Spotlighting Innovative Use Cases of Mobile Learning

Samantha Eastman, UC Riverside
Alex Rockey, UC Davis
Ubiquity of Mobile
“American adults collectively check their phones 12 billion times per day, according to a 2017 Deloitte survey” - Real Simple magazine, June 2018

“According to a 2017 survey by eMarketer, the average adult spends 12 hours a day connected to media.”
- Southwest the Magazine, May 2018
Background of Our Project

More
(Pew Research Center, 2018)

More

More

Our question: How are faculty utilizing mobile technologies to support student learning across UC campuses in innovative ways?
Background of Our Project

Instructional Design
Faculty Support Group
Mobile Learning SIG

We have questions!

1. What is mobile learning?  2. What is being done on each campus?
Research Design

Pedagogy
Use cases from UC courses
(IRB)

Tech Infrastructure
WiFi in classrooms
Device ownership
Mobile access to LMS
Pre-Session Poll

https://tinyurl.com/mobilelearningELD
Crowdsourcing a Definition of Mobile Learning

- With a group, create a definition of mobile learning drawing from some of the keywords generated with the Pre-Session Poll.
Defining Mobile Learning

- Contextualize & Individualize Student Learning
- Dynamic Tech Ecosystems
- Learner Mobility & Flexibility
Defining Mobile Learning

● Educause definition:
“Using portable computing devices (such as iPads, laptops, tablet PCs, PDAs, and smart phones) with wireless networks enables mobility and mobile learning, allowing teaching and learning to extend to spaces beyond the traditional classroom. Within the classroom, mobile learning gives instructors and learners increased flexibility and new opportunities for interaction” (Educause).

● Our definition for participants:
Anything that's done on a device that is or could be mobile that has to do with instruction that's happening inside or outside the classroom.
The Continuum

“Classification of mobile technologies” (From Naismith et al., 2004)
<table>
<thead>
<tr>
<th>Theme</th>
<th>Key Theorists</th>
<th>Sample Activities</th>
</tr>
</thead>
</table>
| Behaviorist learning          | Skinner, Pavlov        | ● Drill and feedback  
                              ● Classroom response systems                                                   |
| Constructivist learning       | Piaget, Bruner, Papert | ● Participatory simulations                                                       |
| Situated learning             | Lave, Brown            | ● Problem and case-based learning  
                              ● Context awareness                                                              |
| Collaborative learning        | Vygotsky               | ● Mobile computer-support collaborative learning (MCSCL)                           |
| Informal and lifelong learning| Eraut                  | ● Supporting intentional and accidental learning episodes                          |
| Learning and teaching support | n/a                    | ● Personal organization  
                              ● Support for administrative duties (e.g., attendance)                         |

*Characterizing Mobile Learning in Higher Education (Adapted from Naismith et al., 2004)*
Use Cases:

- iPads for Field Mapping (Geology)
- Understanding Research Methods (Psychology)
- Cross-Cultural Interactions (Spanish and Applied Linguistics)
- Supporting Peer-to-Peer Learning (Microeconomics)
- Chromebooks in Lab (Biology)
- Community Partners Projects (Business/Advertising)
- Snapchat to Identify Species (Biology)
- Pokemon Go for Applying Sampling Methods (Ecology, Evolution and Marine Biology)
- Discussion
Intended Learning Outcomes:
Students conduct research in the field to:
• identify where things are on the map
• navigate
• recognize landforms
• build maps based on what they see, and
• mark up a map in a way that communicates those things to other people

Students:
Research, observe, co-create, interpret, apply

Instructional Approach: Field mapping using tablets

Teaching and Learning Theory: active learning, situated, constructivist

Golden Thread: “teaching field skills to...the next generation of geologists” in real-world contexts that allow students to assimilate, synthesize, associate, and apply knowledge and skills obtained through prerequisite coursework to a new project or problem
Nicolas Barth, UC Riverside

iPads for Field Mapping: Summer Field Geology (Geology 102A/B), 7-30 students

**Course Description:**

- An immersive, intensive field training in the collection, interpretation, and communication of geologic data
- Covers advanced geological mapping, sections, and production of professional geological reports
- Runs for five weeks straight based at UC reserves in eastern California.
- Project-based; students grapple with real-world scenarios, i.e., evaluate how stable this road is or is this a good place to build the building?
Assignment Progression:

1. One, eight-day project using paper mapping
2. One, one-day excursion to learn how the tablets work and how to use them.
3. One, two-three day mapping assignment using tablets

Students:

