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Using Mobile Personal Response Systems in Large Classroom to Enhance Engagement and Active Learning

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Motivation

- Business School students are seeking active learning experience (Auster and Wylie, 2006)
- Active participation is an essential aspect of T&L strategy (Charlmers and Fuller, 1996)
- As lecture is the dominant teaching method in business schools, it might be difficult to implement active learning in large class sessions (Alsop, 2006)
- Shy students won't be actively engaged in the in-class activities, moreover uncomfortable environment created by such in-class activities may result in poor assimilation of the material by these students (Weltman, 2007)

Solution: **digital interactive activities** can help to increase effectiveness of the learning process, and also satisfy students' expectations. (e.g. Caldwell, 2007; Beekes, 2006, and Weltman, 2007). **Personal response systems (PRSs)** can improve classroom learning by stimulating and motivating students. The usage of mobile PRS allows teachers to get immediate feedback from students, awake students' interest to the subject, and keep up with the times.

However, PRS is not costless technology. An alternative solution is usage of **mobile PRSs.** Majority of recent papers explore usage of an online instant response system "Kahoot!" in teaching (e.g. Plump and Rosa (2017); Boden and Hart (2018)), while the literature is almost silent about other mobile student response systems.

The Project

We use **various mobile PRS** in teaching "Public Economics" for around 400 undergraduate year four students. The module was delivered at the University of Nottingham Business School in China in Spring 2018.

The project aims to answer the following research questions are expected to be answered in :

- How is the students' engagement and motivation affected by usage of mobile PRS in the classroom?
- How is the students' perceived learning affected by the use of a MPRS?
- What MPRS do students prefer to use? What factors determine students' preferences?

This study uses anonymous questionnaire, which is based upon Elliott (2003). At the end of the semester a group of UG students (approx. 400) was asked to complete a short online questionnaire regarding their experience in the module, which used PRSs in each lecture. Students were also asked to leave their feedback about each PRS they tried.

Table 1. Summary of Students' Responses

Question	Average	Strongly Agree (5)	Neutral (3)	Strongly Disagree (1)	Std. Dev.
I enjoyed using online applications in class.	4.72	78%	5%	0	0.58
It was easy to use a mobile device to participate in quizzes, experiments and polls.	4.75 (4.96)	82%	4%	0	0.63
I learnt something from participating in the online quizzes, experiments and polls.	4.74	79%	4%	0	0.55
Using online applications increased my enjoyment of lecture.	4.65 (4.3)	76%	6%	0	0.74
Using online applications has encouraged me to attend lecture.	4.68 (3.6)	77%	4%	0.9%	0.69
Using online applications has helped my concentration level in lecture.	4.65 (4.3)	76%	6%	0.5%	0.74
Using online applications increased my confidence on this course.	4.45 (3.8)	67%	10%	1.4%	0.92
I would like to use online applications in other modules as well.	4.64	75%	6%	0.9%	0.75
Number of participants				212 (out of 403)	

Note: The numbers marked by red color show results of Elliott (2003)

Various mobile PRSs

In the module "Public Economics" we used the following mobile PRSs

MS Office Forms https://forms.office.com/ (University ID associated)
VoxVote http://www.voxvote.com/ (unlimited number of events and users for registered Universities)
Kahoot! https://kahoot.com/ (Gamification element, team mode)

The comparison of these PRSs is summarised in Table 2, which shows that "Forms" is the most convenient tool to run short quizzes, assess students' performance and check their attendance, but it has no gamification elements, and therefore not very suitable for an in-class experiments or simulations. **Interestingly, when we ask students which application they like the most 97% of students choose either VoxVote (48%) or Kahoot!(49%), and only 3% of students choose MS Office Forms.**

Table 2. Comparison of Mobile PRSs

Category	Feature	Forms	Kahoot!	VoxVote
Design	Question types			
	Multiple answers			
	Time limit per question			
	Gamification elements			
Settings	Show results after submission			
	Record name			
	Opening time control			
Join	QR code			
	HTML			
	Room/event number			
Response collection	Response overview in real time			
	Statistics per question			
	Export to excel			
	Post/send results			

Students' Opinion about the Platforms

VoxVote

+	−
Easy to use Convenient Design No time limit Interactive Quick& easy access	Not fun/ boring design Cannot review the question afterward The pin code is hard to be noticed We can see answer of other students, this may influence our own choice

Kahoot!

+	−
Competition Music Colorful Design Interesting and attractive Quick response Easy to use	Distracting Background music Different room code every time Do not see the questions afterwards Student may focus more on score than on the question Inconvenient to have the questions & answers on the screen rather than our own devices

Forms

+	−
N/A	Not fun/boring/ not interactive Design is too fixed/ not flexible Needs more compulsory questions to encourage usage

Limitations of PRSs

Technology

- Problem with access/ bad internet
- No option to review questions after the activity
- PRSs do not provide feedback
- Boring design

Moderation

- Limited time to answer questions
- Short time to log in
- Forget PIN/ cannot see PIN
- Not enough time for reflection
- Easy questions/not challenging

Participants

- Low participation rate
- Distraction ("students might start to check their phone after voting")
- A challenge may increase diffidence

Conclusions

- Students' perceived engagement, motivation and enjoyment of the lectures increased when the mobile PRSs were implemented in the lecture.
- Strong preference for "Kahoot!" and "VoxVote" rather than "MS Office365 Forms", suggesting that students find the entertaining elements of these technologies an aid to their concentration as they create more comfortable environment in the classroom.
- Interestingly, there are two groups of students of relatively same size – competitive and competition-averse.
- There is no significant evidence of positive effect of the competitive nature of the applications; instead, the core factors to keep students engaged are quality and interest of the organized interactive activities.

Practical Recommendations

- Spend some time in the first class precisely explaining students how to use application. Repeat the instructions **every time** you run the activity.
- Design interesting/challenging activities via mobile PRS.
- Allow **enough time** for students to access the platform.
- Show clearly the **access code**/ link/ QR code.
- Check number of the participants who entered the application, and encourage others to participate as well (e.g. set a participation threshold when you start the activity).
- Allow **sufficient time** for students to think and answer the questions.
- **Do not overuse** mobile PRS, students might get bored of it

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