

Eye-tracking Reveals How Students of an Oral Health Therapy Course Read and Interpret Dental X-Rays

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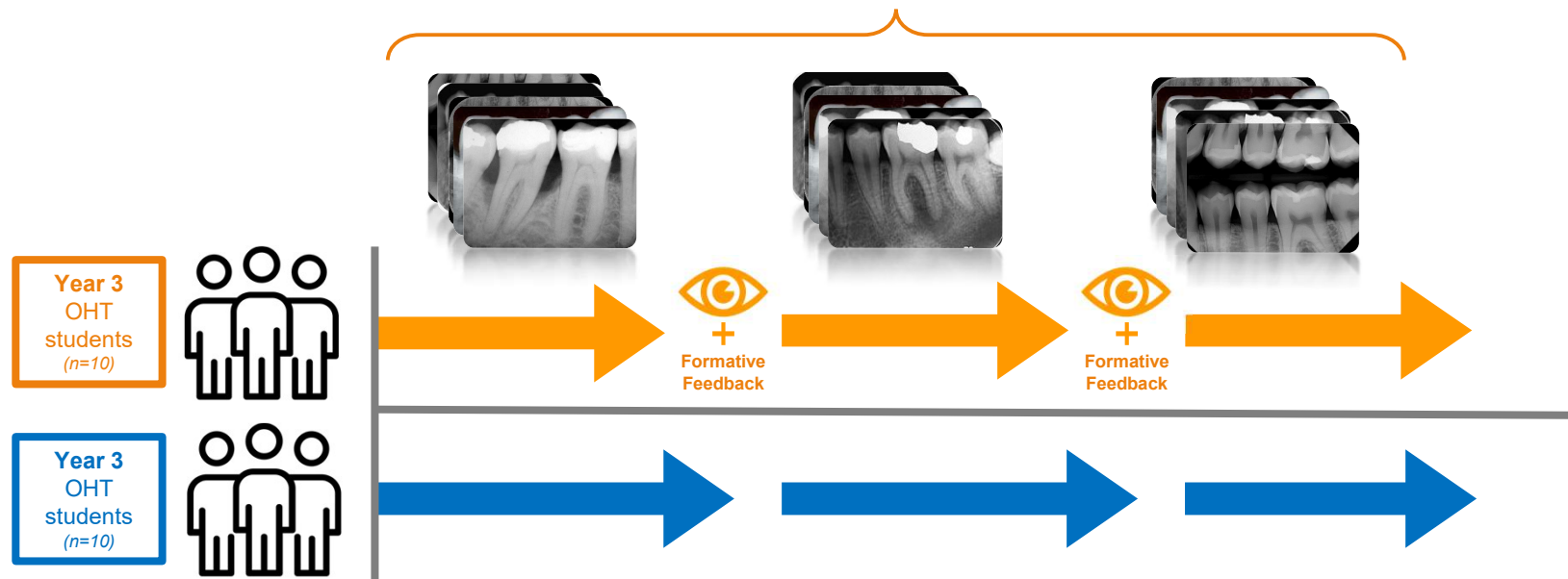
We use **eye tracking** technology to:

- **Visualise** how Oral Health Therapy students read X-rays, and their associated **diagnostic performance**.
- Assess if **customised teaching feedback** alters students' **search pattern**, and if it leads to better **diagnostic accuracy**.

Experimental Design

3 sets of:

FIVE (5) Intra-oral X-rays* = **4 with lesions** + **1 without lesions**
(Caries, Perio or Endo) (Normal)