- write reports
- interpret different geology
- make decisions concerning effective land use and natural hazards.
- annotate on photos of geologic outcrops
- collect data in the field and pull it into Google Earth
- work in groups to map out quads, and then stitch maps together for working on areas that might be too large for one group to map at once
Nicolas Barth, UC Riverside

iPads for Field Mapping: Summer Field Geology (Geology 102A/B), 7-30 students

Successes:

• Creates efficiencies in data collection processes
• Provides opportunities for students to develop highly sought-after, digital skills
• Simplifies concepts relating to spatial orientation through dynamic, graphical representation
• Provides opportunities for group work/student-student collaboration and communication
• Reduces the technology skills gap among students; Intuitive
• Simplifies cheating prevention
• Improves students’ abilities to master geologic interpretation
Nicolas Barth, UC Riverside

**iPads for Field Mapping: Summer Field Geology (Geology 102A/B), 7-30 students**

**Challenges:**

- Finding a system
- Apple’s approach to operating system updates; when third-party app developers can’t keep up with new updates, it can “brick it”, or there may be bugs
- Occasional software crashes, but data is not lost
- Sometimes the iPads overheat
- Maintaining group morale so students remain productive
- Obsolescence of devices; Sustainability

**Resources:**

- Mobile Learning Use Case eHandout
- UCR GeoPad Digital Field Mapping System
- UCR Summer Field Geology Rubric

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“I enjoyed the iPads tremendously. They were far more convenient to carry around and take measurements with than the traditional map boards and I do think they enhanced the understanding and mapping efficiency of the various areas.”
### Use Case for Understanding Research Methods

#### Research Methods in Psychology, 200 students

**Learning Outcomes:** Students will apply research methods and critical thinking skills to answer the Monty Hall Problem

**Instructional Approach and Integrated Technology:** Quickly generate and instantly visualize data using Google Forms and iClickers

**Teaching and Learning Theory:** Constructivist and Collaborative (Naismith et al. 2004)

**Golden Thread:**
- “Bringing the hard work into the classroom”
- “Feel the research”

### Successes:
- Increased accountability and engagement
- Increased student participation
- Generates data that approaches established ⅓ and ⅔ outcomes

### Challenges:
- Dependence on WiFi
- Limited numeric entry on iClickers
- Difficulty of writing “good” iClicker questions
- Changing technologies
- Digital literacies and students’ ability to navigate tools

### Resources
- **AudioBlog Entry** on *The Wheel*
- **Lecture capture** from 4/5/18
<table>
<thead>
<tr>
<th>Robert Blake, UC Davis</th>
<th>Use Case for Cross-Cultural Interactions</th>
<th>Spanish and Applied Linguistics, ≈55 Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Outcomes:</strong> Students will participate in class discussions to develop cross-cultural understanding</td>
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<tr>
<td><strong>Instructional Approach and Integrated Technology:</strong> Encourage all students (both bilingual native speakers and second language learners) to participate more frequently and more meaningfully using technologies like Nearpod, Socrative, and Google Forms</td>
<td></td>
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</tr>
<tr>
<td><strong>Teaching and Learning Theory:</strong> Constructivist and Collaborative (Naismith et al., 2004)</td>
<td></td>
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<tr>
<td><strong>Golden Thread:</strong></td>
<td></td>
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<tr>
<td>● “Interaction is where it’s at”</td>
<td></td>
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<tr>
<td>● “Conversations that are mediated by technology seem to be freer”</td>
<td></td>
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</tbody>
</table>

**Successes:**
- Generates a wide variety of language use (bilingual and second language learners)
- Allows for anonymous participation

**Resources:**
- Discussing Canvas in CIO Report
- AudioBlog Entry for The Wheel

**Challenges:**
- Digital literacies and students’ ability to navigate tools
- Liability of certain out-of-class activities
- Changing technologies
Jim Burnette, UC Riverside

Chromebooks in Lab: Dynamic Genome (BIOL 20), 24 students/section (8 sections)

**Intended Learning Outcomes:**
Students explore scientific discovery using the tools of bioinformatics and genomics, while applying computational and experimental approaches to investigating the genomes of plants and animals for authentic research projects being conducted on campus.

**Teaching and Learning Theory:** active learning, situated, constructivist

**Students:** explore, investigate, interpret, apply, document

**Instructional Approach:** Students use basic bioinformatics tools for DNA sequencing, analysis, and visualization, while also developing their bench skills and maintaining a laboratory notebook.

