Case Study 5

Mobile learning

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List of abbreviations and acronyms

DFAQ	Dynamic frequently asked questions
LMS	Learning management system
OER	Open educational resources
SMS	Short message service
UCT	University of Cape Town

Introduction

In March 2007 Tim Berners-Lee, co-originator of the World Wide Web, predicted that 'in the future, the Web will seem like it's everywhere, not just on our desktop or mobile device'.[1] We are already seeing ways in which mobile technology is – increasingly – being adopted as a delivery platform for services of all kinds (New Media Consortium 2006).

Mobile technology and mobile learning

Cook, White, Sharples, Sclater and Davis reflect (2006) that until recently most mobile technologies had a solitary function – acting as a phone, a digital camera, a personal digital assistant, etc. These have now converged into a single device that offers a number of different functions and 'provide[s] new opportunities for both personal and informal learning'. Jones and Issroff (2007) point out the value of mobile technologies in supporting informal learning. They note that while mobile technologies 'were not designed as learning devices … institutions have tried to capitalise on their success and to use them in supporting "institutional learning" in various ways e.g. to remind students of assignments' (2007: 200).

Mobile learning in Africa

Mobile technologies are potentially very valuable, especially in developing countries, because of their swift take-up rate. Minges (cited in Moon 2007: 18) claims that in sub-Saharan Africa digital communication technologies are spreading rapidly and that Africa has the fastest growing telecommunication sectors in the world.

Moon speculates that 'within less than a decade widespread connectivity will become commonplace in even the most remote part of Sub-Saharan Africa' (2007: 19). His view is strongly supported by Atkins, Seely-Brown and Hammond who maintain that 'wireless cellular phone technologies offer new opportunities for OER [open educational resource] access, especially in the developing world' (2007: 35).

Mobile learning in South Africa

The availability of mobile phones in South Africa has spurred interest in how this technology can be appropriated for learning (Ford and Botha 2008; van Rooyen 2008; Czerniewicz 2004). The International Telecommunications Union, a United Nations agency, estimates that mobile cellular subscription in South Africa rose from nearly 14 million in 2002 to over

1 http://dig.csail.mit.edu/2007/03/01-ushouse-future-of-the-web [accessed 30 October 2008]

42 million in 2007, which means that just over 90% of the total number of telephone subscribers (landline plus mobile phone) in South Africa are mobile telephone users.

Table 1: Mobile phone penetration in South Africa

	Mobile cellular subscribers					As % of total telephone subscribers
	Thousands		CAGR[2] (%)	Per 100 inhabitants	Percentage digital	
	2002	2007	2002–07	2007	2007	2007
South Africa	13 702.0	42 300.0	25.3	87.08	100.0	90.1

Source: International Telecommunications Union[3]

By contrast there were only 4 279 000 internet subscribers in South Africa in 2007 (Table 2).

Table 2: Internet subscription in South Africa in 2007

	Internet				Broadband subscribers	
	Subscribers (thousands)	Subscribers (per 100 inhabitants)	Users (thousands)	Users (per 100 inhabitants)	Total (thousands)	Per 100 inhabitants
South Africa	4 279.2	9.02	3 966.0	8.16	335.1	0.70

Source: International Telecommunications Union (2008)[4]

Interestingly, at the moment there is greater interest in South Africa in the use of the internet in teaching and learning than the use of mobile phones for this purpose. According to Ford and Botha, the mobile phone 'is poised to play a major role in the stimulation of the information society and can be seen to be the most important networked knowledge exchange technology used in Africa today' (2008: 159).

Mobile learning at UCT

At the University of Cape Town (UCT), mobile learning is already being adopted for specific teaching and learning purposes. This paper describes the use of the Dynamic Frequently Asked Questions (DFAQ) tool, designed and developed at UCT by Dick Ng'ambi, as a

2 Compound Annual Growth Rate

3 http://www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx#

4 Ibid.

special-purpose question and consultation environment for students with a Short Message Service (SMS) interface which allows students and lecturers to pose and respond to questions using their mobile phones.

