*International Review of Research in Open and Distance Learning*
*Volume 8, Number 2.* *ISSN: 1492-3831*

**June – 2007**

# *Mobile Learning and Student Retention*

**Bharat Inder Fozdar** & **Lalita S. Kumar**
India Gandhi National Open University
India

## Abstract

Student retention in open and distance learning (ODL) is comparatively poor to traditional education and, in some contexts, embarrassingly low. Literature on the subject of student retention in ODL indicates that even when interventions are designed and undertaken to improve student retention, they tend to fall short. Moreover, this area has not been well researched. The main aim of our research, therefore, is to better understand and measure students' attitudes and perceptions towards the effectiveness of mobile learning. Our hope is to determine how this technology can be optimally used to improve student retention at Bachelor of Science programmes at Indira Gandhi National Open University (IGNOU) in India. For our research, we used a survey. Results of this survey clearly indicate that offering mobile learning could be one method improving retention of BSc students, by enhancing their teaching/ learning and improving the efficacy of IGNOU's existing student support system. The biggest advantage of this technology is that it can be used anywhere, anytime. Moreover, as mobile phone usage in India explodes, it offers IGNOU easy access to a larger number of learners. This study is intended to help inform those who are seeking to adopt mobile learning systems with the aim of improving communication and enriching students' learning experiences in their ODL institutions.

**Keywords:** Mobile learning; m-Learning; information and communication technologies; ICTs; retention; withdrawal; open distance learning; ODL; interventions; student support system; micro-learning

## Introduction

The use of new technology for educational purposes has always been in the forefront of most cutting-edge open distance learning (ODL) systems. Technology-supported teaching and learning has helped enormously in overcoming the physical distances between teachers and students, enabling the flexible delivery of education at a distance, anyplace, anytime. Taylor (2001) characterizes the growth of DE in terms of 'generations of technologies' adopted by ODL institutions keen on providing the support to its teaching-learning processes (see Table 1). Keegan (2002), on the other hand, viewed the growth of distance education (DE) on the basis of technological developments in information and communication technologies (ICT). According to Keegan, the evaluation in DE is characterized as a move from distance learning (d-Learning), to electronic learning (e-Learning), to mobile learning (m-Learning), a phenomenon that he suggests corresponds to the 'societal evolution' from the Industrial Revolution, to the Electronic Revolution of 1980s, to the Mobile Revolution at the close of the 21st Century.

Recent generations of ICTs have given rise to new opportunities for sharing information, resources, and experiences, as well as providing networking opportunities with student peers, tutors, and the institution of higher education itself. The use of these technologies, however, does not necessarily mean the abandonment of the earlier technologies used. In fact, the classic model of DE that uses print along with audio-video remains the most widely used modality in most ODL institutions, especially in developing countries. Indeed, classic DE methods of course delivery still represents the most accessible medium for learning in developing countries. On the other hand, the more flexible and enriching teaching and learning environment afforded by ICT is hard to ignore. Today, the use of mobile devices to enhance ODL systems is starting to take hold.

Currently, more and more ODL institutions – particularly in developed countries – are using ICT-supported or ICT- based instruction either as their primary or supplementary delivery system. In a country like India the adoption of ICT-based ODL, such as online instruction, is not yet as popular as in developed countries like USA, Canada, the UK, or Australia. Although it is gradually gaining momentum, impediments such as the high cost of owning personal computers and availability of limited ICT- infrastructure coupled with limited networking capacity still hamper developing countries. According to a 2006 survey, about 68.6 percent of all households in the United States have Internet access (Internet World Stats, 2006). Other survey results of developed countries also indicate that majority have computer systems with Internet support. Conversely, in India, Internet service only started with VSNL (Indicom) in 1995. At present, 95 percent of Internet customers in India are still using dial-up access. Moreover, the quality of service for dial-up Internet access in India remains very poor and dial-up connection are generally very slow, with speeds typically below 28.8 kbps. Only 1.5 million Indians have broadband communication connections, which clearly is more suitable to support online learning. There is another communication technology on the horizon, however, one that has tremendous potential – mobile phones and Personal Digital Assistants (PDAs). In India, mobile technology services were launched in 1995. At first, the adoption of mobile technologies (i.e., phones) in India remained very slow, primarily due to poor infrastructure and high costs involved in purchasing and using 'mobile phones.' Favourable government policies and reduction in mobile tariffs, however, have led to explosive growth of mobile phone services in India. Today, India has more than 100 million mobile phone subscribers and is currently ranked fifth in the world in terms of mobile phone ownership according to a 2006 press release of Telecom Regulatory Authority of India (TRAI, 2006). These statistics are solid indicators that mobile communication technologies (i.e., mobile phones, PDAs, etc.) are well positioned in India to enhance learning in its ODL systems.

**Table 1.** Generations of Distance Education

| Generation | Model | Delivery Technologies |
|---|---|---|
| First Generation | The Correspondence Model | Print |
| Second Generation | The Multi-media Model | Print, audio tapes, video tapes, computer based learning (e.g., CML/CAL /IMA), interactive video (disk and tape) |
| Third Generation | The Telelearning Model | Audio teleconferencing, videoconferencing, audio-graphic-communication, broadcast TV/Radio |
| Fourth Generation | The Flexible Learning Model | Interactive multimedia (IMM) online, internet based access to www resources, computer mediated communications |
| Fifth Generation | The Intelligent Flexible Learning Model | Interactive multimedia (IMM) online, internet based access of www resources, computer mediated communication, using automated response systems, campus portal access to institutional process and resources |

Regretfully, at most ODL institutions the effectiveness of new technologies (i.e., mobile technologies) are typically not well researched prior to adoption. To determine whether – and to what extent – mobile technologies can be deployed for educational purposes, a study was conducted at IGNOU, located in New Delhi, India. The subjects of this study were students enrolled in IGNOU's Bachelor of Sciences programme. The main aim of this research was to determine students' attitudes and perceptions on the effectiveness of mobile learning. Our objective was to ascertain if and how mobile technology can be best used to improve students' quality of learning, and by extension bolster IGNOU's student retention rates.