**Golden Thread:** Students apply the scientific method, experience how a scientist works, learn what science is, and how to “do” science in order to understand how all the information in textbooks is generated- by using an experimental approach.
Chromebooks in Lab: Dynamic Genome (BIOL 20), 24 students/section (8 sections)

Course Description:

- Hands-on, laboratory environment
- Can accompany any of the 4-unit, introductory Biology lecture courses:
  - BIOL 005A “Introduction to Cell and Molecular Biology”
  - BIOL 005B “Introduction to Organismal Biology”
  - BIOL 005C “Introductory Evolution and Ecology”

Purpose: To successfully identify TE insertion polymorphisms between three different strains of maize and comparing the execute a PCR experiment to isolate and analyze the DNA surrounding the TE insert in the maize DNA.

Materials:

- large 1.5 ml tubes
- small 0.2 ml tubes
Chromebooks in Lab: Dynamic Genome (BIOL 20), 24 students/section (8 sections)

Assignment Progression:
1. 4 weeks learning background and skills
2. 4-5 weeks working on an authentic, UCR project

Students:
• discover DNA bioinformatics using Muscle and Blast tools
• sequence genetic information using Genome Browsers
• isolate new variations of genes, i.e., generated by a CRISPR cassandine mutagenesis
• amplify genes with desirable traits, i.e., resistance to drought, or to white fly attacks
• use cell phone cameras to record microscope images of gels on which to annotate
• document findings in electronic notebooks
• develop hypotheses and design experiments

Chapter 1: Introduction and Basic Lab Skills
• Experiment 1: Experiment 1
• Chapter 2: Genetic Information Transfer
• Chapter 3: Gene Structure
• Experiment 1: Experiment 1
• Chapter 4: Finding Exons and Introns
• Chapter 5: Genome Polymorphism
• Experiment 2: Experiment 2: Polymorphism
• Chapter 6: Bacterial Transformation
Jim Burnette, UC Riverside

Chromebooks in Lab: Dynamic Genome (BIOL 20), 24 students/section (8 sections)

Successes:

- Scientific inquiry among students participating in experimentation on real-world projects allows for authentic exposure to help advance and to accelerate research
- Research findings can be used to i.e., “modify agriculturally important varieties (of alfalfa)”
- Students use Chromebooks fairly easily because of both touchscreen and keyboard options, plus the devices take up less space than traditional laptops
- “Ease of use” removes technology barriers, allowing students to focus on learning biology
- Over 90% of students from Biology 20 students will make an A or a B and 5A, while 43% of students who take 5LA will make an A or a B
- e-Notebooks allow students to capture data electronically, which saves money in printing costs and streamlines documentation for assignments, while shortening turn-around for which instructors provide feedback, and modeling industry-standard, electronic record keeping processes that ensure replicability
- Students who previously have little access to technology gain exposure and develop technology fluency
- Assignments are primarily web-based, and easily integrated with the Google Apps for Education suite
Chromebooks in Lab: Dynamic Genome (BIOL 20), 24 students/section (8 sections)

Challenges:

- Development of bench skills while using devices poses a challenge due to limited physical space
- Students often enroll with very little exposure to use of mobile devices
- Sustainability with lab sets that have a shelf-life; there’s a lack of funding sources for maintaining and replacing devices
- Students will need to be able to create and interpret graphs; need to identify a graphing solution

Resources:

An Open Source, Collaborative Electronic Notebook for Undergraduate Laboratory Classes
Sherryl Berg-Ridenour, UCR

Community Partners Projects: Advertising (Business 117), 80 students

**Intended Learning Outcomes:**
Students demonstrate how advertising is part of an integrated marketing communications (IMC) plan by applying the theories and principles of advertising.

**Teaching and Learning Theory:** active learning, constructivist, behaviorist, situated, collaborative

**Students:** research, observe, collaborate, interpret, apply, examine, manage, communicate

**Instructional Approach:** In groups of 6 or 8, students run a six-week social media marketing campaign on behalf of community partner business and service organizations, adjusting based on analytics relating to followership to extend the partner’s reach and impact in promotion of services or programs.

