Addressing the Pedagogical Challenges of Mobile Applications to Support Ubiquitous Learning

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Work from new inter-institutional educational support project

• HKBU and HK PolyU Schoold of Design
• Operational for 4 months
Background

Resource Centre for Ubiquitous Learning and Integrated Pedagogy

ULIP

Resource Centre for Ubiquitous Learning & Integrated Pedagogy

遍 存 學 習 與 綜 合 教 學 資 源 中 心
Background

All about addressing pedagogical issues with mobile applications.
Ubiquitous Learning

- Term *Ubiquitous Learning*, from *Ubiquitous Computing*
Ubiquitous Learning

• a.k.a. Pervasive Computing

1960s
1 computer-many users

1980s
1 computer-1 user

2000s
1 user- many computers
Background

Students accustomed mobile-learning supporting interactive content.
Students might learn more *commuting* to a lecture, than *in* the lecture.
Background

• That’s what we do
User experience

Important difference in our apps
User experience

Web-based:

Content →

On a server →

Student user →
User experience

Web-based:
- Content → On a server →

  Student user →
  - sluggish response to media
  - uses up data-plan
Avoid the frustration of media over the internet:
• Rewinding, fast-forwarding clumsy
• Pages take time to load
All the content of our apps are downloaded with the app:

• media and interactivity instant and fluent
• no cost of use
• makes copyright compliance easier
Ubiquitous Learning

Inline with recent instructional design:
• a shift toward a user-centric perspective
• learners’ instant access to content
Pedagogical Challenges

My Background

• Teach music students 20\textsuperscript{th} century music and music technology
• Last 6 years writing software for my students
Pedagogical Challenges

Context:

- Undergraduate students in traditional university setting
Pedagogical Challenges

My experience:

• use can make a significant difference in student learning

  • A desktop app
Pedagogical problem:
• results of final listening exam (typical)

2009 and before
If they don’t know the music, talking about it is pointless.
Pedagogical Challenges

Enter: 20\textsuperscript{th}-century Music Study Guide (2010)

- simple design
  - pull-down menus for pieces to be studied
  - 3 points to remember
  - representative image
Pedagogical Challenges

Results of final listening exam: before and after 20th-century Music Study Guide (2010)
Pedagogical Challenges

Never read that app was counterproductive...but

2009 and before

2010
Pedagogical Challenges

My other experiences & literature show:

- possibility of insignificant gains
- not at all proportional to the amount of work it takes
Pedagogical Challenges

Example: i-WAIL

*Interactive Workshop for Audio Intelligence and Literacy*

**Issue**: help display aspects of sound visually
Pedagogical Challenges

- 4 sound analysis tools
- 27 self-study, interactive tutorials
- over 250 photos, sound examples, and videos
- utilizes visual, aural, and tactile learning modalities for students of different backgrounds..
Pedagogical Challenges

...but still was not very effective; especially the first time I used it.
Pedagogical Challenges

...very bitter experience
Pedagogical Challenges

Natural focus on

1. functionality
2. content
Focusing on

1. functionality; what cool things could we do?
2. content

Can lead to *expensive* and marginally effective materials
Pedagogical Challenges

Easy to overlook

• educational design
  • how will this app integrate, pedagogically, into the course?
Pedagogical Challenges

Easy to overlook

• educational **design**
  • how is the content going to be reviewed and contextualized?
Pedagogical Challenges

Easy to overlook

• design of navigation and flow
Pedagogical Challenges

Easy to overlook

• **design** of navigation and flow
  • Are there **visual** and **conceptual** prioritization?
Pedagogical Challenges

Easy to overlook

- **design** of navigation and flow
  - Are there visual and conceptual prioritization?
  - How is the eye going to be guided to the most important images/ideas on the page?
Pedagogical Challenges

Easy to overlook

- **design** of navigation and flow
  - Are there visual and conceptual prioritization?
  - How is the eye going to be guided to the most important images/ideas/navigational tools on the page?
  - Will the navigation and hierarchy of information be transparent?
Pedagogical Challenges

Most find the functionality and content of i-WAIL impressive, but

**Major design problems**

1. does not guide the user on how to use it
2. does not inform the user of why any of it is important
3. does not review material nor resent problems
4. flow of menus and content not obvious to user
5. far too much material for a single application -->
6. overwhelming and does not give students confidence
7. ‘Un-fun’
8. Etc
9. etc.
Pedagogical Challenges

Our design priorities
Pedagogical Challenges

Design

(1) their overall design must be transparent
  • easy/fun to use, and aesthetically pleasing
  • they must compete in the mobile ecosystem of other apps, all vying for their attention; and
Pedagogical Challenges

Purpose

(2) the apps should **target specific pedagogical problems**

- demonstrably difficult to address in the classroom;
Pedagogical Challenges

Significance/motivation

(3) crystal clear to the student

- *why the app’s content is important* to them
- *how it will be used and/or assessed in the course*
Significance switch: is this important enough to be processed for long-term memory?

Profrontal cortex (working memory)

Switch: is this important to me?

Processes for long-term storage: (limbic system, thalamus, hippocampus, amygdala, etc.)
Ubiquitous Learning

Relatively little information on:

• types of apps most effective
• use in various disciplines/pedagogies
Goodwin and Highfield proposed three broad categorizations

1. Instructive
2. Manipulable (*subject-area & reference*)
3. Constructive apps
1) Instructive apps

• promote rote memorization of content through recall and drill-and-practice activities.

• often with flashcard interface
App Categories

1) Instructive apps

Example - *Music Technology Glossary*
App Categories

Home screen and example front/back screens
Unlike an exam, feedback is instant,
App Categories

and can be pronounced (promote use of earphones).
Design informed by above requirements:

1 – use & navigation is transparent
2 - targets specific pedagogical need
3 – emphasizes its significance

• via a ‘why the app?’ screen.
App Categories

Presented first time app is used and on home screen:

• why the app’s content is important and
• how it will be used and/or assessed in the course
Although low on rigor these are high in significance:

• can help understanding lectures and discussions
• can help build confidence
App Categories

Although low on rigor these are high in significance:

- Enable more higher level learning in class
- able to apply in solving complex problems
Manipulable (*subject-area apps*) offer students guided discovery

- Example: 20th Century Music Study Guide
App Categories

20th Century Music Study Guide (guided listening)

• Typical screen order:
  • select piece, listen, and read points to remember
App Categories

20th Century Music Study Guide (guided listening)

- Also has gaming engine (self-test) for fun and to monitor improvement
App Categories

**Manipulable (reference apps)** Example: Chinese Medicinal Plant Database

- Typical screen order:
3) Constructive apps

- transform learned information into usable forms
- create learning artifacts
  - (e.g. videos, creative writings, images, multimedia presentations, visual representations of their learning)
3) Constructive apps

- with these type of apps, efficacy of using mobile technology, vs. in-class or individual contact becomes less clear.
Conclusions

Focusing exclusively on *functionality* and *content* can lead to:

- marginally effective educational apps
- may not be worth the effort
Conclusions

Content developers and programmers are not necessarily good, trained designers.
Conclusions

Best to get help from people who are trained in design, who know

• How to avoid classic design mistakes
• Have sensitivity to alignment and other elements.
Conclusions

Best to get help from people who are trained in design, who know how to use
• Proportions
• Shapes
• Fonts
• Colors etc.
to convey the message you want to emphasize
Conclusions

Get design help.