



香港浸會大學  
HONG KONG BAPTIST UNIVERSITY



全人教育教與學中心  
Centre for Holistic  
Teaching and Learning

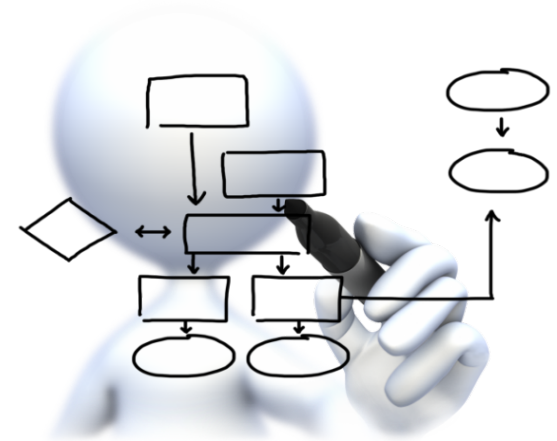
# *An Application of Clickstream Tracking for Mobile Learning*

*Joey CHAN, Rex CHIU,  
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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

## 公民 Citizenship

Be responsible citizens with an international outlook and  
**a sense of ethics and civility;**

## 知識 Knowledge

Have up-to-date, in-depth knowledge of an academic specialty,  
as well as a broad range of cultural and general knowledge;

## 學習 Learning

Be independent, lifelong learners with an open mind and an  
inquiring spirit;

## 技能 Skills

Have the necessary information literacy and IT skills, as well as  
numerical and problem-solving skills, to function effectively in  
work and everyday life;

## 創意 Creativity

Be able to think critically and creatively;

## 溝通 Communication

Have trilingual and biliterate competence in English and Chinese,  
and the ability to articulate ideas clearly and coherently;

## 群體 Teamwork

Be ready to serve, lead and work in a team, and to pursue a  
healthy lifestyle.





# Academic Integrity Online Tutorial

[Home](#)[Introduction to Academic Integrity](#)[Modules](#)[Resources](#)[Checklist Before the Final Quiz](#)

## Modules

- **Module 1: Plagiarism**
- **Module 2: Citing Sources**
- **Module 3: Copyright Infringement**
- **Module 4: Falsification and Fabrication**
- **Module 5: Collusion and Other Forms of Cheating**
- **Module 6: E-Submission and TURNITIN**

You are required to complete all the six modules in this tutorial.

When you finish, you can go back to Blackboard site to take the Post-tutorial Quiz.

### Plagiarism: Case One

In writing an argumentative essay about animal rights, Marianne found some newspaper articles to support her arguments. She worried that direct use of these articles would make the ideas seem as if they are not coming from her, so she decided to rewrite some bits of the articles in her own words and use them in her essay without mentioning the sources.

What do you think about Marianne's behaviour?



The newspaper articles are used only to support Marianne's idea, so it is not necessary to mention them.



As Marianne rewrote some bits of the articles in her own words, this makes it Marianne's own work and hence it is not necessary to mention the articles.



Marianne should mention the sources even though these articles are only used to support her arguments.

## Case study-based modules

Explanations given upon students' response in case studies

Further discussions and guidelines provided afterwards



Would there be a copyright issue if I copy the music from the CD?

This is correct. Even if you have bought the CD, you cannot freely duplicate it. You must observe the terms and conditions set on the product as well as follow the Hong Kong copyright law.



What do you think about the discussion between Betty and Charles?

- A. Charles is right about the copyright issue.
- B. The Hong Kong Philharmonic Orchestra should be cited if they use the music, but they don't have to pay the Orchestra for using the music.
- C. Even Charles has bought the CD, he may not freely duplicate it, as his right may be limited.
- D. If they cite the source of the music they use, there will not be any copyright issues.

