QuestionMark Perception Quizzes & Mobile Phones

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Project Background

Molecular Microbiology is a third-year course with 80-90 students. In the previous years, students encountered one QuestionMark Perception (QMP) test session in a computer lab. This year there were several sessions (QMP1-4, constituting 16 quizzes), spread over the semester (11 weeks). QMP1 was computer-based and used for technical training and course revision, whilst QMP4 was a computer-based, summative assessment which covered the entire course material. QMP2 and 3 were focused on specific course sections. QMP1-3 each contained 5 quizzes, and were each made openly and repeatedly accessible for 3 week intervals, to discourage end of course 'exam cramming'. Students were also given a range of interchangeable options in terms of mode of access for QMP1-3: via computer, via phone web browser or via Smartphone app. The aim here, was to provide preliminary insight into whether students wished to utilise brief 'study pockets' for self testing during their 'personal' time and also, to provide deeper insight into their working environments and study patterns. For this latter aspects of the study, student volunteers were enlisted to produce video diaries or provide information on their location at the time of access to the test sessions.

Quantitative User Data

Before the projected started, a quick survey was carried out to investigate the students' usage of mobile phones. The survey revealed that almost every student owned a mobile phone (98.9%), and the majority of the phones had web browsers (65.5%) with monthly Internet data allowances (64.4%). The percentages of smartphones that were able to use the QMP Apps were also moderately high (Android phones 28.7% and iPhones 20.7%). Hence, 12 of the 16 quizzes were specifically designed to be suitable for the QMP Apps for both Android phones and iPhones. The QMP server recorded the students' access time and performances for QMP1-3 quizzes, and 12 of the quizzes also included questions that asked students to indicate the kind of devices they used to access the quizzes, where and why they used the particular devices.

In 308 instances the students reported how they were accessing the online quizzes (Table 1). Only a minority of students used their mobile phones to access the quizzes, however, among these students slightly more of them (9.7%) tended to use the apps rather than the phone web browsers (8.7%). Table 2 shows the three sets of quizzes had considerably varied usages from individual users. As expected, QMP1 at the start of the course attracted reasonable attention, whereas the majority of students hardly used QMP2 in the middle, but near the end of the course QMP3 saw a peak of usage (Median=4.0).

Table 1: Access Devices

Mobile Phone Apps	Mobile Phone Web Browsers	Computer	Mobile Tablet	Other
9.7%	8.7%	78.6%	1.9%	1.0%

Table 2: Access Frequency

Number of Access	QMP1	QMP2	QMP3
Minimum	0	0	0
Maximum	34	61	80
Median	1.5	0	4.0

Table 3: Locations & Reasons for Using Mobiles

Mobile Phone	Locations	Reasons
Apps	Internal (home, library, etc)	'I have free time as my practical section today is relatively short'; 'Its half time. Marseille (0) vs Arsenal (0)'
Browsers	External (bus, train, chaplaincy, etc)	'waiting for praying'; 'waiting for a friend'; 'killing time travelling on the bus'

When students used their mobile phones to access the quizzes, generally they were either in their usual study locations (e.g., home, library, lab) or on travel (e.g., bus, train). Occasionally, some students tried the self-tests in more public areas such as a park or a chaplaincy. However, all their reasons for using the quizzes pointed to a tendency to fill in unexpected or transient short period of free time with some learning. Table 3 lists some typical answers that illustrate students' 'ad hoc' use of the online resources while waiting for something else to happen.

Table 4: Access Frequency vs Performance Correlation

	Academic Performance	Ranking of 2nd-year Average	Ranking of QMP4
Total Use of QMP1-3	Spearman (2-tailed)	.44**	.37**
	No. of Cases	84	84
For the students whose ranking in the class improved since 2nd Year			
Total Use of QMP1-3	Spearman (1-tailed)	--	.55**
**. Sig at .001 level	No. of Cases	--	41

The Spearman correlation tests in Table 4 demonstrate that significant positive correlations exist between the students' previous and current academic performances and their use of the online quizzes. In order to reflect the students' academic abilities more accurately, we did not use the absolute marks from their 2nd-year averages or the QMP4 test, but instead we used their ranking positions in the class. Unsurprisingly, the students who had done well in the second year were more likely to use the quizzes. The more a student used the quizzes, the better they performed in the final test in this third-year course (coefficient=.37). Moreover, when looking at the students whose rankings in the class rose up after the course (i.e., when 'Ranking of QMP4' – 'Ranking of 2nd-year Average' > 0), we found a positive correlation with an even bigger effect (coefficient=.55). This further suggests the possibility of a causal relationship between frequent use of the quizzes and improved academic performances.

Qualitative User Data

Four students from the cohort volunteered to provide learning diaries during the 10 weeks when the QMP 1, 2 and 3 quizzes were run. Each volunteer was asked to produce a total length of 3-5 minutes' videos each week, however, only 3 volunteers managed to produce continuous and meaningful learning diaries over the whole period of time. One student was very diligent throughout, whilst the other two provided less diaries during busier work periods.

The diaries provided valuable insights into student work patterns, organisation and time management, motivation, and experiences and expectations of the course. Here is a summary of key comments:

- Long questions, with tables, or those in a series, are hard to follow by phone
- QMP increases course topic interest and stimulates deeper thinking
- QMP can help instigate early learning of course material and organised exam revision
- Not all students are willing to commit to voluntary self-assessment, if a direct exam link of the same question style is not apparent
- Students would like the tests to be available throughout the entire course period; this might compromise the aim of continuous learning
- Self assessment dwindles at the busier times, particularly with less organised students
- Video diaries can be a useful record of self-development, and can be useful for self-reflection and for motivating better time management

Available Resources

Mobile phone ownership: 98.9%
Android: 28.7%; iPhone: 20.7%

Web browser on phone: 65.5%
Monthly data allowance: 64.4%

QMP: 16 quizzes accessible through web browsers or Smartphone apps

Student Usages

93 students

1421 Completed Access

Each student's total use of all quizzes:
Min: 1 time; Max: 127 times
Mean: 15 times

Student Reflections

32 learning diary videos from 4 student volunteers Over 10 weeks

Video lengths ranged from 12 seconds to 5 minutes

Volunteers' performances on the end-of-course test: Low, Medium & High

Conclusion

This study shows that, technically, the undergraduate students in this university are well equipped for ubiquitous mobile learning. However, most students on this course did not make use of the freely available online quizzes through their mobile devices. They still preferred to work on their computers. The small percentage of students who used mobile phones to access the quizzes were normally doing so whenever they happened to have brief periods of free time. It seems most students didn't seem to regard their mobile phones as a learning tool. In total, the quizzes had attracted repeated use from the majority of students. The use of the quizzes might have been beneficial in that there were significant correlations between the usage and students' performances on the final test QMP4, especially among the students whose academic ranking in the class improved over the semester.

The learning video diaries have provided useful student perceptions on the strengths and weaknesses of the questions designed for mobile phone access. What was particularly interesting was that the academically strong and average students both considered the online quizzes very helpful in instigating early learning of course material and organising exam revision, and suggested they should be available throughout the whole semester, whereas the relatively weak student regarded the quizzes as not useful because there was no direct link between the exam and the quizzes. In general, it seemed that the more able students seemed to enjoy the intended benefits of this extra learning opportunity while the low-achievers were not motivated even when it was easily accessible by either computer or mobile phone.

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