

The use of mobile phones in distance education – a survey of student views at the NKI online college

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Introduction

The article presents evaluation results from NKI in connection with the Socrates Minerva project, [The role of mobile learning in European education](#) (2006-2008). NKI work on mobile learning in this project builds on previous EU funded projects on mobile learning. These projects are:

[Incorporating mobile learning into mainstream education](#) (2005-2007)

[From e-learning to m-learning](#) (2000-2003)

[Mobile learning- the next generation of learning](#) (2003-2005).

Developments and evaluations from the preceding projects have been presented by Dye, Fagerberg, Midtsveen (2004), Dye & Fagerberg (2004), Dye & Rekkedal (2005), Fagerberg, Rekkedal & Russell (2002), Rekkedal (2002a), Rekkedal (2002b), Rekkedal (2002c), Rekkedal & Dye (2007), Russell (2005). The article by Rekkedal & Dye (2007) builds on the same data, however with specific reference to use of SMS services.

The developments carried out by NKI in the mobile learning projects have been done within the organisational frames and teaching philosophy of NKI Distance Education, as one of the megaproviders of online distance education (see Arneberg et al. (2007), Paulsen (2007a)), and also within the frames of infrastructure and electronic communication system of Norway – with specific reference to mobile phone penetration and use.

Norway, as Scandinavia in general, has a higher penetration of mobile phone subscriptions than most other countries. All the Scandinavian countries have more mobile subscriptions than inhabitants. Norway has 4.7 million inhabitants and 5.2 million mobile phone subscriptions, increased 7 percent from 2006. Mobile communications increased with 21 percent last year. The average Norwegian talks 2.4 hours by mobile phone during a month. 3 billion SMS/MMS messages were sent during the first half of 2007. The average Norwegian mobile subscriber sends 99 messages per month. The number of SMS messages increased 5 percent last year, while the number of MMS is much lower (totally 51 million during the first half of 2007) and shows less increase (2 percent). There is a clear tendency that the mobile phone takes over for ordinary telephone communication; two years ago mobile phone communication stood for 28 percent, in 2006 38 percent and first half of 2007 46 percent of all telephone communications (Aftenposten 2007).

For NKI the present project builds on the situation that all online distance courses are available on PDAs (and also on smart phones with web browser) without any need for adaptation of the individual courses. This situation is a result of the theoretical work and technical developments taking place as part of the mobile learning projects.

The context of mobile learning developments at NKI

NKI was one of the first institutions worldwide to offer online distance education when we started the first trials on our in-house developed Learning Management System, *EKKO* (Norwegian acronym for “*electronic combined education*”), in 1987. Since then online

education has continuously been offered to an increasing student population. In March 2008 NKI has approximately 9,000 active online students, studying one of more than 80 study programmes or over 400 courses offered on the Internet/Web. This spring we will pass 100,000 course enrolments to NKI online distance education since 1987. In 2001 we launched what we considered to be the 4th generation online distance education system at NKI when introducing the internally developed LMS, *SESAM (Scalable Educational System for Administration and Management)*, that totally integrates the web-based Learning Management System with the overall Student Administration System and a number of other applications for efficient operation and administration of the logistics and student support measures in online distance education (see figure 1). The total integration of distance education IT systems is in our view the major prerequisite for operating efficient and effective large-scale distance education, including a mobile learning environment. A description of SESAM and functionalities has been given by Paulsen et al. (2003). It should be mentioned that short after carrying out this survey NKI Distance Education launched its SESAM 6 LMS (December 18th 2007) based on a new technological platform. It is a general problem that web technologies for PC applications are available before the same technologies are adapted to mobile phones and other handheld devices such as PDAs. For NKI mobile learning the new LMS included functionalities not yet available for mobile use. However, as mobile learning in the NKI online learning system is an add on service, this situation is hopefully not critical for overall acceptance of mobile learning as part of the online distance learning solutions.