As an exemplar of the use of DFAQ, this case study describes how this tool is being used by lecturers in the School of Management Studies at UCT to support a section of the curriculum of the Organisational Psychology course. The study first describes the pedagogical need that spurred the use of DFAQ, explaining how the tool works and how it has been used by the lecturers and students, and then discusses how well it is perceived to be working. Finally, more general lessons are drawn from the case study for others who may be interested in using this type of mobile technology.

Background and methodology

This case study used a range of methods to investigate the use of DFAQ by the Organisational Psychology lecturers, including presentation and document analysis and follow-up interviews.

The researcher (one of the authors) attended a presentation by one of the lecturers as part of the Commerce Faculty's Education Group seminars. During this seminar additional comments were made by the other lecturer involved, as well as by a group of Honours students involved in the Organisational Psychology course who had been invited to attend the seminar. The researcher took copious notes and was later given a copy of the lecturer's PowerPoint presentation.

Using these notes and the presentation, the researcher wrote a draft report to highlight points that she needed the lecturer to clarify. The researcher then sent this four-page document to the lecturer and set up a follow-up interview. Additional notes were taken during the hour-long interview. The report was redrafted and sent to the lecturer for confirmation. This report forms the basis of this paper.

The researcher and her assistant also attended a presentation by the DFAQ tool designer, Dr Dick Ng'ambi. The notes they took there were combined with information from existing journal and conference papers (see Ng'ambi 2002a; 2002b; 2002c; Ng'ambi and Hardman 2004; Ng'ambi and Johnston 2006; Ng'ambi & Brown 2008; Ng'ambi and Knaggs 2008) to compile the section of this paper describing how the DFAQ tool works.

This paper was subsequently sent to both the lecturer and eventually co-authored with Dick Ng'ambi.

Dynamic frequently asked questions

The Dynamic Frequently Asked Questions (DFAQ) tool was designed and developed by Dick Ng'ambi at UCT as a special-purpose question and consultation environment for students and lecturers (Ng'ambi 2002a). It provides an anonymous medium through which students can consult lecturers, their tutors and one another (Ng'ambi 2002a). DFAQ uses the web as a platform and has a two-way SMS interface (Ng'ambi 2007). The web version of DFAQ (without SMS) was first implemented in a course in 2002 (Ng'ambi and Hardman 2004) and the SMS version was first used in 2005 (Ng'ambi 2006a; 2006b).

The DFAQ project began as doctoral research in 2002, aimed at designing an anonymous consultation environment to empower students to ask questions. It has since grown to include the features of mobile phones to widen access both to the tool itself and to knowledge resources the tool mediates.

The context of the project is a cosmopolitan institution where students come from socio-cultural backgrounds that lead to some student voices being mute in face-to-face interactions, while other voices dominate. The educational rationale is that, without students asking questions, it is impossible to gauge how much they have understood the content and what misconceptions, if any, they may have.

The premise on which DFAQ operates is that questions are a window into students' understanding, and embodied in these questions is information about what is known, what needs to be known, and what could be known – with some guidance. The educational goal of DFAQ is to help students learn from one another through anonymous consultations, and in the process reveal their knowledge through asking questions. It follows that a deluge of questions from a group of students (such as a class) has the potential of giving feedback to educators about what students know, need to know and can know. This understanding of DFAQ is important: although questions are triggered by current events or information needs, they give rise to non-expressive insights with potential impact on teaching.