## Literature Review

It is clear that ICTs play a great role in the ODL systems. Emerging technologies, such as wireless networking, the Internet, and mobile communications, go a long way to enhance connectivity amongst stakeholders. In a recent review of the literature, Naismith, Lonsdale, Vavoula, and Sharples (2005) reported that mobile technologies do provide strong support to underpin different types of learning. In their literature review, these scholars examined case studies of projects like 'Ambient Wood,' which was part of an Engineering and Physical Sciences Research Council (EPSR) funded project focusing on the integration of physical and digital interactions (Rogers, Price, Harris, Phelps, Underwood, et al., 2002). They also looked at natural science learning in Taiwan (Chen, Kao, Yu, & Sheu, 2004); the MOBILearn project (Lonsdale, Baber, Sharples, Byrne, Arvanitis, et al., 2003, 2004), a " . . . worldwide European-led research

and development project exploring context-sensitive approaches to informal, problem-based and workplace learning by using key advances in mobile technologies" (MOBILearn, *n.d.*, ¶ 1); Chile's mobile computer support collaborative learning (Cortez, Nussbaum, Santelices, Rodriguez, Zurita, et al., 2004); a Pan-European research and development programme (Attewell & Savill-Smith, 2003; Colley & Stead, 2003; Mitchell & Doherty, 2003; Traxler, 2003); and mobile devices for breast cancer care (Wood, Keen, Basu, & Robertshaw, 2003). According to these researchers, mobile learning via mobile technologies can effectively support a wide range of activities for learners of all ages; they also concluded that a blended approach likely would be more successful. In a similar type of literature review, Keegan (2002) analysed 30 initiatives that assessed mobile technologies potential use in learning. He also discussed the potentials and limitations of different mobile devices such as screen phones, PDAs, smart phones, and wireless (WAP) telephones. Four surveys determining students' experiences of the effectiveness of mobile learning were also reported by Keegan (2002). Results of this survey examining learning support using PDAs indicated that some students were enthusiastic, while others were apprehensive; some also indicated that they did not appreciate reading long texts on PDA because of its small screen size (Rekkedal, 2002a; 2002b). Another important research study on mobile learning indicated that 62 percent of learners were enthusiastic about mobile learning and were keen to take part in future learning after they had tried mobile learning (Attewell, 2005). In terms of access, it is clear that many learners might never be able to afford a personal computer, but they are very likely to afford to own a mobile phone, which in turn will become their 'digital life'. Indeed, according to Attewell (2005), there are several advantages inherent in mobile learning:

- It helps learners to improve literacy and numeric skills
- It can be used for independent and collaborative learning experiences
- It helps learners to identify where they need assistance and support
- It helps to overcome the digital divide
- It helps to make learning informal
- It helps learners to be more focussed for longer periods
- It helps to raise self-esteem and self-confidence

Vavoula (2005) in his recent study carried out as part of the MOBIlearn project, concluded that "mobile learning is more interactive, involves more 'bustle', more contact, communication and collaboration with people" (p. 17). Vavoula also demonstrated a task model for mobile learning (Taylor, Sharples, O'Malley, Vavoula, & Waycott, 2006). Some researchers have even used mobile technologies for enriching visitors' experience of a museum (Boehner, Gay, & Larkin, 2005).

From these literature reviews, one can conclude that mobile learning can be an effective tool for learning or enhancing the teaching-learning process, because it increases access. Moreover, it can be harnessed anywhere, anytime. Similar to e-Learning, mobile technologies can also be interfaced with many other media like audio, video, the Internet, and so forth. In terms of usability of new technologies, there are two viewpoints that must be considered: one 'in support' and other 'against it.' In case of mobile learning technologies, some users may find it not very conducive to learning (i.e., screen too small; physical environment like being outside in the bright sunlight), while for others, the benefits of being able to learn on-the-move at a convenient

location outweigh its optical disadvantages. Clearly, students' individual perceptions of mobile learning do matter.

The first part of our research (i.e., studies of students' attitudes and perceptions towards mobile learning) was based on Rogers' model of innovation diffusion (Roger, 1995). According to Rogers' model, the diffusion of any innovation follows five steps:

1. ***Knowledge –*** a person becomes aware of an innovation and has some idea of how it functions

2. ***Persuasion –*** a person forms a favourable or unfavourable attitude towards the innovation

3. ***Decision –*** person decides to engage in activities that lead to their adoption or rejection of the innovation

4. ***Implementation –*** the person puts the innovation to use

5. ***Confirmation –*** the person evaluates the results of the innovation

In determining whether a new technology, like mobile phones for instance, can be used for educational purposes or not, and up to what extent, we focused only on the first two steps of Rogers' model: 1) *knowledge* and 2) *persuasion.* For these two steps, we adapted Rogers' three constructs: 1) *prior conditions*; 2) *characteristics of the decision-making unit*; and 3) *perceived characteristics of the innovations.* In order to apply the three constructs of Roger's model, a questionnaire was designed based on indicators from Rogers' (1985) research. These indicators – or questionnaire items – were modified according to our unique requirements.

The second part of our research aimed to determine 'how' mobile technologies can be used to improve student retention in IGNOU's ODL system. Most ODL institutions offer various distance education programmes/ courses, and student enrolment in these programmes/ courses continues to rise, primarily because they are more flexible, convenient in terms of time and place (Cavanaugh, 2005; Fozdar & Kumar, 2006). Nonetheless, researchers continue to report poor retention and high dropout rates amongst ODL students that are significantly higher than those for formal or conventional institution-based learners. In recent years, student retention studies have become a major focus of interest for DE researchers, primarily because poor retention is one major indicator of quality (DEST, 2005). In the UK, for instance, public funding for higher education is now based on the number of students who successfully complete courses (Simpson, 2004; 2005). Retention, therefore, is an area of concern and thus requires interventions and corrective measures.

