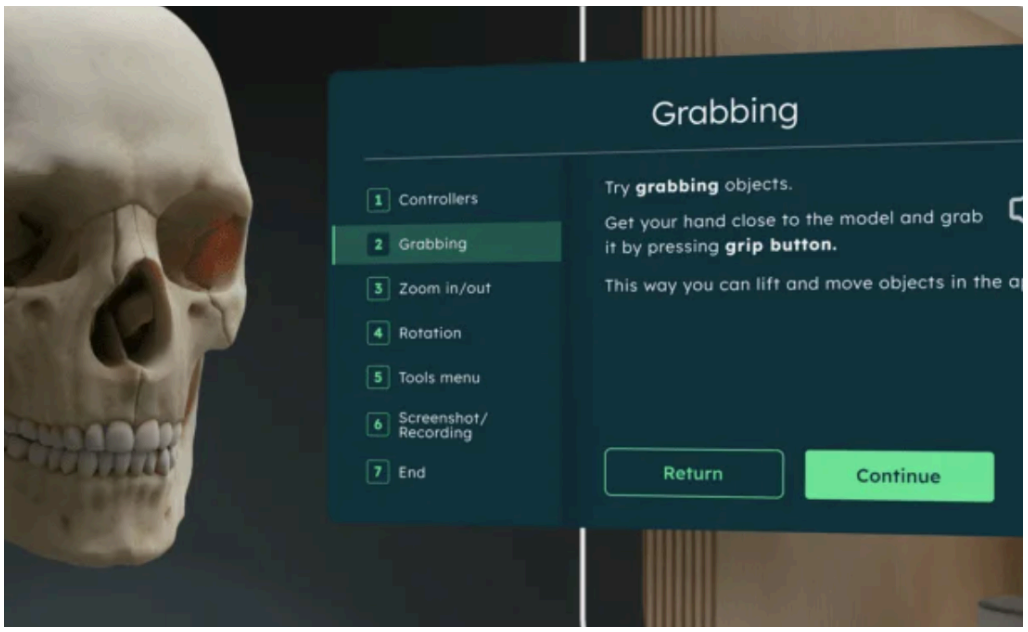
- The Lazer Anatomy VR app enables direct interaction with anatomical layers, which, together with additional modules such as quizzes and 3D models of microscopic structures, provides a valuable educational resource for our students and faculty. It is an advanced tool that integrates perfectly with our medical curricula, enabling students to interactively and precisely explore anatomical structure, significantly improving the quality of classes.
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Figure 1 Giant Lazer (source: https://giantlazer.com/)

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- VR activity: https://vr-dentist-a-dental-app.soft112.com/
- Features of the VR Dentist App:

  1) Users can Zoom and Rotate the 3d model.

  2) Students and teachers can Take apart each of the parts.

  3) Each Part of the virtual reality model can be made Glassy.

  4) Teachers can Label or Title every part of the VR model in application.

  5) Analyze feature allows teachers discuss any one part of the VR Dentist App.

  6) The snap feature allows you to save the image of the 3D or augmented reality model. This image can be used for your next project or learning. Share or upload or print the images to showcase it to your friends.

  7) Pen tool allows teachers to draw or pin specific parts of the VR Dentist App.

  8) The AR button allows you to bring the model from virtual world to real life situation by placing the camera on a marker.

  9) Quiz feature allows you to play a fun VR game of naming parts of the model.