The value of DFAQ as an educational tool lies in the multi-faceted ways it supports teaching and learning. At one level it is a convergence of three environments: the educative environment, the social environment and a communicative environment. Through DFAQ, seen as an educative environment, students invite peers, through questions, to help find answers to their problems, and educators learn from student postings about levels of student understanding and adjust their pedagogy based on these emerging learning needs. Through DFAQ, seen as a social environment, students whose voices are mute during face–to-face interaction, or who are unable to ask questions due to other reasons – such as lack of time in a large class, or low self-esteem or shyness in a small class – are empowered both to ask

and to respond to questions posted by peers. As a communicative environment, DFAQ's seamless interface between mobile phone SMSes serves as a virtual communication centre for students.

Students' mobile phones are not the sole medium of communication; a web browser is integrated in such a way that students can use SMSes to retrieve class notices, as well as post questions and responses. Web browser users can communicate with the class anonymously, regardless of what devices users have available at any given time.

A subsidiary benefit of using DFAQ is that it provides ongoing summative evaluation through aggregation of postings from individual students. Thus DFAQ artefacts are a learning resource created by students from anonymous peer consultations.

How DFAQ works

To use DFAQ from a mobile phone, a user prefixes a message with a 'forum name' (e.g. cet0625) and sends it to the DFAQ short code number. A forum name could be a course code or project identification code. DFAQ's anonymity is confined to a forum. In other words, a user knows that a question has come from a classmate, without knowing from whom in particular. The anonymity within a group allows questions to stay relevant to the group.

Sending a course code by SMS to the DFAQ number activates the system to read the 'virtual noticeboard', retrieve the latest news and send it to the user. Being able to read course notices on demand gives users control of when and where they receive these notices. Any user may forward a course notice or a response to a question to any mobile number. Through the forward message feature, users receive important responses or notices from DFAQ on their phones. For example, if a lecture has had to be cancelled or a tutorial time changed, a message can be posted to the DFAQ website and forwarded to the students on their phones. This enables students to make arrangements before coming on to campus and/or accessing the DFAQ website. As students are more likely to have cell phone access than computer access at UCT, they have a better chance of being informed timeously than if messages were posted to the website only.

Posting notices

In order to post items on the noticeboard a student user needs to be authorised, whereas lecturers have default permission to do this for their own courses. However, all DFAQ users can view notices using a web browser or 'pull' the information to their mobile phones or forward to others. To post a news item on the notice board, an authorised user sends the following: [course code]-[news] followed by the message. For example: cet0625-news *Wednesday test will be held in LT2 @ 11:00am*.

Posting questions

Posting questions in DFAQ is achieved in either of these ways: A user may type a question using a DFAQ web interface (see Figure 1), or may send a question to DFAQ by SMS. To SMS a question, a user prefixes the question with a forum name (for example: cet0625 *where can I find publications on DFAQ?*). Our observations are that students would rather type something like: *whr cn I fnd publictns n dfaq*. As a communicative and social tool, the use of such 'chat lingo' for knowledge-seeking is allowed. The rule of thumb is that information seekers and givers must have a shared language.

When a new question arrives in DFAQ, the tool automatically sends an email (optionally also an SMS) to notify the forum convener of the question, and sends an acknowledgement of receipt to the user, with an assigned reference number. Using the assigned reference number, a user may add to a submitted question – e.g. cet0625-18 + *nd other related dfaq papers.* Questions wait for responses in a public queue so that anyone can see which questions have been posed. Anyone can respond to questions and a question can have many responses. In addition, a responder may use the reference number to extend the question (see 'collaborative questioning' below).

Responses from peers are flagged as being from a peer, and lecturers' responses carry an official flag to alert users to the source of the response. DFAQ sends responses to users either by email or by SMS – the method corresponding to that of the initial question. Regardless of how questions are posted into DFAQ, both question and response remain on the DFAQ website, where they can be read and commented on by other users. Within DFAQ every question can be seen as a 'chat room' where conversation has happened, is happening or will probably happen.