Different models have been proposed by different researchers to describe the key factors that have been found to influence student achievement, course completion, and/ or withdrawal. US researchers have taken lead in developing a wide range of models that attempt to explain the key factors contributing to student retention in higher education (Tinto, 1975, 1993; Bean, 1980, 1983; Bean & Metzner, 1985; Astin, 1977, 1985; Braxton, 2000). The British researcher, Woodley (2004), has discussed the strengths and weaknesses of some important student retention models such as Tinto's Model (Tinto, 1975), Sweet's Model (Sweet, 1983), and Kember's Model (Kember, 1995). These models are widely used by ODL researchers to predict retention trends and identify interventions to improve retention.

The most commonly cited model for explaining student retention is the one given by Tinto (1975). According to Tinto's model, the process of withdrawal depends on how students interact with the social and academic environment of the institution. ODL researchers, however, tend to avoid more traditional concepts of 'social integration' and instead place more emphasis on external environmental factors such as the students' occupation and family (Kember, 1995). Indeed, unlike students enrolled in traditional bricks-and-mortar educational institutions, students studying in ODL systems are typically adult part-time learners, juggling their studies with full-time jobs and family responsibilities (McGivney, 2004). Factors such as 'lack of time,' 'poor guidance,' 'not getting adequate and timely feedback on assignments,' and 'time management issues' vis-à-vis 'course content loads,' 'high expectations,' etc., have all been cited as factors compelling students to withdraw from their ODL courses (Garland, 1993; Ostman & Wagner, 1987). Other related factors leading to withdrawal have also been reported in the literature, such as 'lack of guidance and information prior to registration,' 'lack of support from faculty,' and 'difficulty in contacting faculty' (Brown, 1996; Cookson, 1989; Pierrakeas, Xenos, Panagiiotakopoulos, & Vergidis, 2004; Tresman, 2002).

Clearly, ODL researchers have invested much time and attention to identifying the key factors that influence learners to withdraw from the courses. Less work, however, has been done to examine and develop specific remedies to improve student retention in specific programmes of study. Based on this literature review, the common problems of distance learners can be summarized as follows:

- Lack of personal contact and immediate instructor feedback that some learners prefer (Brown, 1996; Carr, 2000; Garland, 1993; McGivney, 2004)
- Sense of isolation (Galusha, 1997; Gibson & Graff, 1992; Heverly, 1999; Sweet 1983; Wojciechowski & Palmer 2005)
- Requirement of pre-course orientation to help manage courses (Ashby, 2004)
- Requirement of the tutor support counselling sessions during course of study (Ashby, 2004)
- Improved information and formative advices (Ashby, 2004)

In sum, previous research indicates that providing proactive and more robust student support goes a long way to improve student retention in ODL institutions (Ashby, 2004).

Some recent developments in the field of ODL system indicate that e-Learning supported DE, more-or-less addresses the common cited problems listed above; it does so by promoting student retention and successful completion coursework typically via face-to-face tuition (Knight, 2007). By using of email, bulletin boards, or chat rooms, learners' can communicate with fellow students, with teachers, or their institutions. Teachers can provide feedback and advice through email. Some institutions are using e-Learning for the formative and summative assessments (Byrnes & Ellis, 2006). As mentioned earlier, infrastructure to support complete e-Learning programmes, however, are not yet very prevalent in India. This means we must investigate viable alternatives to improve retention of distance learners.

Previous research indicates that frequent, faculty-initiated contact with ODL students helps to improve retention (Catchpole, 1992; Simpson, 2004). In a similar study, Chyung (2001) used the

telephone to contact students, an intervention this scholar found to have yielded positive retention effects. There are also research studies that indicate that contact or intervention from the institution does improve student retention appreciably. According to Simpson's (2004) finding for UKOU, for instance, intervention is a cost-effective activity when viewed in terms of the university's income versus expenditures. Simpson also mentions several possible points to implement interventions:

- Before the course start
- Before the first assignment
- Failure of an assignment
- Pre-examination intervention
- Non-sitting for an examination
- No registration for a further course
- Withdrawal category of the students

The next question that arises is: What kinds of interventions are most effective? Keller (1987) proposed the ARCS model (Attention, Relevance, Confidence, and Satisfaction), which suggests that any contact must clearly cater to student's attention, must be seen to be relevant to their needs, enhance their confidence, and promote their satisfaction with their experience.

Many media have been used in the past for implementing interventions, including correspondence via postal mail, one-on-one phone calls, bulk email, and so forth. Chyung (2001), for instance, applied Kellers' model using telephone calls as an intervention. However, along with technological aspects, the actual hard cost of the intervention is also an important determinant of the final strategy finally used for identifying media for use in interventions.

In developing countries like India, problems abound in terms of delay and reliability of the nation's postal system, access and cost of using land-line telephones and computers. As such, cost factors alone often makes these media inappropriate for many of the interventions noted above. The increasing and ubiquitous use of mobile phones among Indian youths and adults, however, provides a viable avenue for initiating contact and implementing interventions proactively. For instance, Short Message Service (SMS) is highly cost-effective and very reliable method of communication. It is less expensive to send an SMS than to mail a reminder through regular postal mail, or even follow-up via a telephone call. Further, no costly machines are required (which is clearly the case in terms of owning a personal computer). Research by Traxler and Riordan (2003) indicates that SMS is very effective, especially if the communication is short, personalized, and focused.