# 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

Issue Explored	Scenario Description	Question	Ethical Choices
<b>Plagiarism</b>	A student in the classroom discovers that she has insufficient time to complete an assignment, and is considering copying it from a classmate.	Should the student plagiarise?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
<b>Ethical Use of Library Resources</b>	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.	What should you tell this student?	<ol style="list-style-type: none"> <li>1. "Don't do that..."</li> <li>2. "It's okay to put the book on the original shelf later."</li> <li>3. "It's a clever idea."</li> </ol>
<b>Citation and Common Knowledge</b>	A student is considering using a famous Chinese phrase (inscribed on the statue) in her assignment, and ponders whether citation is required.	Is citation needed for this Chinese phrase?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Unsure</li> </ol>
<b>Data Falsification</b>	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.	Should the student report the change of data collection method?	<ol style="list-style-type: none"> <li>1. "It should be OK not to mention it in the report..."</li> <li>2. "It's completely unacceptable..."</li> <li>3. "It's important to state how the data are collected..."</li> <li>4. "Consult tutor..."</li> </ol>

# 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

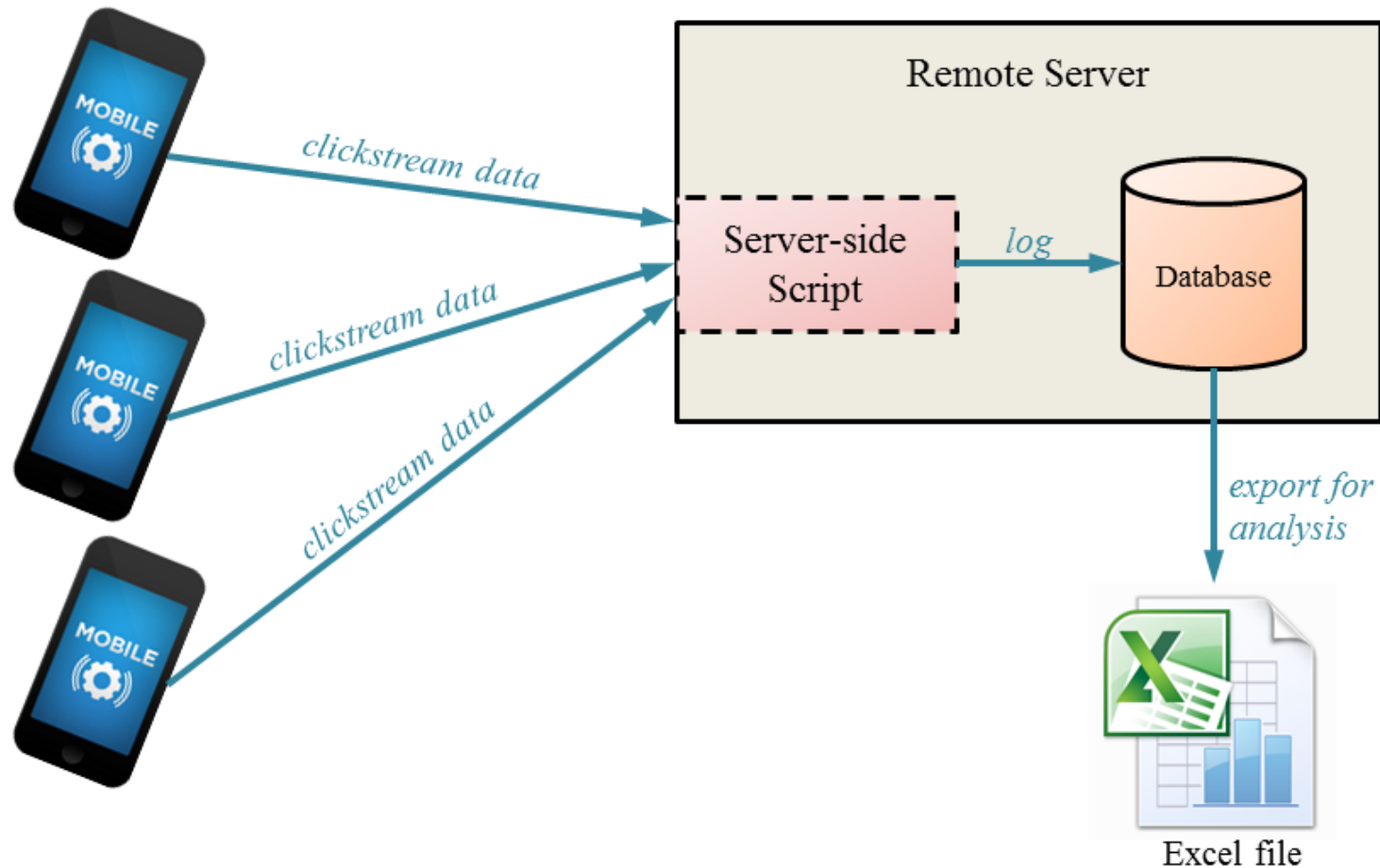
## 3. **Mobile Type**

- 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

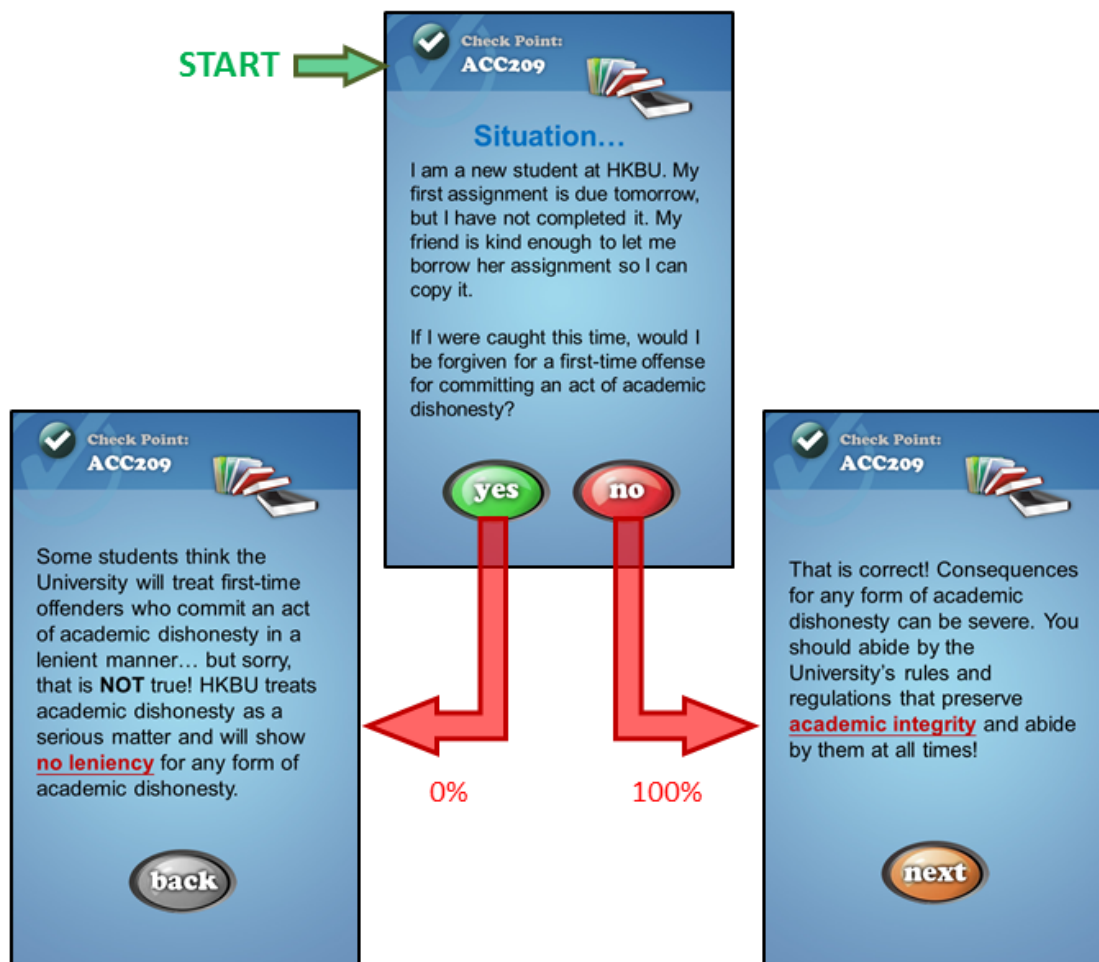




# Results



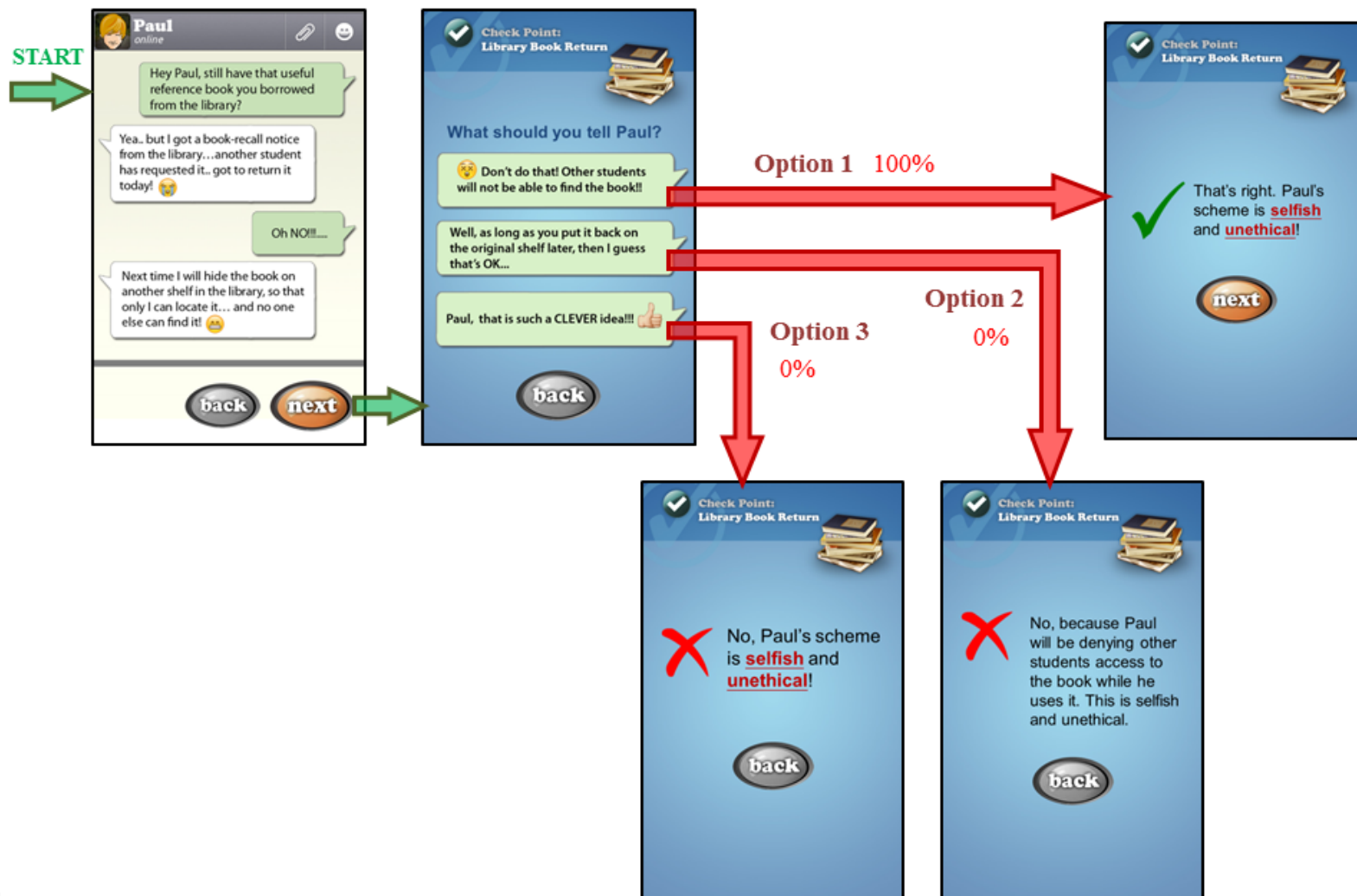
# Decision on Ethical Choices [Plagiarism]