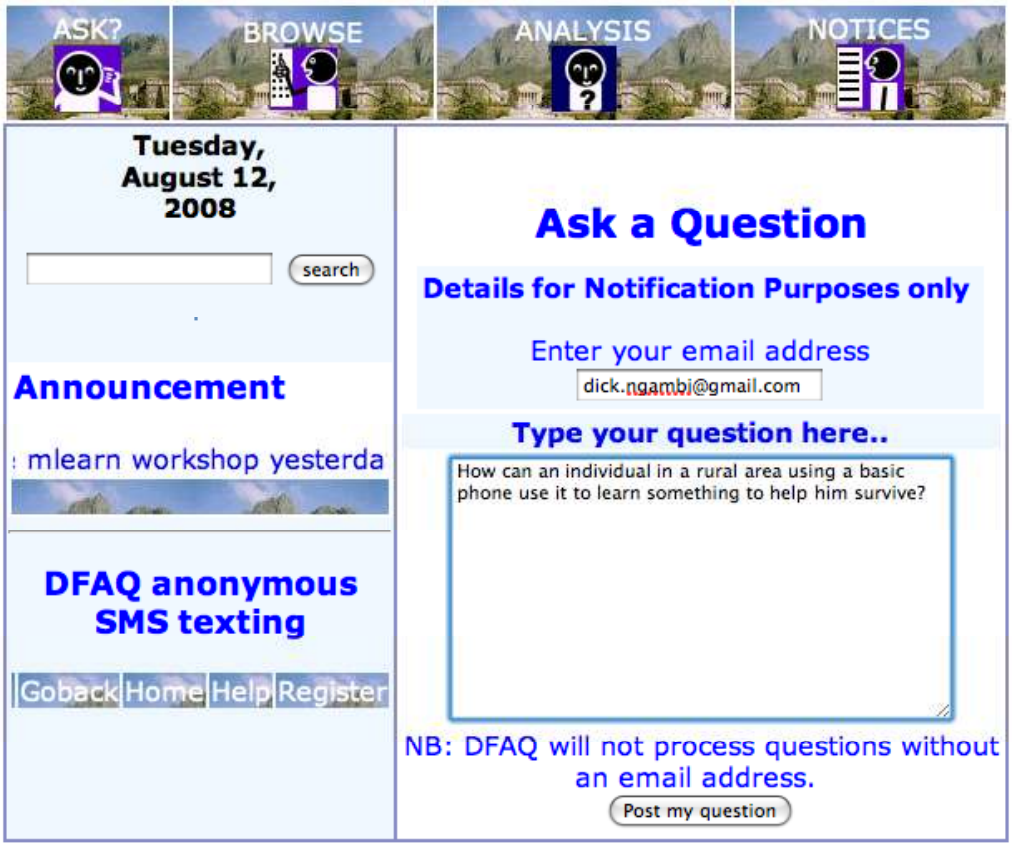

Figure 1: How to post a question in DFAQ

Collaborative questioning

Conversations take three forms: posting a response, adding to an existing question, and engaging mobile users in conversation through forwarding messages via SMS. An innovative feature of DFAQ is its support for collaborative questioning (Ng'ambi 2006a; 2006b): a user may ask a question which triggers one or more other questions. Rather than having these new questions posted as separate questions, DFAQ allows the initial question to be extended, resulting in a compound and sometimes complex question. In this way DFAQ extends the limit of 160 characters per SMS message. Figure 2 depicts an example of such a collaborative question.