IGNOU currently offers most of its programmes through classical ODL delivery modes. It also provides practical counselling to its students at hundreds of study centres scattered over the country. In an earlier survey conducted by the authors, only 35 percent of IGNOU's students reported that they attended counselling sessions, while 65 percent reported that they did not attend any sessions (Fozdar & Kumar, 2006). In this earlier survey, students were asked to give their reasons for not attending their counselling sessions. The majority of students questioned cited two major reasons for not attending the counselling sessions: first, many opted not to

receive the counselling schedule; and second, many cited distance as a factor. Indeed, many reported that they simply lived too far away from their closest study centre. At present, IGNOU sends mail via regular post to relay this type of information, and as noted earlier, India's postal system is often not very reliable. Not only can SMS be used to address this problem, it can foster and develop students' sense of belonging to IGNOU through the provision of timely student support – a dynamic which we opine enriches IGNOU students' learning experience while, at the same time, improves retention.

Besides SMS, voice mail and pre-recorded MP3 files can also be used to broaden and enhance student learning. Audio course-wear, which is currently developed along with print material at IGNOU, can easily be converted into MP3 files. Students can use mobile phones/ MP3 players to listen to their course lectures, and for storage and data transfer. Clearly, new technologies give rise to many new opportunities. These developments in mobile technologies are now challenging the concept of traditional DE, simply because distance learners no longer need to learn in isolation.

## Method and Sample

In order to study the attitudes and perceptions of students on the effectiveness of mobile learning, a questionnaire was developed consisting of 33 items designed to measure students' attitudes and perceptions on the effectiveness of mobile learning. A five-point Likert scale with 'strongly agree' and 'strongly disagree' as anchoring points was used for main items. This approach is commonly employed in distance education research (Biner, 1993; Roberts, Irani, Telg, & Lundy, 2005). In the first step, researchers generated potential items using qualitative approach. In the second step, before sending it to IGNOU's BSc learners, a pilot test was carried out on 25 BSc students for the purposes of selecting essential items. The data collected from the pilot test was used to further refine and develop the questionnaire, which eventually consisted of 33 items deemed essential. These items were used to measure students' attitudes and perceptions on the effectiveness of mobile learning.

The survey was administered to Bachelor of Science students enrolled in IGNOU, who were required to attend face-to-face laboratory courses at different study centres in Delhi in May 2006. Of 100 questionnaires sent, 65 questionnaire responses were received yielding a 65 percent response rate. Of the 65 respondents, 49.2 percent ($n$ = 32) were female and 50.8 ($n$ = 33) percent male. 81.5 percent of respondents' ages ranged between 20 to 25 years of age. The educational qualifications of the respondents varied from 10+2 (52.3%) to 10 +2 with diploma (46.2%).

## Data Analysis

The study found that only 29.2 percent of the respondents were aware of mobile learning. When surveyed on the use of different communication tools at home, 61.5 percent ($n$ = 40) of the respondents reported that they owned a radio; 70.8 percent ($n$ = 46) owned a land-line telephone; 83.1 percent ($n$ = 54) owned a mobile phone; 86.2 percent ($n$ = 56) owned a television; 43.1 ($n$ = 28) percent owned a computer; and 23.1 percent ($n$ = 15) reported having access to the Internet. The finding that 54 of the 65 respondents reported owning a mobile phone suggests that mobile technologies are rapidly becoming more ubiquitous and, arguably, more accessible to a larger number of learners in India.

Responses to the item, 'How often do you use different technological tools?' indicates that of those students surveyed, most are using mobile phones for receiving and sending SMS. Very few reported that they were using it for Web-browsing, receiving MMS, for learning purposes, however. These finding indicates that SMS can be viewed as a viable teaching/ learning tool to improve communication between ODL institution and its learners, between learners, or between teachers and learners. Our survey and national statistics data (TRAI, 2006) on the availability of mobile phones clearly indicates that mobile technologies has good future in India. This statement is further supported by the rapid growth mobile phone systems in the country.

## Discussion

The first aim of our study was to determine students' attitudes and perceptions on the effectiveness of mobile learning. Several indicators in the survey that relate to effectiveness of mobile learning, are shown in Table 2.

