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**.
3 sets of:

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

*Pictures for illustration purposes only.
• **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
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

Periodontal Disease – Bone Resorption
Furcation Involvement
Caries – Tooth Decay
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
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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