# Decision on Ethical Choices

## [Ethical Use of Library Resources]



# Decision on Ethical Choices

## Citation and Common Knowledge

Option	Percentage
Yes	81%
No	6%
Unsure	13%

## Data Falsification

Option	Percentage
Option 1	0%
Option 2	30.46%
Option 3	30.77%
Option 4	30.77%

# Time on Task

<b>Learning Activity</b>	<b>Number of Students</b>	<b>Number of Screens</b>	<b>Mean Time (in sec)</b>	<b>Min (in sec)</b>	<b>Max (in sec)</b>
Plagiarism	16	7	56	11	126
Ethical Use of Library Resources	15*	8	35	10	62
Citation and Common Knowledge	16	8	36	8	72
Data Falsification	13*	12	73	33	137

*\*Loss of some data due to temporary server failure*



# Mobile Platforms



**25%**



**75%**

# Discussion



# Clickstream Data in TIE-1

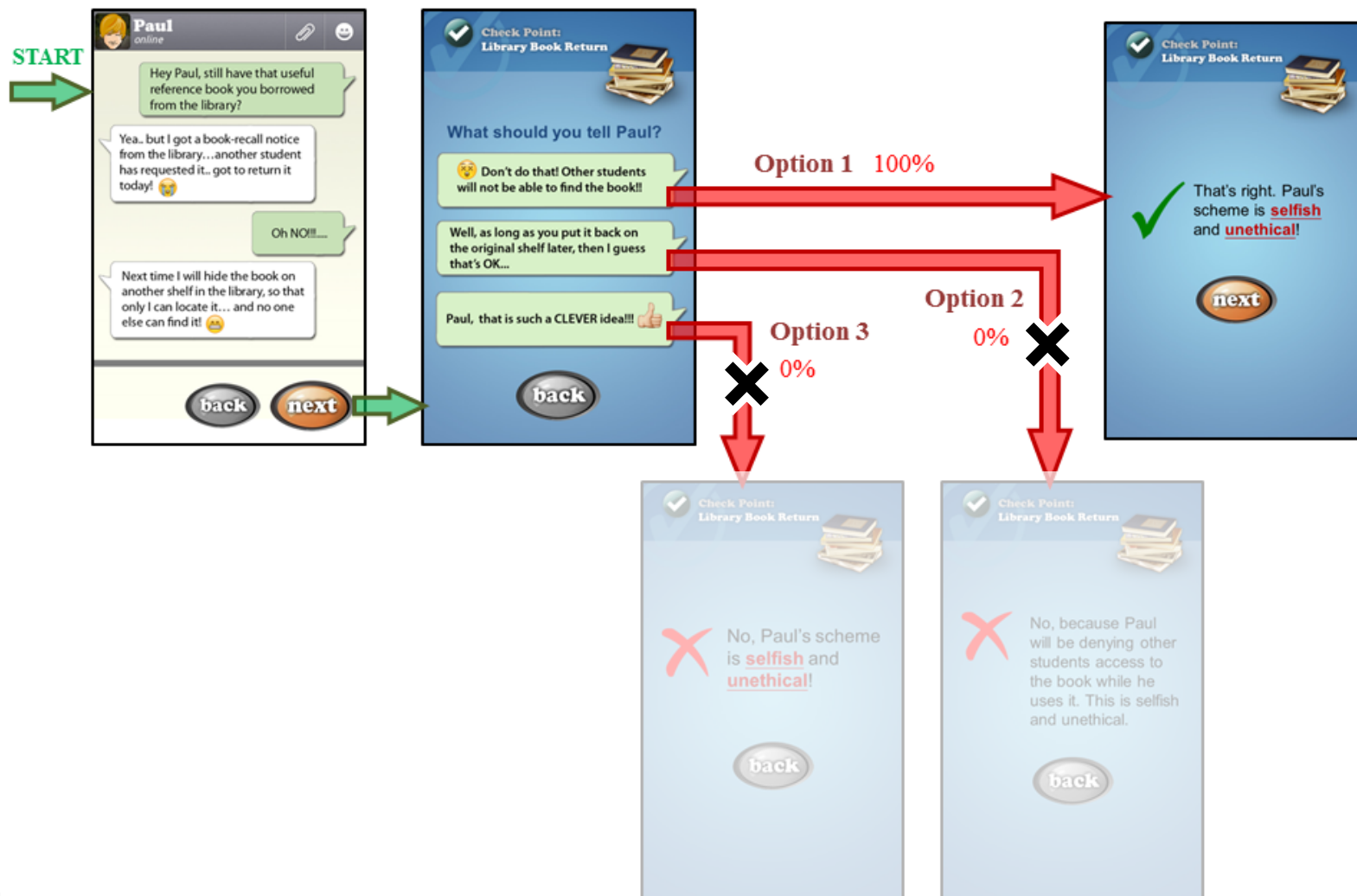
- Overall, clickstream data can:
  - Provide valuable insights into students' interactions and behavioural patterns
  - Help optimise the mobile learning contents
  - Improve the general design of the learning trail