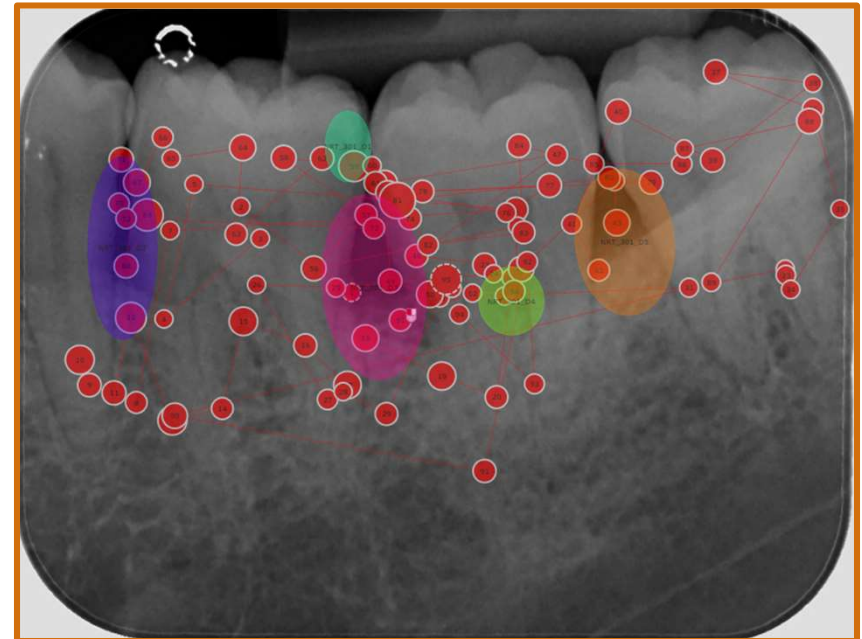


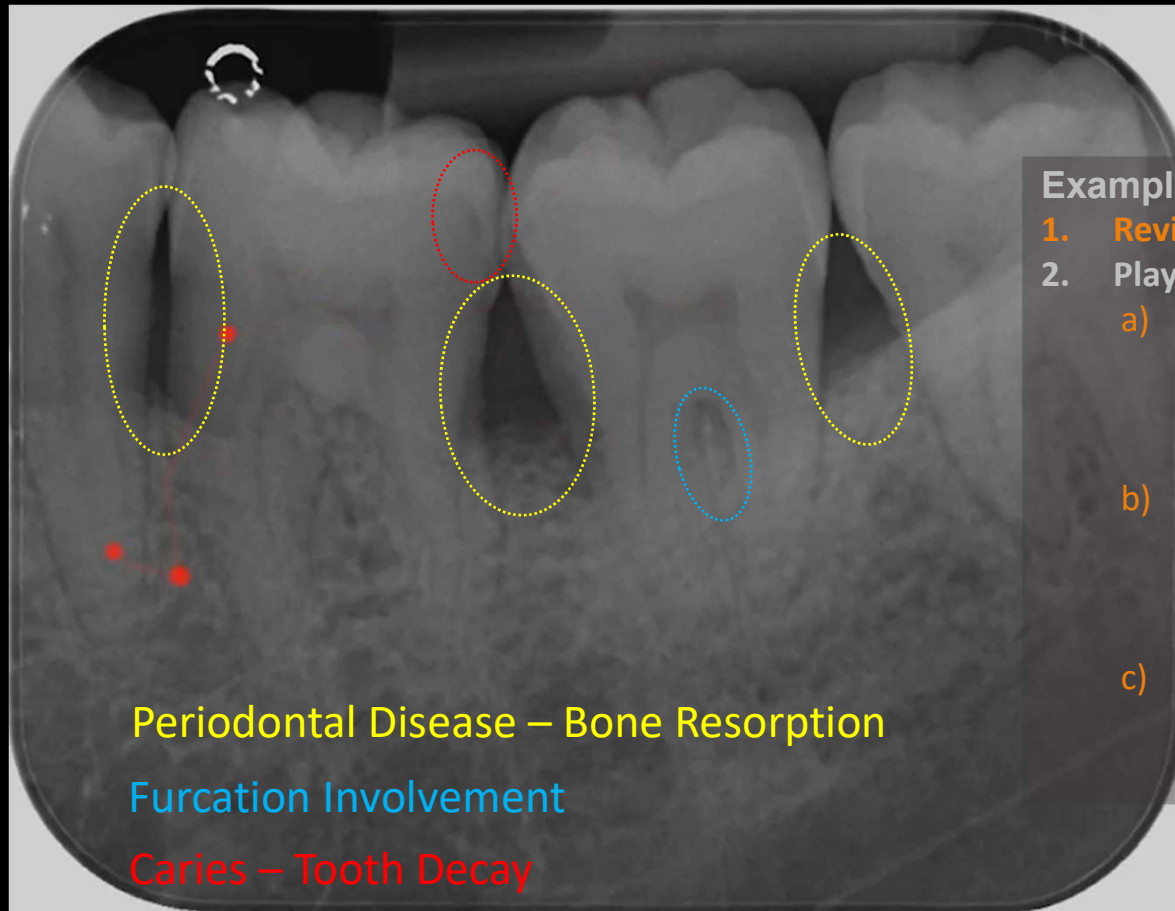
- **Eye gaze and visual fixation data** collected with **Tobii X2-60 eye tracker (60Hz)** (Tobii AB, Sweden)
- Each student had **30 seconds** to interpret each X-ray and identify all lesions present
- Upon **identification**, students **mouse-clicked** on the lesion and **verbally stated** their findings
- If the X-ray is **normal**, students should **not click** on any area