Figure 2 VR Dentist - A Dental App (source: https://vr-dentist-a-dental-app.soft112.com/)

Resources: preparation of materials for the application, VR equipment, computer

Nerve forces and load on teeth, abrasion (30 minutes)

- nerve forces and tooth load
- causes and prosthetic meaning of abrasion
- VR activity: examining teeth

  https://store.steampowered.com/app/1256680/CHICARO_DENTISTRY/

  - An educational simulation game for the learners that entertains teaching the actual dentist profession. Your students may perform dental treatments as expert dentists using realistic dental tools with our lovely dental hygienist robot ' VITALONG'. This

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game was developed and reviewed by the famous dental group " Yonsei Children's Dental Hospital' and your children can learn the importance of oral health through real dentist experience

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Figure 3 Chicaro Dentistry (source: https://store.steampowered.com)

Resources: VR equipment, computer, application, presentation

Guided VR for patient relaxation (30 minutes)

- Guided reality technique and its benefits (example: https://www.youtube.com/watch?v=m7v_YQyv95s)
- VR activity: https://guidedvr.com/vrfordentists/

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Figure 4 Guided VR for dentist (source: https://guidedvr.com)

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Resources: interactive models, VR equipment, computer, application, presentation

Nervous muscles and mandibular movements (30 minutes)

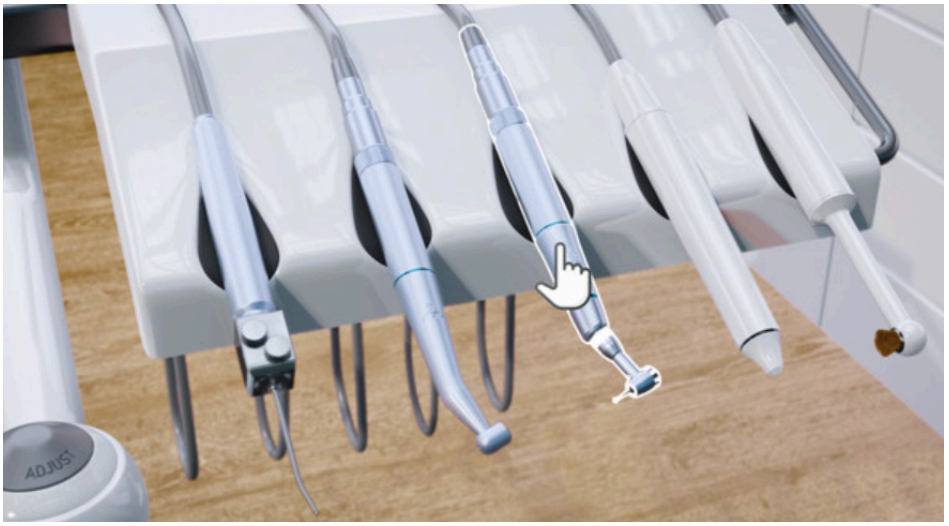
- chief assistant
- cheek muscles
- VR activities: interactive exercise on muscle movements https://store.steampowered.com/app/1460770/Boring_Game/
    - Remember about careful sterilization of your tools, and make sure you used the right anesthetics for the job.
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Figure 5 Boring game (source: https://store.steampowered.com)

Resources: animations, VR equipment, application, computer, presentation

9. Assessment methods

- Observation during VR practice and hands-on activities: Instructors observe participants during VR simulations and hands-on activities to assess their skill and understanding.
- Worksheets or digital quizzes: Students complete worksheets or digital quizzes after each section to assess their knowledge.
- Group project presentations: participants work in groups to prepare and present projects related to the learned topics.
- Hands-on demonstration of skills on physical models or tools: participants demonstrate acquired skills using physical models or tools.

10. Extension activities

- Assign additional VR modules to further practice advanced skills: Provide learners with access to additional VR modules for further training.

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- Encourage students to research innovative technologies and present their findings: Organize activities where participants research innovations in dentistry and present their findings.
- Arrange visits to relevant facilities for real-world observation and practice: Plan visits to dental practices or colleges for hands-on experience.

11. Reflection and feedback

- Collect feedback from students about their VR and practical experience: use questionnaires or group discussions to collect feedback.
- Reflect on lesson effectiveness and identify areas for improvement: analyze feedback and evaluations to improve teaching.
- Discuss how VR can be further integrated into field education: discuss opportunities to further integrate VR technology into teaching and hands-on training.

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