An Application of Clickstream Tracking for Mobile Learning

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Outline

• Background and Rationale
• Methods
• Results
• Discussion and Conclusion
Background and Rationale
Whole Person Education @HKBU
embodied by the 7 Graduate Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citizenship</td>
<td>Be responsible citizens with an international outlook and a sense of ethics and civility;</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Have up-to-date, in-depth knowledge of an academic specialty, as well as a broad range of cultural and general knowledge;</td>
</tr>
<tr>
<td>Learning</td>
<td>Be independent, lifelong learners with an open mind and an inquiring spirit;</td>
</tr>
<tr>
<td>Skills</td>
<td>Have the necessary information literacy and IT skills, as well as numerical and problem-solving skills, to function effectively in work and everyday life;</td>
</tr>
<tr>
<td>Creativity</td>
<td>Be able to think critically and creatively;</td>
</tr>
<tr>
<td>Communication</td>
<td>Have trilingual and biliterate competence in English and Chinese, and the ability to articulate ideas clearly and coherently;</td>
</tr>
<tr>
<td>Teamwork</td>
<td>Be ready to serve, lead and work in a team, and to pursue a healthy lifestyle.</td>
</tr>
</tbody>
</table>
Case study-based modules

Explanations given upon students’ response in case studies

Further discussions and guidelines provided afterwards
The AIE-AR Project

http://www.ar-learn.com

• **Title:** *Reinforcing the Importance of Academic Integrity and Ethics in Students through Blended Learning – A Deployment of Augmented Reality Applications (AIE-AR)*

• An inter-institutional mobile learning project (~HK$8million) funded by the Hong Kong University Grants Committee (UGC)

• Involves the design of Trails of Integrity and Ethics (TIEs)
The AIE-AR Project

http://www.ar-learn.com

• Aimed to let students effectively learn about rules of academic integrity and ethics by exploring unethical choices through simulated “realistic” experiences of envisioned scenarios, without actually violating them in reality.
Trails of Integrity and Ethics (TIEs)
First pilot – TIE-1

• TIE-1 conducted in 2 rounds:
  1. 2 Dec, 2014 - 25 Postgraduate research students
  2. 23 Dec, 2014 - 16 Undergraduate GA Ambassadors

• Included 4 learning activities

• Learning contents were deployed in HTML format

• Students accessed contents via Mobxz MLS app
# Summary of Learning Activities for TIE-1

<table>
<thead>
<tr>
<th>Issue Explored</th>
<th>Scenario Description</th>
<th>Question</th>
<th>Ethical Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plagiarism</td>
<td>A student in the classroom discovers that she has insufficient time to complete an assignment, and is considering copying it from a classmate.</td>
<td>Should the student plagiarise?</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Ethical Use of Library Resources</td>
<td>A student is considering hiding a sought-after textbook in the library on another shelf, so that he can use it for as long as needed without letting other students having access to the book.</td>
<td>What should you tell this student?</td>
<td>1. “Don’t do that…”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. “It’s okay to put the book on the original shelf later.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. “It’s a clever idea.”</td>
</tr>
<tr>
<td>Citation and Common Knowledge</td>
<td>A student is considering using a famous Chinese phrase (inscribed on the statue) in her assignment, and ponders whether citation is required.</td>
<td>Is citation needed for this Chinese phrase?</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Unsure</td>
</tr>
<tr>
<td>Data Falsification</td>
<td>A student is conducting a survey about recycling habit of HKBU students. However, the student cannot collect enough data, and is considering calling up relatives and friends to answer the survey, without reporting this change of data collection method in his final report.</td>
<td>Should the student report the change of data collection method?</td>
<td>1. “It should be OK not to mention it in the report…”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. “It’s completely unacceptable…”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. “It’s important to state how the data are collected…”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. “Consult tutor…”</td>
</tr>
</tbody>
</table>
TIE-1

• After the first round, 3 sets of data were collected:
  1. Usage Experience Survey
  2. Qualitative feedback
  3. Pre-trail and post-trail discussion

• However, we would like to know more on:
  1. students’ choice of answers in each scenario
  2. students’ engagement in the learning activities
  3. the effect of mobile platforms to the user experience

• How to collect these data in the second round?
   By employing Clickstream Tracking
What is Clickstream Tracking?