**Table 2.** Effectiveness of Mobile Learning

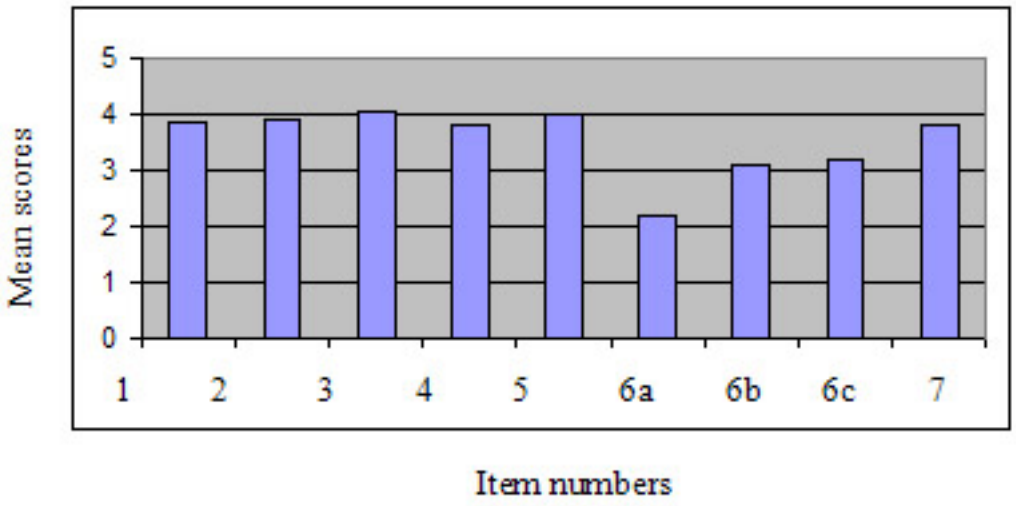
| Item No. | Questionnaire Indicator | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Not responded | Total | Mean |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Mobile learning can be an effective method of learning as it can give immediate support. | 19 (29.2) | 26 (40.0) | 10 (15.4) | 05 (07.7) | 03 (04.60) | 02 (3.1) | 65 | 3.84 |
| 2. | Mobile learning will bring new opportunities of learning. | 20 (30.8 | 27 (41.5) | 10 (15.4) | 05 (07.7) | 02 (03.1) | 01 (1.5) | 65 | 3.91 |
| 3. | Mobile learning will be more flexible method of learning as it can be done anytime, anywhere. | 18 (27.7) | 30 (46.2) | 07 (10.8) | 02 (03.1) | 02 (03.1) | 06 (9.2) | 65 | 4.02 |
| 4. | Mobile learning will improve communication between student and teacher. | 16 (24.6) | 21 (32.3) | 08 (12.3) | 08 (12.3) | 01 (01.5) | 06 (9.2) | 65 | 3.80 |
| 5. | Mobile learning is a quicker method of getting feed back in learning. | 18 (27.7) | 25 (38.5) | 10 (15.4) | 03 (04.6) | 01 (01.5) | 08 (12.3) | 65 | 3.98 |
| 6. | Mobile learning cannot be used for learning due to: a) unavailability of mobile phones with a larger number of students. | 05 (07.7) | 03 (4.6) | 09 (13.8) | 14 (21.5) | 21 (32.3) | 13 (20.0) | 65 | 2.17 |
| | b) expenses involved in mobile learning. | 14 (21.5) | 03 (4.6) | 09 (13.8) | 24 (36.9) | (02) (3.1) | 13 (20.0) | 65 | 3.06 |
| | c) poor networking in the city. | 11 (16.9) | 10 (15.4) | 09 (13.8) | 18 (27.7) | 03 (4.6) | 14 (21.5) | 65 | 3.16 |
| 7. | IGNOU should adopt mobile learning | 19 (29.2) | 16 (24.6) | 12 (18.5) | 06 (9.2) | 02 (3.1) | 10 (15.4) | 65 | 3.8 |

Note: Figures in parenthesis indicate percentage

Responses to each of the indicators on effectiveness of mobile learning were measured on a Likert scale of 1 to 5, ranging from 'strongly agree' to 'strongly disagree.' Scores greater than 3.2

indicate relative importance, below 3 indicate relative unimportance; a score of 3.0 to 3.2 shows it to be neither important nor unimportant. Data in Table 2 and Figure 1 provides an overview of the relative importance of these indicators for the IGNOU sample as a whole.

**Figure 1.** Indicators for effectiveness of mobile learning: Mean score




Mean scores for the sample indicate that the first four indicators strongly support mobile learning as an effective method for learning. This data indicates that mobile technologies are more flexible and enable students greater freedom of learning anyplace, at anytime. Responses to a question on availability of mobile phones, shows that respondents did not agree with the suggestion that mobile phones are unavailable to larger number of students. Respondents also did not agree with the suggestion that there would be high cost involved in owning and using mobile devices for mobile learning. Respondents did, however, report apprehension regarding the quality of networking presently available to them. These findings clearly indicate that mobile phones can provide better two-way communication support to IGNOU's students. Mobile technologies such as mobile phones can be used to enrich students' learning environment by providing timely information. In sum, more than 50 percent of the respondents strongly supported, in principle, that IGNOU should adopt mobile learning.

Respondents were also asked to give their preferences on where mobile learning can be effectively used in their BSc Programme (see Table 3).

**Table 3.** Student preferences for mobile learning

| S. No. | Statements | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Not responded | Mean |
|---|---|---|---|---|---|---|---|---|
| 1 | For receiving feedback on assignments | 21 (32.3) | 23 (38.5) | 05 (07.7) | 04 (06.2) | 02 (03.1) | 08 (12.3) | 4.04 |
| 2. | For information regarding important dates | 23 (35.4) | 23 (35.4) | 05 (07.7) | 02 (03.1) | 01 (01.5) | 11 (16.9) | 4.20 |
| 3. | For receiving schedules of counselling sessions | 27 (41.5) | 21 (32.3) | 01 (01.5) | 04 (06.2) | 01 (01.5) | 11 (16.9) | 4.28 |
| 4. | For receiving schedules of practical sessions | 27 (41.5) | 22 (33.8) | 01 (01.5) | 04 (06.2) | 01 (01.5) | 10 (15.4) | 4.27 |
| 5. | For receiving grades and results-related information | 28 (43.1) | 17 (26.2) | 05 (07.7) | 03 (04.6) | 02 (03.1) | 10 (15.4) | 4.2 |
| 6. | For receiving study guides for various courses | 10 (15.4) | 10 (15.4) | 09 (13.8) | 03 (04.6) | 10 (15.4) | 23 (35.4) | 3.17 |

Note: Figures in parenthesis indicate percentage

Results of Table 3 and Figure 2 indicate that mobile devices are an effective tool for providing short information, such as: 'receiving feedback on assignments' (item 1); 'information regarding important dates' (item 2), 'schedules of counselling (item 3) and laboratory sessions' (item 4), and 'grades and examination results' (item 5). Results were not very clear, however, when students were questioned on 'receiving their study guides' (item 6) on mobile phones; a larger percentage of respondents (35.4%) indicated that 'receiving their study guides' was not desirable. Another point to be noted, is that of the 65 respondents who completed the questionnaire, most indicated that most were comfortable with SMS format, while only a few (20.5%) indicated that they could Web-browse on their mobile devices. Further, because PDAs are still very costly to own and use in India, the study found that devices that support download of large textual material could be an issue.