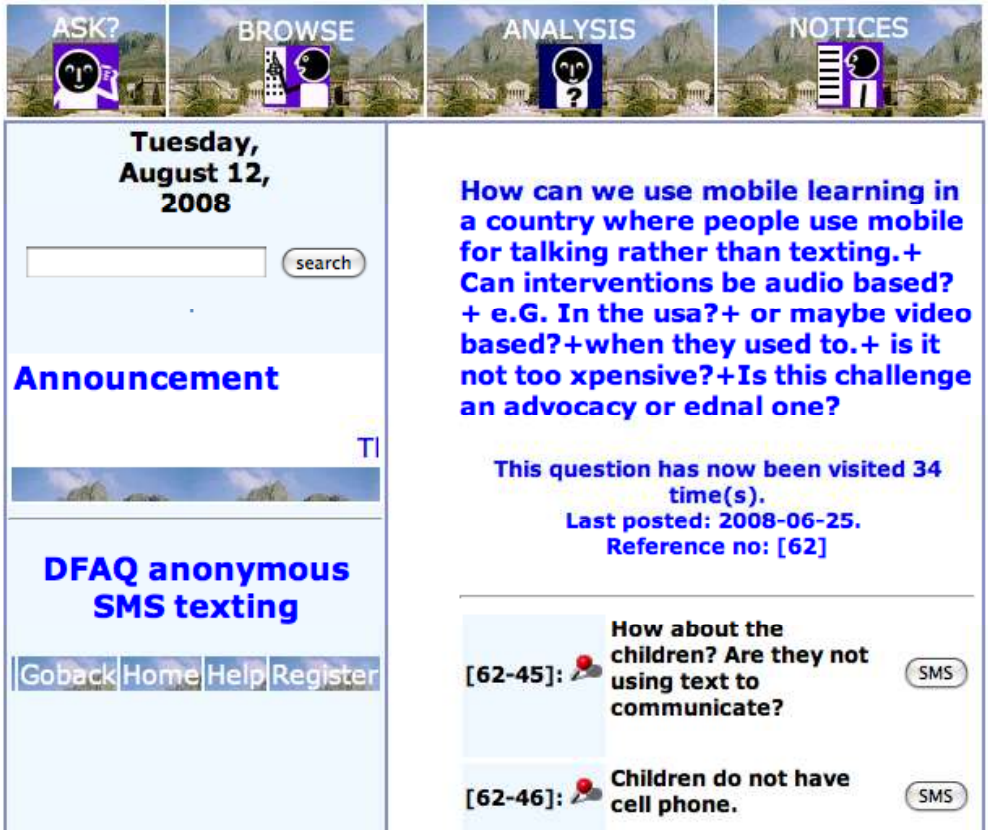

Figure 2: Collaborative questioning in DFAQ

Every question posted into DFAQ is assigned a unique reference number. In Figure 2 the question reference number is 62. To add to this particular question, a user sends to the DFAQ number a message such as: cet0625-62 + *Is this challenge an advocacy or ednal one?* The '62' identifies the question to be extended, and the '+' indicates that the message should be added to the existing question. If the '+' is omitted the posting is treated as a response to the question.

Some DFAQ features, including collaborative questioning, are available only via SMS. For example, the extension of the number of SMS characters to support collaborative questioning is not available from the web interface. Using DFAQ's web interface a user has access to the following features: searching DFAQ postings by entering a keyword or part of a question or response; viewing recently read questions; viewing frequently read questions; viewing frequency of response postings; and viewing most recently posted questions.

Uses of DFAQ at UCT

DFAQ has been used in various courses and projects at UCT since 2003. The mobile phone interface was added to DFAQ in 2005. Below are some of the courses that have used DFAQ and the number of students per course:

2002: 20 BEd Honours students in the School of Education.

2003: 25 Honours students in Education; 30 Information Systems Honours students.

2004: 140 third-year Information Technology and Project Management students; 30 Information Systems Honours students.

2005: 28 Honours students in Organisational Psychology; 60 third-year Information Systems students; 750 Information Technology in Business students; 30 Information Systems Honours students.

2006: 39 Honours students in Organisational Psychology; 154 first-year Film and Media students; 610 first-year Information Systems students; 25 postgraduate diploma Information Systems students; 200 third-year 'Organisational learning and wellness students'.

2007: 5 Masters students in Education; 17 Masters students in Education; 800 first-year Information Systems students; 30 Honours students in 'Labour relations and organisational change'.

2008: 400 (est.) first-year students in Foundations of South African Law; 800 first-year Information Systems students.