# Decision on Ethical Choices [Plagiarism]



# Decision on Ethical Choices

## [Ethical Use of Library Resources]





# 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

Learning Activity	Number of Students	Number of Screens	Mean Time (in sec)	Min (in sec)	Max (in sec)
Plagiarism	16	7	56	11	126
Ethical Use of Library Resources	15*	8	35	10	62
Citation and Common Knowledge	16	8	36	8	72
Data Falsification	13*	12	73	33	137

\*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.

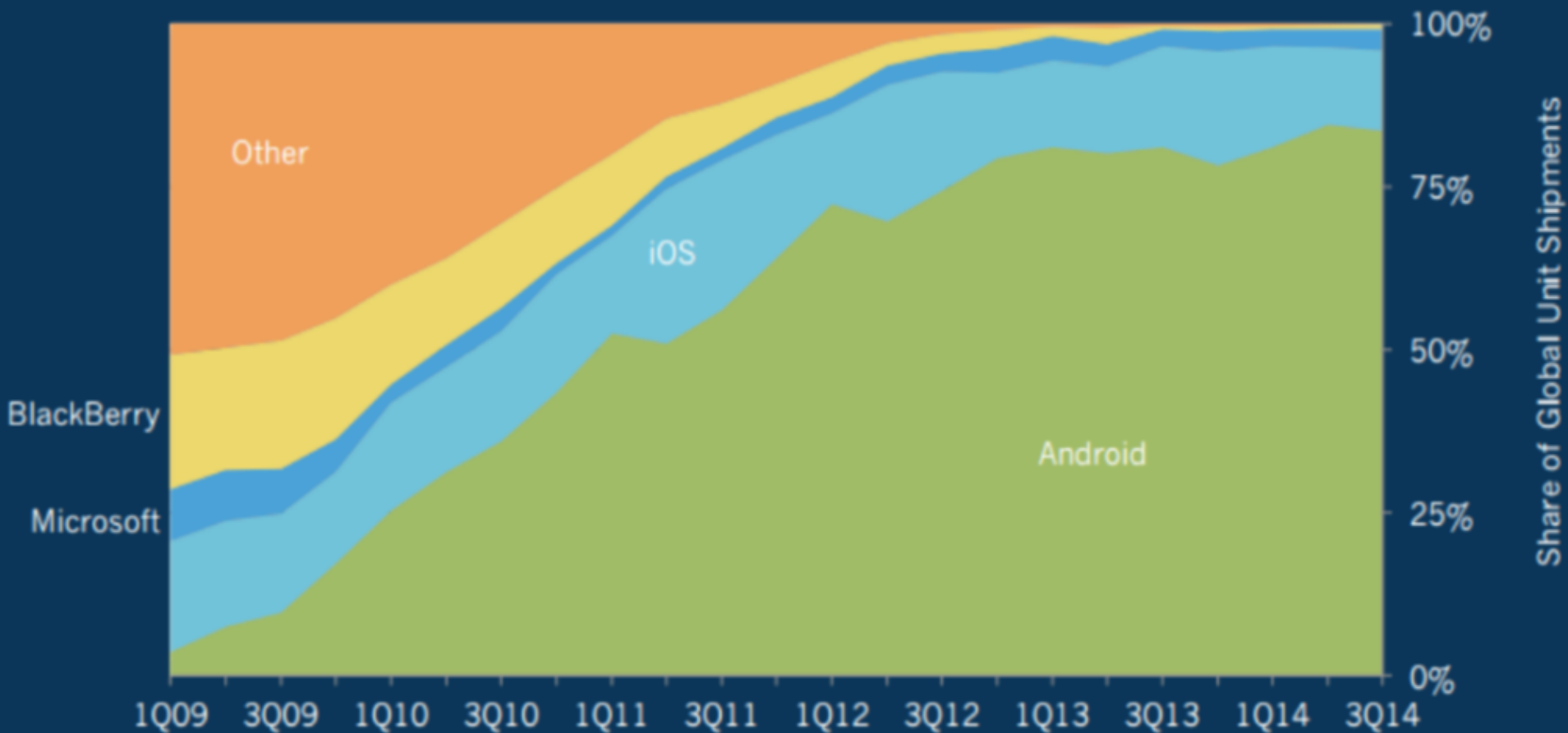


25%



75%

# Global Smartphone Market Share By Platform



Source: BI Intelligence (2014). <http://goo.gl/ntcriK> (02 Jan 2015)

# 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

- Ally and Khan (2015) International Handbook of E Learning Volume 2: Implementation and case studies, Routledge
- Biemer, P.P., Groves, R.M., Lyberg, L., Mathiowetz, N.A. and Sudman, S. (1991). Measurement Errors in Surveys. New York:Wiley.
- Chatti M. A., Dyckhoff A. L., Schroeder U. and Thüs H. (2012). A reference model for learning analytics. International Journal of Technology Enhanced Learning, 4 (5/6)
- Elias, T. (2011) Learning Analytics: Definitions, Processes, Potential <http://learninganalytics.net/LearningAnalyticsDefinitionsProcessesPotential.pdf>
- Global Smartphone Market Share By Platform*. (2014). BI Intelligence. Retrieved Jan 02, 2015, from <http://goo.gl/ntcriK>
- Moe, W., P. S. Fader. (2004). Dynamic conversion behavior at e-commerce sites. Management Science. 50(3): 326–335.
- Mohamed Amine Chatti, Anna Lea Dyckhoff, Ulrik Schroeder, Hendrik Thüs
- Montgomery, A. L. (2001). Applying quantitative marketing techniques to the internet. Interfaces 31(2): 90–108.
- Pegrum, M. (2014). *Mobile learning: Languages, literacies and cultures*. Basingstoke: Palgrave Macmillan.
- Roebuck, K. (2011). Web Analytics: High-Impact Strategies - What You Need to Know: Definitions, Adoptions, Impact, Benefits, Maturity, Vendors, Newstead: Emereo Pty Limited:
- Stovall, I. (2003). Engagement and Online Learning. *UIS Community of Practice for E-Learning*, 3, 2014.



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# Thank You!

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