**Figure 2.** Students' preferences for mobile learning: Mean score

One of our previous studies on student dropouts from IGNOU's BSc programme indicated that the major factors, under the category of 'personal reasons' responsible for their withdrawal were: 'absence of interaction with fellow students' and 'lack of time due to job and family responsibilities' (Fozdar et al., 2006). The latter factor 'lack of time due to job and family responsibilities' is clearly beyond IGNOU's control. The first factor, however, can be addressed by providing mobile phones to students and by designing and promoting collaborative learning activities, such as forming 'self-help' groups. Mobile phones can also be useful for meetings and to locate fellow group members. It must be stressed, however, that 'privacy issues' must be considered when exchanging students' mobile phone numbers. One of the main advantages of ICT-based e-Learning/ m-Learning is that it supports collaboration among students, a dynamic that underpins effective distance learning (Swan, 2006; Naismith et al., 2005). Collaboration enables students studying at a distance to interact, socialize, and develop feelings of connectedness and community (Rovai, 2002). Thus, not only can mobile phones provide a viable platform for collaboration and interaction, they are becoming increasingly ubiquitous as more and more students buy mobile phones. These facts alone make mobile technologies a logical media to support interaction between and amongst students and their institution and teachers. Moreover, such interactions will very likely alleviate some of the common causes leading students to withdrawal as cited above, simply by improving interaction, collaboration, and feelings of connectedness and community.

Students indicated other important reasons for withdrawal: distance from the study centres; insufficient academic support; insufficient information on counselling and laboratory sessions; and other associated information from IGNOU. As mobile phones become more ubiquitous, they are arguably well positioned to play a more central and effective role in providing students with much needed information – i.e., schedule of counselling and/ or laboratory sessions; and other relevant information related to their studies. Using increasingly ubiquitous and accessible technologies – such as mobile phones – will improve and strengthen the role of student support at IGNOU, helping to make significant qualitative and quantitative improvements in IGNOU's ODL climate.

Mobile learning can also provide good support to micro-learning, a new way and effective way of learning (Habitzel, Märk, Stehno, & Prock, 2006). It has been observed by Habitzel and colleagues (2006), for example, that people can learn more effectively if 'information' is broken down into smaller, more easy-to-comprehend units. It is suggested here, therefore, that mobile learning is an ideal medium simply because it supports this 'new way' of learning by via the use of SMS, pre-recorded MP3 files, and so forth.

## Conclusion

Mobile technologies are perceived by the participants in this study to be an effective tool in improving communication and learning. In developing countries like India, where WAP and PDA-based mobile technologies are not yet popular due to the costs involved in owning and using such higher-end mobile technologies, less expensive SMS-based mobile technologies such as mobile phones, however, do hold tremendous potential, which can be strategically used to support and improve student retention.

## Limitations

Like all studies, the study reported here also had limitations. Although response rate was good (65%), the sample size was relatively small, especially when taking into consideration that

IGNOU admits around 5,000 students into its BSc programme each year. We also carried out this survey in the Delhi region only, where student awareness of IGNOU and its programmes is arguably much higher than in other, more far-flung regions of India. Many respondents did not answer all parts of the questionnaire, possibly due to their unfamiliarity with the concept of 'mobile learning.' Participants' lack of 'actual experience' with mobile learning therefore made it difficult for them to provide fully informed opinions on the use of mobile learning technologies. Findings of this study, therefore, cannot be generalized to other IGNOU programmes and should only be extended to inform other learner-group studies with caution. Nevertheless, the results of the survey does provide promising indications and clues on students' attitudes and perceptions towards the effectiveness of mobile technologies for student support. Indeed, the finding reported here could be useful to guide other ODL institutions seeking to adopt mobile learning to provide better communication and learner support.

## The Future

We can say with some certainty that mobile technologies do appear to have a great future in developing countries, like India. Indeed, mobile phones are one of the less expensive, most accessible and popular media among students of all ages. In India, however, we still have a long way to go before an entire course can be delivered via mobile phones. As indicated by our research, however, mobile telephones are inexpensive, accessible, and well positioned for the delivery of student support interventions. Low cost mobile technologies can be used to maintain and enhance contact with students and teachers, and, by logic, improve retention in ODL institutions. Next, we plan to extend our current research by undertaking a control experiment to determine the actual impact of mobile technology on student retention in Indira Gandhi National Open University's BSc programme. We would also like to explore the use of micro-learning blended with our DE system using mobile systems for support.

## References

Ashby, A. (2004). Monitoring Student Retention in the Open University: detritions, measurement, interpretation and action. *Open Learning, 19*(1), 65-78.

Astin, A. W. (1977). *Four critical years.* San Francisco: Jossey-Bass.

Astin, A. W. (1985). *Achieving academic excellence.* San Francisco: Jossey-Bass.

Attewell, J. (2005). *Mobile Technologies and Learning: A technology update and m-learning project summary.* Retrieved July 1, 2006 from: http://www.m-learning.org/docs/The%20m-learning%20project%20-%20technology%20update%20and%20project%20summary.pdf

Attewell, J., & Savill-Smityh, C. (2003). m-Learning and Social Inclusion: Focusing on learners and learning. *Proceeding of MLEARN 2003: Learning with mobile devices* (pp. 3-12). London: Learning and Skillls Development Agency.

Bean, J. (1980). Dropouts and Turnover: The synthesis and test of a casual model of student attrition. *The Review Higher Education, 12*,155-187.

Bean, J. (1983). The application of a model of turnover in work organizations to the student attrition process. *The Review Higher Education, 6*,129-148.

Bean, J., & Metzner, B. S. (1985). A conceptual model of nontraditional student attrition. *Review of Educational Research, 55*, 485-540.

Biner, P. M. (1993). The development of an instrument to measure student attitudes towards television course. *The American Journal of Distance Education, 7*(1), 62-73.

Boehner, K., Gay, G., & Larkin, C. (2005). Drawing Evaluation into Design for Mobile Computing: A case study of the Renwick Gallery's Hand-held education project. *Journal of Digital Libraries Special Issue: Museums, 5*(3), 219-230.