In addition to uses for teaching and learning at UCT, the Office of Discrimination and Harassment used DFAQ to facilitate the ease, anonymity and immediacy of complaints or advice about sexual assault, rape or domestic violence. In addition, the Research Ethics Committee used it to allow researchers to seek advice anonymously on ethics issues in research.

To explore just one example of how DFAQ has been used to support teaching and learning, we now report on one case study in more depth.

Case study: DFAQ use by Organisational Psychology

In 2006 and 2007 DFAQ was used by the lecturers in Organisational Psychology in two third-year courses, 'Organisational learning and wellness' and 'Labour relations and organisational change', and also in the Honours module 'Organisational learning'.

Pedagogical problems

The use of DFAQ was prompted by a number of pedagogical problems that had beset the lecturers of this course. These included large class numbers, students with heterogeneous backgrounds, students with difficulties with English as the medium of instruction, limited contact time, constraints imposed by formal lectures, poor lecture attendance and a lack of self-efficacy displayed by students.

There were approximately 200 students in the third-year class, who were expected to attend three 45-minute lectures each week, and four tutorials in each 12 week cycle. They also had an opportunity to consult the two lecturers during their two to three hours of consultation on four days of the week. However, given the numbers of third-year students, there was relatively little time for individual students to pose questions directly to the lecturers or tutors. (As the Honours class was much smaller, with approximately 30 students, they had less difficulty in accessing the lecturers and tutors.)

Students in the third year and Honours classes were demographically quite diverse and, because of their varying backgrounds and different knowledge and skills, they displayed varying degrees of preparedness for university. Some had come with sub-optimum competencies which affected their confidence, self-efficacy and their fluency in English as the medium of teaching and learning. According to the main lecturer in the course, these issues were more noticeable in undergraduates than in the Honours year.

The main lecturer described her greatest challenge as finding ways to open the learning space in an unthreatening way, as the students display a lack of 'epistemological access' (Morrow 1993; Boughey 2002), and she is confronted with the challenge of teaching the discipline and its specific discourse as well as English at the same time. The lecturer explains that 'epistemological access' is more than just the discourse of the discipline, but also relates to the assumptions underpinning the discipline and what are understood to be valuable knowledge and processes at university.

Use of DFAQ

The main lecturer explained that the formal programme already included the use of the UCT Learning Management System (LMS), 'Vula' (which means 'open' in Xhosa), and is a UCT branding of Sakai,[5] a collaboration and learning environment for education. Vula allows students to use discussion forums to pose questions, but not anonymously, as they log on using their student numbers.

The lecturers used DFAQ to facilitate learning conversation outside the formal programme and to facilitate a 'safe' space for shy or self-conscious students to participate and collaborate more readily through the anonymous postings. They hoped that DFAQ would also help keep them in touch with how students were managing the course and interacting with the material, so that they could alter the learning materials and/or shift the emphasis from that used in the lectures. In addition they deliberately used DFAQ in an attempt to shift the responsibility of learning to the students and to create a community of learners.

[5] http://sakaiproject.org/portal [19 October 2008]

Suitability of DFAQ for the discipline

As the students were all Organisational Psychology students, who had learnt *about* the use of e-learning, the main lecturer believed that using DFAQ provided them an opportunity to experience the use of a type of e-learning first hand – experiencing the difference between the theory and application of e-learning. The examples of e-learning in the textbooks the students were using were in the medical field (for example, 'Interactive patient'), and the main lecturer conceded that these were not as meaningful as being involved directly with an e-learning intervention. The various tools available at UCT such as Vula and DFAQ were used, but the main lecturer said she would value having access to the 'real' internal e-learning tools used in the corporate environment.