04 The Feedback protocol

- Gives feedback **immediately** after each exercise
- Goes through the answers first to give **context**
- **Live (real-time) observation** screen gives the instructor an idea how the students read X-rays
- Watches the **eye movement playback video** with the student to point out specific strengths and weaknesses

Methodology





Example of feedback given to a student

1. **Reviews the answers**
2. **Playback video of student's eye tracking**
 - a) **Comments on general scanning pattern**
 - Level by level
 - Roots > cervical > crown
 - b) **Weakness/strength during the scan**
 - Inability to recognise lesions
 - Subject fixates on the lesions but fails to recognise
 - c) **Instructor feedback**
 - Strategies to adopt for improvement

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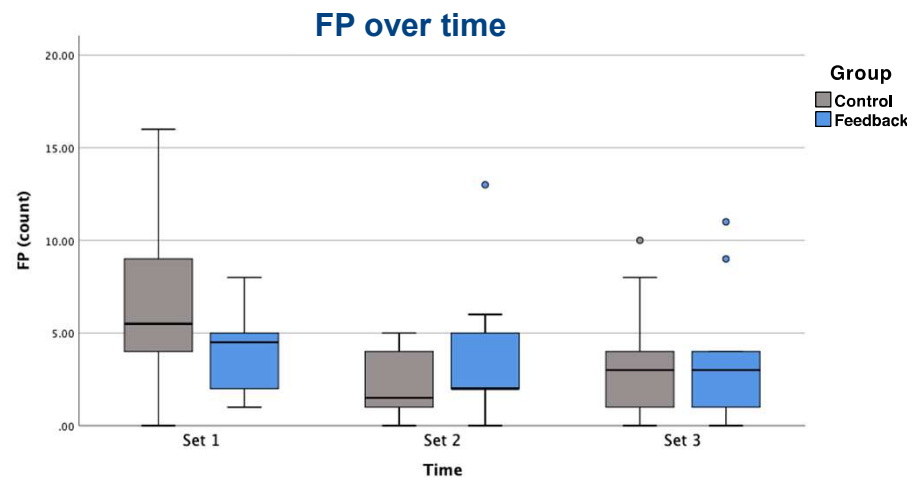
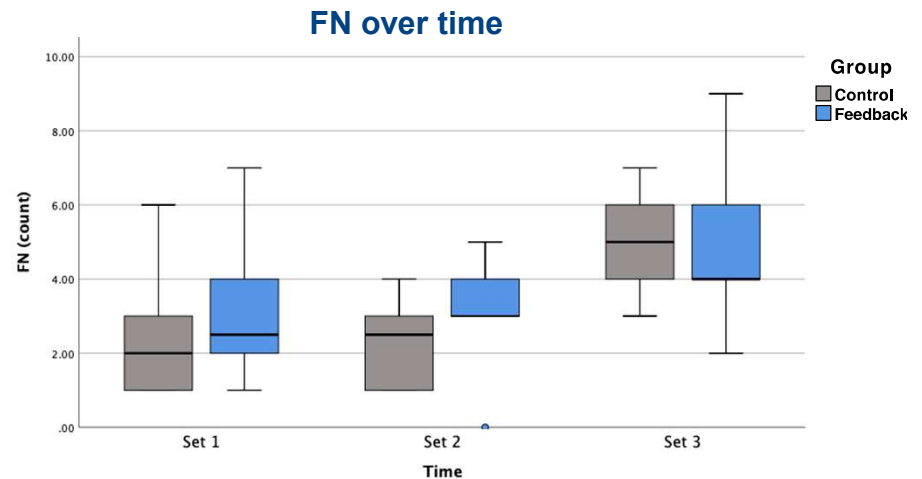
Results

- **Mean Sensitivity scores deteriorated**

- The number of **misses** increased, i.e., False Negative (FN) calls increased with time

- **Mean Specificity scores improved**

- The number of **false alarms** reduced, i.e., False Positive (FP) calls reduced with time



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Results

Result summary: Mean Accuracy scores maintained;
no significant difference observed between two student groups.

1. Demonstrated a **quantitative method** to understand students' **eye movements** when reading intra-oral X-rays.
 - This facilitated **customised teaching feedback**
2. While feedback given with eye movement playback did not appear to be effective in improving students' diagnostic performance,
 - instructors now **understand** how the students were reading and diagnosing X-rays, and what their **weaknesses** were.



THANK YOU

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