Braxton, J. M. (Ed). (2000). *Reworking the student departure puzzle.* Nashville, TN.: Vanderbilt University Press.

Brown, K. M. (1996). The role of internal and external factors in the discontinuation of off campus students. *Distance Education, 17*(1), 44-71.

Byrnes, R., & Ellis, A. (2006). The prevalence and characteristics of online assessment in Australian Universities. *Australasian Journal of Education Technology, 22*(1), 104-125.

Carr, S. (2000, February 11). As distance education comes of age, the challenge is keeping the students. *The Chronicle of Higher Education*, p. A39. Retrieved on July 1, 2006 from: http://chronicle.com/infotech/

Catchpole, M. (1992). Classroom, Open, and Distance Teaching: A faculty view. *The American Journal of Distance Education, 6*(3), 41-51.

Cavanaugh J. K. (2005). Are online courses cannibalizing students from existing course? *Journal of Asynchronous Learning Network, 9*(3). Retrieved July 1, 2006 from: http://www.sloan-c.org/publications/jaln/v9n3/v9n3_cavanaugh.asp

Chen, Y. S., Kao, T. C., Yu, G. J., & Sheu, J. P. (2004). A mobile butterfly-watching learning system for supporting independent learning. Proceeding of *IEEE Computer Society 2nd International Workshop on Wireless and Mobile Technologies in Education* (pp. 11-18). JungLi, Taiwan.

Chyung, S. Y. (2001). Systematic and systemic approaches to reducing attrition rate in online higher education. American *Journal of Distance Education, 15*(3), 36-49.

Colley, J., & Stead, G, (2003). Take a Bite: Producing accessible learning materials for mobile devices. Proceedings of *MLEARN 2003: Learning with Mobile Devices* (pp. 43-46). London: Learning and Skills Development Agency.

Cookson, P. (1989). Research on Learners and Learning in Distance Education: A review. *The American Journal of Distance Education, 3*(2), 22-34.

Cortez, C., Nussbaum, M., Santelices, R., Rodriguez, P., Zurita, G, Correa, M., & Cautivo, R., (2004). Teaching sciences with mobile computer supported collaborative learning (MCSCL). *Proceeding of IEEE Computer Society 2nd International Workshop on Wireless and Mobile Technologies in Education* (pp. 67-74). JungLi, Taiwan.

DEST (2005). Learning and Teaching Performance Fund 2006: Administrative information for providers. *Department of Education, Science and Training website.* Retrieved June 1, 2006 from: http://www.dest.gov.au/NR/rdonlyres/018DB581375G-4BDF-ABD8-1F5E608A4382/7637/FINALAIP2August2005.pdf

Fozdar, B. I., & Kumar, L. S. (2006). Teaching Chemistry at Indira Gandhi National Open University. *Turkish Online Journal of Distance Education, 7*(2), 80-89.

Fozdar, B. I., Kumar, L. S., & Kannan S. (2006). A survey of a study on the reasons responsible for student dropout from the Bachelor of Science programme at Indira Gandhi National Open University. *International Review of Research in Open and Distance Learning, 7*(3). Retrieved May 27 2007 from: http://www.irrodl.org/index.php/irrodl/article/view/291/747

Galusha, J. (1997). Barriers to learning in distance education. *Interpersonal Computing and Technology, 5*(3-4). Retrieved on July 1, 2006 from: http://www.emoderators.com/ipct-j/1997/n4/galusha.html

Garland, M. (1993). Ethnography penetrates the "I didn't have time" rationale to elucidate higher order reason for distance education withdrawal. *Research in Distance Education, 8*(2), 181-198.

Gibson, C. C., & Graff, A. O. (1992). Impact of adults' preferred learning styles and perception of barriers on completion of external baccalaureate degree programmes. *Journal of Distance Education, 7*(1), 39-51.

Habitzel, K., Märk, T. D, Stehno, B., & Prock, S. (2006) Microlearning: Emerging concepts, practices and technologies after e-learning. *Proceedings of Microlearning 2005 Learning & Working in New Media.* In Conference Series: Innsbruck University Press: Retrieved June 6, 2007 from: http://www.microlearning.org/micropapers/microlearning2005_proceedings_digitalversion.pdf

Heverly, M. A. (1999). Predicting retention from students' experiences with college processes. *Journal of College Student Retention, 1*(1), 3-11.

Internet World Stats (2006). *American Internet usage and population statistics.* Retrieved on July 1, 2006 from: http://www.internetworldstats.com/am/us.htm

Keegan, D. (2002). *The Future of Learning: From e-learning to m-learning (No. ZIFF Papiere 119).* Hagen Zentrales Institute fur Fernstudienforschung: FernUniversitat.

Keller, J. (1987). Development of the ARCS model in instructional design. *Journal of Instructional Development, 10*(3), 2-10.

Kember, D. (1995). *Open Learning Courses for Adults: A model of student progress.* Englewood Cliffs, NJ.: Educational Technology Publications.

Knight, P. (2007). Promoting Retention and Successful Completion on Master Course on Education: A study comparing e-tuition using asynchronous conferencing software with face-to-face tuition. *Open Learning, 22*(1), 87-96.

Lonsdale, P., Baber, C., Sharples, M., & Arvanitis, T. N. (2003). A context-awareness architecture for facilitating mobile learning. Proceedings of *MLEARN 2003: Learning with Mobile Devices,* (pp. 79-85). London: Learning and Skills Development Agency.

Lonsdale, P, Baber, C, Sharples, M, Byrne, W, Arvanitis, T, Brundell, P., & Beale, H (2004). Context awareness for MOBIlearn: creating an engaging learning experience in an art museum. Proceedings of *MLEARN 2004.* Bracciano, Rome: Learning and Skills Development Agency.

