IMPACT OF INTEGRATED ADAPTIVE TUTORIALS ON LEARNING IN PATHOLOGY

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DEBATE REGARDING EFFICACY

1. Cook et al., 2008

SELF-PACED LEARNING AND INDIVIDUALISED FEEDBACK

2. Kramer and Bente, 2010

ACCESSIBILITY AND EQUITY

3. O’Leary and Janson, 2010

VIRTUAL DIALOGUE BETWEEN TEACHER AND STUDENT

4. Wong et al., 2010

Laurillard’s Conversational Framework

Teacher’s concepts

- Theory
- Ideas
- Questions
- Ideas

Student’s specific concepts

- Adaptation of learner’s actions
- Reflection on learner’s actions
- Adaptations of actions in light of feedback
- Modification of concepts

Teacher’s constructed environment

- Tasks
- Actions
- Feedback
- Revisions

Student’s specific actions

- Theory
- Ideas
- Questions
- Ideas

Virtual Microscopy

Is e-learning any good?

- Debate regarding efficacy
- Self-paced learning and individualised feedback
- Accessibility and equity
- Virtual dialogue between teacher and student

1. Cook et al., 2008
2. Kramer and Bente, 2010
3. O’Leary and Janson, 2010
4. Wong et al., 2010
Aim

To create, implement and evaluate the learning impact of a suite of integrated adaptive tutorials in Phase 2 of the UNSW Medicine program.

Hypothesis

Integrated adaptive tutorials will enhance learning of clinicopathological correlation by Phase 2 Medicine students, compared with VMATs.\(^1\)

Methods: 1. Design Phase

- Development of adaptive tutorials
- Case-based learning
- Aligned with curriculum learning objectives
- Interactivity and adaptive feedback
- Software tool: Adaptive e-learning platform (AeLP)

\(^1\)Cook and Beckman, 2010
Integrated ATs: screenshot 1

**Case 1**

A 26-year-old female intravenous drug user presented to the emergency department with a one-week history of high fever and chills, together with dyspnea, pleuritic chest pain and occasional episodes of tachycardia.

On physical examination the JVP was raised 5 cm; there was a percussion roncus at the left clavicular edge and the liver was enlarged and palpable. There was decreased to percussion at the bases of both lungs.

Which ONE of the following is the **MOST LIKELY** diagnosis in this case?

- [ ] Miliary sepsis with septification
- [ ] Deep vein thrombosis with recurrent pulmonary embolus
- [ ] Aseptic meningitis
- [ ] Venous endocarditis of the tricuspid valve
- [ ] Pneumonia

*Check*

Integrated ATs: screenshot 2

**Case 1**

A 56-year-old man with hypertension and hyperlipidemia presented to the emergency department with a one-week history of severe chest pain and shortness of breath. The patient has a history of chronic bronchitis and smoking. Physical examination revealed a systolic murmur at the left lower sternal edge.

On physical examination the JVP was raised 5 cm; there was a percussion roncus at the left clavicular edge and the liver was enlarged and palpable. There was decreased to percussion at the bases of both lungs.

Which ONE of the following is the **MOST LIKELY** diagnosis in this case?

- [ ] Acute aortic dissection
- [ ] Aortic stenosis
- [ ] Venous endocarditis of the tricuspid valve
- [ ] Pneumonia
- [ ] Deep vein thrombosis with recurrent pulmonary embolus

*Check*

Integrated ATs: screenshot 3

Integrated ATs: screenshot 4
2. Experimental Phase

Controlled trial:

Phase 2 medicine: Adult Health 1

1st cohort (N=43)

Control Group

2nd cohort (N=41)

Study Group

Post-test & Questionnaire

VMATs

Integrated Adaptive Tutorials

Power analysis: minimum n=34 per group (20% difference, 95% probability)

Results – Student evaluations

<table>
<thead>
<tr>
<th>Item</th>
<th>CONTROL (n=40)</th>
<th>STUDY (n=28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework for independent study</td>
<td>93</td>
<td>100</td>
</tr>
<tr>
<td>Revision tool</td>
<td>95</td>
<td>96</td>
</tr>
<tr>
<td>Improved understanding</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td>Feedback assisted learning</td>
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<td>96</td>
</tr>
<tr>
<td>Appropriate level of difficulty</td>
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<td>93</td>
</tr>
<tr>
<td>More adaptive tutorials desired</td>
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<td>100</td>
</tr>
<tr>
<td>Integration with clinical experience</td>
<td>93</td>
<td>96</td>
</tr>
<tr>
<td>User-friendly interface</td>
<td>98</td>
<td>100</td>
</tr>
<tr>
<td>Easy navigation</td>
<td>100</td>
<td>96</td>
</tr>
<tr>
<td>Overall valuable learning tools</td>
<td>100</td>
<td>96</td>
</tr>
</tbody>
</table>

N.B. 93% of respondents in the Study group preferred integrated ATs to VMATs

Results – Representative quotes

Control group (VMATs)

"They could be longer, and use X-rays, macroscopic specimens and other images too".

"Provides a 'starting point' to orientate the slide. A good introduction to the disease process and the histopathology."

"Unlimited review of explanations and the visual marking of areas on histology that are otherwise difficult to analyse in a classroom setting"

Study group (Integrated adaptive tutorials)

"Really clear and concise explanation of the pathological processes underlying disease...correlating presenting symptoms with differentials and investigations and subsequent management."

"Integration of clinical, pathological and biochemical results with easy access and user friendly interface."

"They integrate all aspects of a clinical problem, from histopathology through the diagnosis. A good way to integrate all aspects with a clinical focus."

Results - Post-Test

Comparison of Post-test scores

Self-report of time spent (hrs):

Study: 3.6 ± 0.8
Control: 1.8 ± 0.3
P = 0.02

1Baird and Özler, 2012
**Limitations of the study**

- Possible cohort effect
- ‘Low-stakes’ assessment\(^1\)
- Clinical application

\(^1\)Ruiz et al., 2006

**Conclusions and future work**

- Integrated ATs preferred, but perhaps ‘less is more’
- Inter-disciplinary ATs
- Advanced analytics