Value of DFAQ: Lecturers' views

Reviewing the use of DFAQ for both third-years and Honours students, the lecturer was convinced that DFAQ certainly increased communication between students and the lecturers and offered an improved service to students by increasing lecturer availability, particularly over weekends. She felt that DFAQ enabled the lecturers to 'feel the pulse of the lecture' and to assess 'where the class is at'. Additionally it helped to have DFAQ for clarifying minor administrative issues that could have taken up valuable lecture time.

The main lecturer felt that DFAQ worked well at the undergraduate level but, as it was not fully integrated into the rest of the course, it was not used optimally as yet. According to her, DFAQ needs to be integrated into the programme with other tools used for training in organisations, for example DVDs.

At postgraduate level, the main lecturer considers DFAQ to be working well, but she is aware that it is not well enough linked to theory. While the use of DFAQ does provide students with an excellent opportunity to engage in a different way with course material, and with each other, the lecturers are still grappling with how to incentivise knowledge-sharing. One strategy the main lecturer has used is to post a question each week. However, she feels that she is not yet maximising what she can do with DFAQ and may need to receive additional technological support from the developer of DFAQ.

The other lecturer present at the Commerce Faculty's Education Group seminar referred to above indicated that, although she valued the use of DFAQ, it was on occasion very time-consuming. She said it was necessary to set up and agree on expectations – so that lecturers are not expected to be at their students' beck and call 24/7. She felt that the students' expectations were a little 'unrealistic' and that limits needed to be set. For example, she checked DFAQ queries three times a day rather than answering each DFAQ query as it

appeared. She also noted that DFAQ questions 'peaked' prior to tests, but agreed that the tool had a valuable benefit in reducing 'panicky' phone calls, since students were encouraged to use DFAQ instead of phoning.

The main lecturer commented on the way in which her tutors had been able to support the students using DFAQ. Some of the tutors had included their names in the responses that they sent, and the students had really valued this indication of 'authority' on the matter concerned. The students present at the Commerce Faculty's Education Group seminar agreed that they found it useful to know who was responding – not on an individual basis necessarily, but whether it was a lecturer, tutor or one of their peers. The lecturer indicated that it would have been useful to have a new icon developed that would indicate a tutor's response in DFAQ.[6]

Overall, the lecturers felt that using DFAQ had been worthwhile. They had been encouraged by their Head of School to experiment, even though there had been a possibility of failure. However, the lecturers conceded that, for the system to work optimally, there needs to be lecturer buy-in and the commitment of at least one key individual. The lecturers also maintained that there has to be a balance between editorial prerogative and an open forum for debate. In other words, lecturers should not intervene if there are dissenting voices, but rather facilitate discussion and reserve editorial rights only to avoid potentially hurtful exchanges. The students admitted that they did not like belligerent responses, but the main lecturer felt that the students responded well to instances of 'tetchiness'. The students also confessed to finding the presence of the lecturers reassuring as it gave them a sense that the online engagement would not 'get out of hand' – as students are perceived by each other as being 'a bit cutthroat' at times.

In conclusion, the lecturers see DFAQ as an additional mechanism for lecturer-student and student-student communication, and not as a replacement for questions posed during formal lectures, during tutorials or in face-to-face consultations.

Value of DFAQ: students' views

From the focus group interviews undertaken by the lecturer it emerged that the students had felt that DFAQ was good for boosting those with low confidence and that it offered an opportunity for a collective way of learning. However, what was helpful for the third-years was not necessarily useful to the Honours group, who are a small group with confidence to speak and who consequently used DFAQ less. The students at both levels commented that

6 The researcher subsequently approached the developer, Dr Ng'ambi, who created a suitable icon for tutor responses. This is now available to all DFAQ users.

they valued the anonymity of being able to ask honest questions without feeling stupid. They felt that it was a support system for the whole class and could provide an opportunity to mirror what they thought they understood in relation to other students' views. The third-year students wanted to have the opportunity to use DFAQ in other courses, especially for course administration – particularly for students not attending classes. Comments from the Honours class indicated that, because they were required to be on campus anyway, they did not feel the need to use DFAQ for administrative purposes.