Mobilearn (*n.d.*). *Homepage of the Mobilearn project website.* Retrieved May 25, 2007 from: http://www.mobilearn.org/

Mitchell, A., & Doherty, M. (2003). *m-Learning Support for Disadvantaged Young Adults: a mid-stage review.* London: Ultralab. Retrieved on March 1, 2007 from: www.mlearning.org/reports.html

McGivney, V. (2004). Understanding persistence in adult learning. *Open Learning, 19*(1), 33-46.

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2005). *Literature Review in Mobile Technologies and Learning, 11: NESTA Futurelab*. Bristol, UK.: NESTA.

Ostman, R., & Wagner, G. (1987). New Zealand management student's perceptions of communication technologies in correspondence education. *Distance Education, 8*(1), 47-63.

Pierrakeas, C., Xenos, M., Panagiiotakopoulos, C., & Vergidis, D. (2004). A comparative study of dropout rate and causes for two different distance education courses. *International Review of Research in Open and Distance Learning, 5*(2). Retrieved May 27, 2007 from: http://www.irrodl.org/index.php/irrodl/article/view/183/265

Rekkedal, T. (2002). Trying out a Learning Environment for Mobile Learning: Evaluation of the course. *The Tutor in Distance Education: Phase 1 of the NKI sub-project of EU Leonordo Project, 'From e-learning to m-learning.'* Retrieved March 1, 2007 from: http://learning.ericsson.net/mlearning2/files/workpackage2/designing.doc

Rekkedal, T. (2002b) Trying out a learning environment for mobile learners II evaluation of the course. *Online Teaching and Learning: Phase 2 of the NKI sub-project of the EU Leonardo Project, 'From e-learning to m-learning.'* Retrieved March 1, 2007 from: http://learning.ericsson.net/mlearning 2/project_one/student_use_year_2_nki.doc

Roberts, T. G., Irani, T. A., Telg, W. & Lundy, L. K. (2005). The development of an instrument to evaluate distance education courses using student attitudes. *The American Journal of Distance Education,19*(1), 51-64.

Roger, E. M. (1995). *Diffusion of innovations, 4th Ed.* New York: Free Press.

Rogers, Y., Price, S., Harris, E., Phelps,T., Underwood, M., Wilde, D., et al. (2002). *Learning Through Digitally-Augmented Physical Experiences: Reflections on the Ambient Wood project.* Equator Technical Report. Retrieved March 1, 2007 from: http://www.informatics.sussex.ac.uk/research/groups/interact/papers/pdfs/Playing%20and%20Learning/Tangibles%20and%20virtual%20environments/Rogers_Ambient_Wood2.pdf

Rovai, A. P. (2002). A preliminary look at structural differences in sense of classroom community between higher education traditional and ALN courses. *Journal of Asynchronous Learning Networking, 6*(1), 41 – 56.

Simpson, O. (2004). The impact on retention of intervention to support distance-learning students. *Open Learning, 19*(1), 78-95.

Simpson, O. (2005). The costs and benefits of students retention for students, institutions and governments. *Studies in Learning, Evaluation Innovation and Development, 2*(3), 34-43.

Swan, K. (2006). Online Collaboration: Introduction to the special issue. *Journal of Asynchronous Learning Networking, 10*(1). Retrieved July 1, 2006 from: http://www.aln.org/publications/jaln/v10n1/v10n1_1swan_member.asp

Sweet, R. (1983). Student Dropout in Distance Education: An application of Tinto's model. *Distance Education, 7*, 201-213.

Taylor, J. (2001). *DVD Demystified, 2nd Ed.* New York: Mc Graw Hill.

Taylor, J., Sharples, M., O'Malley, C., Vavoula, G., & Waycott, J. (2006). Towards a task model for mobile learning a dialectical approach. *International Journal of Learning Technology 2*(2/3), 138-158.

Tinto, V. (1975). Dropout from Higher Education: A theatrical synthesis of recent research. *Review of Education Research, 45*, 89-125.

Tinto, V. (1993). *Leaving College: Rethinking the cause and cure of student attrition*, 2nd ed. Chicago: University of Chicago Press.

TRAI (2006). *Telecom Regulatory Authority of India.* Retrieved June 6, 2007 from: http://www.trai.gov.in/index.asp

Traxler, J. (2003). M-learning-evaluating the effectiveness and the cost. *Proceeding of MLEARN 2003: Learning with mobile devices*, (pp. 183-188). London: Learning and Skills Development Agency.

Traxler, J., & Riordan, B. (2003). Evaluating the effectiveness of retention strategies using SMS, WAP and www Student Support. Proceeding of the *4th Annual Conference: LTSN Centre for Information and Computer Science* (pp. 54-55). Galway, Ireland.

Tresman, S. (2002). Towards a Strategy for Improved Student Retention in Programmes of Open, Distance Education: A case study from the Open University UK. *International Review of Research in Open and distance Learning, 3*(1). Retrieved March 1, 2007 from: http://www.irrodl.org/index.php/irrodl/article/view/75/145

Vavoula, G. N. (2005). D4.4: A study of mobile learning practices. MOBIlearn project deliverable. *The MOBIlearn project website.* Retrieved March 1, 2007 from: http://www.mobilearn.org/download/results/public_deliverables/MOBIlearn_D4.4_Final.pdf

Wojciechowski, A., & Palmer, L. B. (2005). Individual Students Characteristics: Can any be predictors of success in online classes? *Online Journal of Distance Learning Administration, 8*(2). Retrieved June 6, 2007 from: http://www.westga.edu/~distance/ojdla/summer82/wojciechowski82.htm

Wood, J., Keen, A., Basu, N., & Robertshaw, S. (2003). The development of mobile applications for patient education. Proceedings of *the 2003 Designing for User Experiences* (DUX) conference. San Francisco: ACM.

Woodley A. (2004). Conceptualizing Student Dropout in Part-time Distance Education: Pathologizing the normal? *Open Learning, 19*(1), 47-64.