Clickstream tracking refers to the recording of what a computer user clicks on while web browsing or using a software application. Any action done by the users within the webpage or application is logged (Roebuck, 2011)
Clickstream Usages

• Companies worldwide employ clickstream to:
  ➢ examine the quantity and profile of visitors to their websites
  ➢ analyse detailed clickstreams for revealing visitors’ page viewing patterns.
Methods
Collection of Clickstream Tracking Data

- students’ choices in each scenario
- effect of mobile platforms to the user experience
- students’ engagement in the learning activities
Collection of Clickstream Tracking Data

• Clickstream tracking was employed to collect the following data:

1. **Decision on Ethical Choices**
   - Recording button-press (or tab)

2. **Time on Task**
   - Timestamping when HTML page is loaded and the “Got it!” button is pressed

3. **Mobile Type**
   - Recording the `UserAgent` property
Applying Clickstream Tracking

- **Client-side (Mobile content)**
  - Customized JavaScripts snippets inserted in the HTML5 content

- **Server side**
  - Programming scripts log the data
  - Exports data to Excel file for analytics processing
Schematic Diagram of Clickstream Tracking for TIE-1

Remote Server

Server-side Script

Database

Excel file

export for analysis

log

clickstream data

MOBILE

MOBILE

MOBILE
Results
Decision on Ethical Choices
[Plagiarism]

START

Situation...
I am a new student at HKBU. My first assignment is due tomorrow, but I have not completed it. My friend is kind enough to let me borrow her assignment so I can copy it.

If I were caught this time, would I be forgiven for a first-time offense for committing an act of academic dishonesty?

Yes

No

Some students think the University will treat first-time offenders who commit an act of academic dishonesty in a lenient manner… but sorry, that is NOT true! HKBU treats academic dishonesty as a serious matter and will show no leniency for any form of academic dishonesty.

That is correct! Consequences for any form of academic dishonesty can be severe. You should abide by the University’s rules and regulations that preserve academic integrity and abide by them at all times!
Decision on Ethical Choices

[Ethical Use of Library Resources]
### Decision on Ethical Choices

#### Citation and Common Knowledge

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>81%</td>
</tr>
<tr>
<td>No</td>
<td>6%</td>
</tr>
<tr>
<td>Unsure</td>
<td>13%</td>
</tr>
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</table>

#### Data Falsification

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<tr>
<td>Option 1</td>
<td>0%</td>
</tr>
<tr>
<td>Option 2</td>
<td>30.46%</td>
</tr>
<tr>
<td>Option 3</td>
<td>30.77%</td>
</tr>
<tr>
<td>Option 4</td>
<td>30.77%</td>
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### Time on Task

<table>
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<tr>
<th>Learning Activity</th>
<th>Number of Students</th>
<th>Number of Screens</th>
<th>Mean Time (in sec)</th>
<th>Min (in sec)</th>
<th>Max (in sec)</th>
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<td>16</td>
<td>7</td>
<td>56</td>
<td>11</td>
<td>126</td>
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<tr>
<td>Ethical Use of Library Resources</td>
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<td>8</td>
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*Loss of some data due to temporary server failure*
Mobile Platforms

25% 75%

iOS Android
Discussion
Clickstream Data in TIE-1

- Overall, clickstream data can:
  - Provide valuable insights into students’ interactions and behavioural patterns
  - Help optimise the mobile learning contents
  - Improve the general design of the learning trail
Decision on Ethical Choices

[Plagiarism]

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Yes

No

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Decision on Ethical Choices
[Ethical Use of Library Resources]

Option 1: 100%
- That's right. Paul's scheme is selfish and unethical!

Option 2: 0%
- No, because Paul will be denying other students access to the book while he uses it. This is selfish and unethical.

Option 3: 0%
- No, Paul's scheme is selfish and unethical!
Decisions on Ethical Choices

• What’s next?
  ➢ Revise the questions and choices of each scenario - make the correct choice less obvious
  ➢ Provide opportunities for students to experiment with different choices and learn about the consequences
## Time on Task

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*Loss of some data due to temporary server failure
Time on Task

• What’s next?
  - Multimedia content can be incorporated and keep number of words to minimal
  - Ensure stable Wi-Fi connection in each location of triggering the learning activity
Mobile Platform

- The choice of the learning trail mobile application must be compatible with both iPhone and Android smartphones.

25% 75%
Global Smartphone Market Share By Platform

Summary

• Clickstream data:-
  ➢ reflect users behaviour
  ➢ help improve content design
  ➢ assist in the selection of appropriate technologies for learning activities and thus providing better user experience

• All of the above can help in the design of more engaging learning contents
References


Mohamed Amine Chatti, Anna Lea Dyckhoff, Ulrik Schroeder, Hendrik Thüs


Thank You!

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For more about the AIE-AR project, please visit:
http://www.ar-learn.com

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