**Golden Thread:** To understand how an advertising campaign is run, to see how mobile devices can actually add to the communication strategy, to see how they can use all of the latest technology to increase productivity, and to see how they can use the mobile devices to stay in touch with the group to accomplish a task.
Community Partners Projects: Advertising (Business 117), 80 students

Course Description:

- Emphasizes an application of the principles of advertising to the marketing of services and ideas.
- Focuses on advertising as part of an integrated marketing communications (IMC) plan.
- Provides an understanding of the broader role of advertising for organizations and marketing communications elements and has a community active partner integrated in the class.
### Assignment Progression:

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
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<tbody>
<tr>
<td>OCT 26th</td>
<td>YouTube Introductory Video posts</td>
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<tr>
<td>NOV 2nd.</td>
<td>Straight sell &amp; Emotional appeal ads posts to media (2)</td>
</tr>
<tr>
<td>NOV 9th</td>
<td>Emotion/Humor appeal for Thanksgiving</td>
</tr>
<tr>
<td>Extra Credit (Nov 21st)</td>
<td>Blog/Vlog Challenge “Slice of Life”</td>
</tr>
<tr>
<td>NOV 23rd</td>
<td>Demonstration/Testimonial</td>
</tr>
<tr>
<td>NOV 30th</td>
<td>Story Telling or Dramatization Video</td>
</tr>
</tbody>
</table>

1. Community partner-client are assigned to groups, with whom students meet regularly
2. Students take on individual roles within groups

### Students:
- create ads based on six theories of advertising
- post ads to social media platforms
- watch analytics to see which ads do better and why
- refine tone, wording, and graphics of ads to increase followership
- define personas based on patterns of who's tuning in and when
- adjust ads based on behaviors, attitudes, opinions, and interests of audience
- document the findings in a final paper and to a client
Sherryl Berg-Ridenour, UCR
Community Partners Projects: Advertising (Business 117), 80 students

Successes:
• Impacts the local community in a very positive, meaningful way
• Simplifies monitoring analytics on ads; Access; Immediacy
• Simplifies communication with/among the team and with the client
• Facilitates course management for the instructor
• Helps students with documentation, communication, project management, progress tracking, and collaboration using calendaring, and with the ability to exchange materials or ideas

• Zoom web-conferencing allows students to schedule distributed meetings with one another and with clients, bringing community into the classroom
• Kahoot! web-based polling platform allows for assessments to ensure that students understand the theories and principles of advertising
• Tools/platforms are easy to use; students want to use them, and students scale up very quickly
• Clients often offer internships or letters of recommendation after the course has ended, and clients return
Challenges:

- Calendaring compatibility across both Apple and Android OSs
- Monitoring all groups’ activities so they keep pace with assignments
- Some tools/platforms are better for certain purposes than others

Resources:

- Mobile Learning Use Case eHandout
- Community Partners Profile Sheet
- Article
- Community Partners Meeting Presentation
Kristin Kiesel, UC Davis

Use Case for Supporting Peer-to-Peer Learning

Intermediate Microeconomics, 140 students

Intended Learning Outcomes:
Students will:
“1. Understand economic theories related to imperfect competition applied in many important contemporary fields of economics (e.g. game theory, industrial organization, environmental economics, behavioral economics, and game theory).
2. Be able to apply these theories verbally, graphically, and mathematically in order to analyze complex real world issues.”

Instructional Approach and Integrated Technology:
Foster active student engagement, independent learning from their own questions, and team-based learning using an integrated approach including iClickers, a quarter-long team project, and videos in which students are the presenters.

Teaching & Learning Theory: Collaborative learning (Naismith et al., 2004)

Golden Thread: Foster active student engagement inside and outside of the classroom

“A lot of the technology I'm using is…to allow me to use my class time more effectively and support their learning that…happens outside of the classroom.”

Successes:
● Using student evaluations to guide incremental additions to the course design

Challenges:
● Ensuring students have done their reading when flipping the classroom
● Maintaining active learning in a 140-person classroom
● Gaining access to the active learning classroom
Supporting Peer-to-Peer Learning (Microeconomics)

Team-Based Project

Instructions for the OPFC Game

WHY do I want you to play this game?
1. Learning is not a spectator sport! This game allows you to apply the material covered throughout the quarter in a real world setting. Applying the material does not mean plugging in numbers in equations (provided you with, or referring graphs) showed you. Please try to challenge yourself in making strategic decisions based on incomplete information and inaccurate incentives. Challenging yourself and making mistakes are an important part of the learning process.

2. You will play this game in teams. Working in teams and exploiting context to peers has been shown to enhance learning. It is also the primary working environment you will encounter in today’s business world. Mastering these situations is a key competency you professional success will depend on.

3. This game is a powerful demonstration of an important principle in economic theory: it simplifies an otherwise complex situation, provides insights into the underlying constraints faced by market actors, and allows making sensible predictions regarding the resulting market outcome.