Most importantly, the students felt that DFAQ needed to be integrated with other aspects of the course and in particular requested that DFAQ should be integrated within the UCT learning environment, Vula.

Lessons learned

There are a number of useful lessons to be gleaned from this particular study. These include the value of using a ubiquitous tool, the benefit of posting anonymous questions, and the advantage of extending lecturer accessibility. While there are indications that DFAQ could be used to encourage a community of practice, there does not seem to be sufficient evidence that this is happening as yet. To maximise the use of DFAQ, it would seem that it needs to be integrated into the existing LMS, so that students only have one portal that they need to access.

Value of using a ubiquitous tool

While not all students have access to computers and the internet – particularly when they are off campus – the majority do have access to mobile phones. Providing an opportunity to engage in course discussions using a tool that students are likely to own, or at least to which they have relatively easy access, is a way of providing more equal access to information. At present the restrictions on the amount of information exchanged is a constraint on the use of DFAQ with mobile phones, but with current rapid developments in technology this may be less of a limitation in the future.

Benefit of posting anonymous questions

Both lecturers and students highlighted some benefits of anonymous questioning. Lecturers were able to judge the 'pulse of the lecture' and quite quickly identify areas that required further explanation. For the students the anonymity was seen as providing an opportunity to ask 'stupid' questions without being penalised. It also gave the more reserved students or those whose mother tongue was not English the freedom and the time to formulate their questions. Although the anonymity does pose a potential threat to the well-being of lecturers

and students if used thoughtlessly or maliciously, the fact that the entire class, tutors and lecturers had access to the discussions did seem to temper the way in which ideas were expressed. The value of DFAQ is that the lecturer or moderator can intervene if necessary.

Advantage of extending availability

A pressing constraint of large classes, and a limited number of lecture, tutorial and lecturer appointment times, is that lecturers and tutors are not as available as students would like. DFAQ certainly extends the availability of lecturers, tutors and other students during non-teaching times, which was particularly appreciated before key events such as tests or exams. Clearly there is a danger that – unless clear guidelines are set about reasonable response times – lecturers and tutors will not be able to meet the unrealistic 24/7 expectation that they feel some students have.

Potential for developing a 'community of practice'

Although tutors are using DFAQ to respond to students' questions, and students can review other students' questions and their responses, this does not automatically create a 'community of practice' in which students start taking responsibility for their own learning. However, students' questions reveal their misconceptions and serve as invitations to others to assist in finding answers. This process suggests that DFAQ has the potential to encourage students to take responsibility for their learning, and thus create a community of practice. There is some evidence that students value the comments of their peers, opening up new ways of learning from each other. They do, nevertheless, value knowing the source of the comments, and prefer being able to differentiate between comments made by the lecturers, the tutors and their peers. More attention will need to be given to understanding how to nurture peer learning and overturn the traditional reliance on the opinions of lecturers and tutors.

Integration with institutional learning management system

For optimal use, DFAQ might need to be integrated into UCT's existing LMS, Vula, so that students need to access only one portal. However, further investigation is necessary to ascertain whether this would unduly compromise the anonymity of the postings or be an unnecessary replication of the 'forum' function already present in Vula.

Conclusion

The ubiquity of mobile phones, particularly in South Africa, suggests that they could be more meaningfully used to provide equal access to information and potential collaboration as well

as to extend the availability of lecturers and tutors during non-teaching times. Current tools, such as the DFAQ tool, which include an SMS interface, provide some of the functionality required to allow students to pose questions 'anywhere, anytime', but are still being trialled as meaningful adjuncts to the formal curriculum. This case study of the use of DFAQ in the Organisational Psychology course at UCT has provided some evidence of how mobile phones can be used to extend access, increase availability and allow anonymous postings. It has given a glimpse of how students can start taking responsibility for their own learning, and learn from each other, overturning the traditional dependence on lecturers and tutors.

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