Investigating the transfer of skills learned in the haptic environment

- If proven, how does this help individual students?
- How does it help in training the next generation of clinicians?
- How does it help academic staff?
- How does it help the profession and patients?
- How does it help the institution?

**Background:**

Graduate training course for dentistry

**Doctor of Dental Medicine (DMD)**

- Four year graduate course
- Students have previously completed a 3 or 4 year Bachelor degree (or higher degrees)
- No prerequisite units
  - However: assumed knowledge of
    - Tertiary Level Year 1:  
      - Physics,
      - Chemistry and
      - Biology
- The introduction of manual dexterity training for academically bright students is a potential challenge

**Currently, where are the haptics used in our Course?**

**DMD – hours per student**

- **Year 1 first semester** – module manual dexterity (MD)
  - 10+ hours each student (on a ‘needs’ basis)
- **Year 1 second semester** – within Operative Dentistry module (MD) –  
  - 3 hours
- **Year 2 first semester** – within Operative Dentistry module in advance of moving into clinic
  - Modified cases
  - Complete 4 cases
  - Check sheet
- **Year 2 second semester** – within Paediatric Dentistry
  - Two cases
  - Partial vital pulpotomy
  - Preparation of teeth for a stainless steel crown
- **Years 2 and 4 remediation**
  - Cariology and crown preparations

**Background:**

Simulation in the Curriculum

- Simodont® – haptic dental drilling skills trainer
  - Fully virtual drilling environment
  - Haptic interface providing force feedback
- Improved value of training
- Effective integration into the curriculum requires
  - Positive attitude from all parties
  - Acceptance from all stakeholders
- Students
- Academic staff
- Understanding of its strengths and weaknesses

**Year 1 first semester**

Very early in course – starts within 2 weeks of first semester

- Module manual dexterity (MD)
  - 10+ hours each student (on a ‘needs’ basis)
  - Introduction to the technology
  - Start drilling
  - Proceed at own pace
  - Tutor supported
Aim

Determine if haptic training in a task can result in success in the conventional simulation learning environment.

Methodology

The area of the preparation achieved in the plastic block was compared to that of the area range acceptable for the doughnut task in the Simodont Level 3 with error of 0.2mm.

Three categories were determined:

- Less than 30.042 mm²
- Within the range 30.042 mm² and 41.541 mm²
- Greater than 41.541 mm²

The areas found to be within the range 30.042 mm² and 41.541 mm² were denoted as an acceptable pass.
### Results

66.3% of students were able to cut an acceptable doughnut shape in the DentaPrac Block (as determined by the area) within a time limit of 10 minutes.

Previous experimental experience is that without haptic training students struggle to achieve this standard in 3 hours.

### AIM 2

- Investigate a correlation between individual characteristics (age, gender and previous degree) and ability to perform in the conventional environment after training delivered in the in the haptic simulation.

### Methodology

Demographic data supplied by Faculty of Medicine and Dentistry and Health Sciences Selection Committee

UWA HREC Ethics approved

There were 41 students who passed at least one attempt of the conventional simulation tasks:

<table>
<thead>
<tr>
<th>Passed</th>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
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<tr>
<td>No</td>
<td>Age</td>
<td>2</td>
<td>21.00</td>
<td>0.00</td>
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<tr>
<td></td>
<td>HT Lesson Time</td>
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<td>247.71</td>
<td>73.39</td>
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<tr>
<td></td>
<td>HT Drill Time</td>
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<td>116.31</td>
<td>53.14</td>
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<td></td>
<td>Total HT attempts</td>
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<td>56.50</td>
<td>20.51</td>
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<tr>
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<td>Age</td>
<td>41</td>
<td>25.41</td>
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<tr>
<td></td>
<td>HT Lesson Time</td>
<td>41</td>
<td>343.35</td>
<td>161.23</td>
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<tr>
<td></td>
<td>HT Drill Time</td>
<td>41</td>
<td>126.12</td>
<td>39.85</td>
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<tr>
<td></td>
<td>Total HT attempts</td>
<td>41</td>
<td>130.63</td>
<td>65.74</td>
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</table>

### Data relating to Gender (n=41) and previous tertiary degree (n=41)

<table>
<thead>
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<th>Gender</th>
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<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>Female</td>
<td>N</td>
<td>%</td>
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<td></td>
<td></td>
<td>2</td>
<td>9.09</td>
<td>20 90.91</td>
</tr>
<tr>
<td></td>
<td>Male</td>
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<td>19 100</td>
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<tr>
<td></td>
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<td>0</td>
<td>10 100</td>
</tr>
<tr>
<td></td>
<td>Health/Clinical Science</td>
<td>Non-Science</td>
<td>1</td>
<td>16.67</td>
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<tr>
<td></td>
<td>Science</td>
<td>1</td>
<td>24 96</td>
<td>25 60.98</td>
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</tbody>
</table>

This project has started the investigation of characteristics that may explain ability to achieve success with manual dexterity tasks.

Indicative:

Training in the haptic world is able to transfer acquired skill to successfully achieve in the conventional simulation environment for 66.3% of the cohort within 10 minutes.

The results calculated for the characteristics of gender, previous degree and age are not significant.

Note: Improved power is needed to achieve significance

### Acknowledgement of funding:

Government of Western Australia

Department of Health
References


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Consider the issue of “Failing to Fail”

The difficult issue of assessing underperforming dental students

- Are we able to grade students in a manner which assesses their proficiency of their clinical skills?
- At what level should the student be able to have extra experience/training?

https://www.unige.ch/medecine/udrem/files/1414/8884/0305/


European Journal of Dental Education. ISSN 1201-886X

Failure to fail: clinicians’ experience of assessing underperforming dental students

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Aim: To develop an understanding of clinicians’ approaches to assessing underperforming dental students.

Methodology: Seventeen clinical staff were interviewed (eleven females, six males). Interviews were recorded and transcribed verbatim. A grounded theory methodology was used, with simultaneous data collection and analysis. The main analytical technique was constant comparison.

Findings: Participants’ shared basic problem was Assessing undergraduate students, expressed as how they evaluated and used the assessment system or perceived others to do so. One category, which explains what clinical staff do to manage their difficulties with assessment, was identified as Failing to Fail and has three subcategories: Evaluating the Assessment System, Welding the Student and Protecting Myself.

Conclusion: This study has substantiated the complexity of failing to fail and confirmed that some causes are shared across healthcare professions, although insufficient staff discussion, the avoidance of confrontation and the impact of negative student attitude are not reported elsewhere or are minor findings. It is recommended that clinical staff receive additional training in assessment and that they are made more aware of their learning needs, their attitudes and beliefs. Increased discussion between staff about assessment and about students known to be in difficulty is essential.

Just a thought to consider...........

• Until now, the focus has been on helping the student to succeed
• Soon, there could be an opportunity to help the academic staff member and institution to carry out their most challenging duty........

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