HOW do you play this game?
In the OPFC game, you will be assigned to a team (one of seven OPFC countries in game A, B, C, or D), resulting in 20 teams total. The assignment is based on the sections you signed up for.
Your team controls the oil production of your country. The countries correspond to Saudi Arabia, Iran, Iraq, Kuwait, United Arab Emirates, Venezuela, and Nigeria. In the game, we also have other countries supplying oil to the world market (e.g. the U.S. and Russia among others that make up the rest of the world’s supply of 13).

We will play the game for 10 periods during which you will have to submit a quantity of oil your country wants to produce and sell. You will also have to submit a score at the end of the quarter that allows you to measure and reflect on your decisions throughout.
The 10 periods are divided into three years. Each year includes a slight change of the rules of the game. The first year has only two periods, in which all 15 teams are combined into one game. The second year includes three periods for each OPFC country and three non-OPFC countries such as A, B, C, and D. In the second year, you communicate and negotiate the other OPFC countries in your group to produce an amount that is not less than your country's quota. Your country’s quota is based on the amount of the previous year's production.
The third year consists of three periods. The OPFC country and non-OPFC countries answer questions such as: what is the current market price, and what is the cost of production. The OPFC country must submit a reasonable production quantity based on the market price.

Your goal is to maintain your country's profit over the next 10 periods, taking into consideration your production costs, production capacities, and total resources. This information is

Peer Produced Videos

iClickers
SnapChat to Identify Vertebrate Biology Lab, 40-50 students

Intended Learning Outcomes: Memorize 150+ birds, amphibians, mammals and bones in 9 weeks. Help students who have test anxiety get used to the timed testing environment for the class final.

Instructional Approach: Create a flash-card, pop-quiz way for students to memorize the specimens. Bombard students with pictures of the specimens even when they weren’t in class, but not have a stream or thread of information that they could go back to. She posted 2-5 pictures/day.

Teaching & Learning Theory: Collaborative, Informal and Lifelong

Golden Thread: The only negative comment I got was, “I wish there was more.” There is also this secret objective: that they love learning. It really should be like, “Wow, this is cool!”

Successes:
Some students added their snaps of birds to the chat. Students were talking about birds outside of class. The students were more social and friendly during lab than other labs she’s TA’d, and all came to lab even though it wasn’t required and went from 9-11pm. A few students from other classes joined the SnapChat group and lab.

Challenges:
Had to ask a student how to use SnapChat photo editing tools.

Resources:
Presentation at UCSB Grad Student Teaching Symposium 2018:
https://gauchocast.ucsb.edu/Panopto/Pages/Viewer.aspx?id=1ed8fe83-9f8c-43a2-8ee3-a8f001230dce
Pokémon Go, Google Forms, Google Spreadsheets

**Intended Learning Outcomes:** Students use ecological sampling techniques and compare different types of sampling methods and distribution of Pokémon in different geographical areas using Pokémon Go. Students report their Pokémon collection to create a large data set (Google Form). Student groups use the large data set to develop a research question based on hypotheses they generate based on primary literature that can be answered using the data. Students then analyze the data in R Studio, and write a short scientific paper about their findings and how their sampling techniques and the different geographic locations may have affected those findings.

**Instructional Approach:** Students had to choose a geographical location, determine its boundaries, and collect Pokémon in that area for 120 minutes total. They had to note time, date, weather, location, and other environmental features of their sampling area on a Google form, which collected everyone’s data in a Google spreadsheet. The class then used the data from the spreadsheet to develop research questions, investigate that question, and write a short research paper on it.

**Teaching & Learning Theory:** Collaboration, Flexibility, Project Based Learning

**Successes:**
Preliminary review of student work and survey shows that students achieved the learning outcomes much better than previous years.
Discussion: Emerging Themes

● Successes
  ○ Increase participation and engagement
  ○ Instantly generate and visualize large data sets
  ○ Creates efficiencies and saves resources
  ○ Create “appropriate” and “relevant” uses of technologies during class time

● Challenges
  ○ Changing technologies
  ○ Digital literacies and students’ ability to navigate tools
  ○ Cost; Management
  ○ Infrastructure
    ■ Access to active learning classrooms
    ■ Access to WiFi
Discussion

In what ways can we support or implement innovative and effective uses of mobile technologies?
Questions?
References

https://library.educause.edu/topics/teaching-and-learning/mobile-learning

http://www.pewinternet.org/fact-sheet/mobile/

SESSION EVALUATION

1. Go to the online program:
   https://eldc2018.sched.com/
2. Click on the session title to view description
3. Fill out feedback form

EMERGING LEARNING DESIGN CONFERENCE 2018