

Incorporating a mobile interface in a blended learning programme for Mathematics teachers

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South Africa, like many other African countries, is faced with the challenge of providing sufficient and meaningful professional development for teachers. One means of providing such professional development is the Advanced Certificate in Education (ACE), a two year in-service qualification for teachers wishing to improve their subject knowledge and didactical skills. Teachers enrolling for an ACE can specialise in different fields, one of which is Mathematics.

A second and closely related problem is the limited access that teachers in rural areas have to programmes such as the ACE. To address the problem of accessibility the ACE in Mathematics offered by Stellenbosch University was restructured as a blended learning programme. In 2009 this ACE was offered in its new format and 49 Mathematics teachers enrolled.

The ACE in Mathematics is administrated by the Institute for Mathematics and Science Teaching at the University of Stellenbosch (IMSTUS) in collaboration with the African Institute for Mathematical Sciences Schools Enrichment Centre (AIMSSEC). The blended learning model includes face-to-face contact, self study, interactive telematic sessions and online discussions via a learning management system. It also includes the use of bulk and personal SMS's for administrative purposes and for keeping up student moral.

Two of the outcomes of the programme are to encourage critical engagement with the course material and to establish a network among the enrolled teachers that will remain active even after they have completed the qualification. The online discussions are viewed as essential for achieving both these outcomes. Unfortunately, early in 2009, it became clear that the original model was not sufficient because of the enrolled teachers' lack of internet access.

Due to the fact that all teachers on the programme owned a cell phone and the fact that bulk and personal SMS's had been used successfully, it was apparent that a mobile solution should be considered (Wright, Dhanarajan & Reju, 2009). In this context mobile learning is firstly seen as "remote, rural and development mobile learning" (Traxler, 2009:3). Secondly, because of its relationship to an existing programme, it is viewed as "an extension of e-learning" (Winters, 2006 cited in Traxler, 2009: 3&4). Finally, because of the use of SMS's for administrative purposes, it is a means of improving "support, or coordination of learning and resources" (Naismith *et al.* 2004 cited in Traxler, 2009: 4).

With these definitions in mind various mobile solutions were considered including MXit (a popular South African instant messaging software application) and phpBB (a popular Internet forum package) but neither of these proved suitable. Instead it became apparent that the solution needed was one of the "three ideas in mobile learning" identified by Vosloo (2009), namely a mobile learning management system - ideally one that could be downloaded onto the teachers' phones. Towards the end of 2009, Moodle, an open source learning management system (LMS) with a mobile interface, was identified as a suitable option and, in 2010, was adopted as the programme's learning management system and used for both the remaining 33 second years and the 43 first years.

In an attempt to measure the effect of incorporating a mobile interface, data was collected to compare the number of times the teachers in their second year accessed the LMS in 2010 compared to the number of times these teachers accessed the LMS in their first year in 2009. Although this data showed an overall increase in the number of times the LMS was accessed, an analysis of individuals showed that some had accessed the LMS more while others had accessed it less. There are numerous factors that could have contributed to these changes – not only the addition of a mobile interface. Increased participation could be due to the new LMS (as opposed to merely adding a mobile interface to an existing LMS), the additional functionality of the new LMS (Moodle has a chat function) or the bonus marks being awarded for student participation in online discussions. A decrease in participation could be due to the novelty of the discussions wearing off in the second year of the programme or to the fact that by the second year the programme was much more structured so teachers might have had less need to access the LMS for administrative issues.

Because it was not possible to track whether teachers accessed the LMS from a cellphone or from a computer, a questionnaire was employed to establish to what extent the mobile interface was being used. Teachers were asked how often they had used the mobile interface and if they had not used it, what had prevented them. The questionnaire could be accessed by the teachers directly from their cell phones or via Moodle. Out of the 53 responses, 22 had used the interface and 31 had not. Of the 31 who had not used the interface, 9 indicated that they had sufficient internet access from a computer so they did not need it. The majority of the other teachers selected barriers that relate to the fact that the teachers are 'mobile learning immigrants' and using a cell phone to access the internet is therefore not necessarily easy for them. This can be addressed with more specific training during the residential course. A more challenging barrier is faced by at least 5 teachers whose cellphones cannot be used to access the internet. One means of addressing this is to secure sponsorships to provide each teacher with a suitable cellphone but this is not necessarily a sustainable solution. On the other hand, due to the rapid development of technology it is likely that in the future most, if not all teachers will have internet enabled cellphones.

Based on this feedback and on experience gained in using Moodle, various adaptations will again be made to the blended learning model in 2011. Firstly, more specialised training will be given during the residential course where teachers will be shown how to access Moodle from their cell phones. Secondly, if possible, teachers will be assisted in downloading Moodle's mobile client onto their cell phones. Thirdly, discussions will be more structured with teachers having to respond to specific prompts. Lastly, the way in which the LMS is structured will be made even simpler to make navigation easier.

In conclusion, although the majority of teachers still access the LMS via a computer, incorporating a mobile interface has made it possible for certain teachers to take part in discussions who would otherwise not have been able to. It has also opened the way for alternative means of teaching and learning and has had unexpected benefits such as a more user friendly LMS and the introduction of chat sessions which have increased the interaction between teachers and lecturing staff.

At the same time it is important to note that, as postulated by Traxler (2009: 3), this development in mobile learning was mainly "driven by pedagogic necessity, technological innovation, funding opportunities and the perceived inadequacies of conventional e-learning, and ... within relatively narrow educational discourses, those between and amongst technologists and educationalists" (Traxler, 2009: 3). This discourse still needs to be broadened to include a greater focus on pedagogy, effective monitoring, evaluation and impact assessment (Hollow, 2009).

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