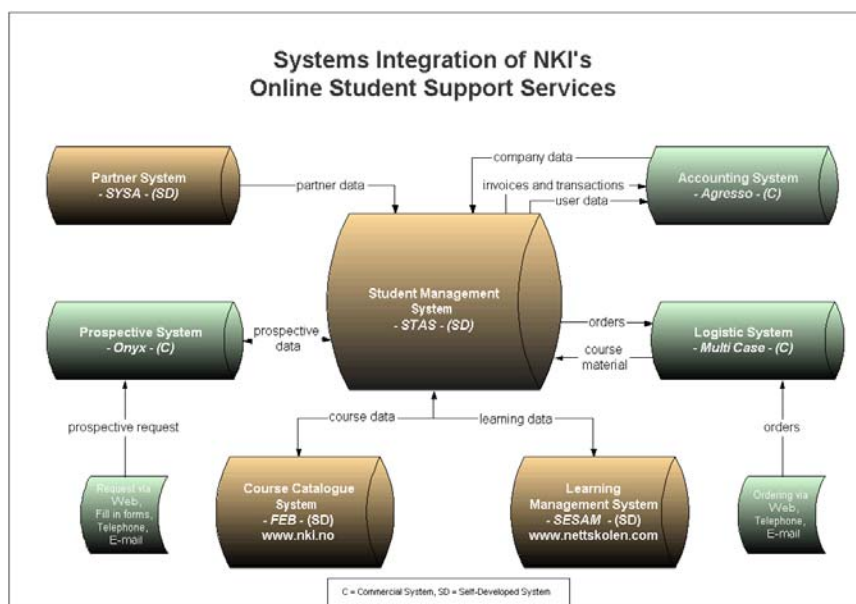


Figure 1. NKI's integrated systems for online administration and student support.

Increasing the flexibility of distance education

One of the main and overall aims when engaging in mobile learning projects has been to extend the distribution of learning materials and communication solutions to lighter equipment and to increase the flexibility in distance education, i.e. refining the total distance learning environment to meet the needs of the '*mobile distance learner*'. A number of evaluation studies among distance and online learners at NKI have demonstrated that students emphasize flexibility (see e.g. Rekkedal 1990, 1998, 1999, Rekkedal & Paulsen 1997, Rekkedal et al. 2003).

We have argued that distance education generally seems to develop in two quite different directions. The solution at one end of a flexibility continuum can be described as an

individual, flexible solution allowing the student freedom to start at any time and follow his/her own progression according to personal needs for combining studies with work, family and social life – *'the individual flexible teaching model'*. This model represents a generic development of the model of distance teaching institutions and applies normally media and technologies independent of time (and place), such as asynchronous computer communication, and pre-produced video, audio and printed materials to be accessed anytime and anywhere. The model on the opposite end of the scale, *'the extended classroom model'*, assumes that the students are organised into groups required to meet regularly either at local study centres or virtually, and applies synchronous technologies such as video, audio or text based synchronous conferencing, satellite distribution, radio and television (Gamlin 1995). Today most uses of synchronous technologies are also distributed on the Internet.

In this connection we have chosen the philosophy for the development of Internet based education at NKI: *Flexible and individual distance teaching with the student group as social and academic support for learning*. NKI Distance Education is the largest distance teaching institution in Norway, recruiting 7,000-10,000 students every year. The students may enrol to any of 400 courses or 80 study programmes or any combination of courses at any day of the year and progress at their own pace. This flexibility does not exclude group-based solutions in cooperation with one single employer, trade organisation or local organiser, or that individual students on their own initiative or by the initiative of the tutor are collaborating on learning tasks. NKI philosophy on online distance learning is expressed in the strategic document (NKI 2007): *"NKI Distance Education aims to offer distance education solutions that make the students attain their learning objectives through optimum individual flexibility where the students shall represent resources for each other without being dependent on each other."* This philosophy sets the premises for the development of flexible education and system for Internet based learning and sets the guidelines for both technical and didactical development – including the environment for mobile learning and new solutions related to web 2.0 technology. The potential of social software for developing solutions, which allow students within *'maximum freedom and flexibility'* modes of distance learning to engage in cooperative learning activities has been presented by Anderson (2005).

NKI are developing different kinds of social software solutions within the last version of the SESAM LMS-system, based on the concept of *'learning partner'*, e.g. all students are urged to present themselves in ways that invite to social interaction for learning purposes. This information may be open to all members of the learning society, to fellow students studying the same programme, or to tutors and administration only. Student lists contain information about where students live and which module they are studying at any time. Software solutions for inviting and accepting learning partners and for establishing connections have been developed parallel to the research on mobile learning Paulsen (2003, 2007b). There is no doubt that mobile technology may increase possibilities for efficient interaction between distance students, making them more independent of time and space.

Views on knowledge and learning

When starting the first discussions on m-learning and planning for the first m-learning development, it was for the NKI research group very clear that the learning aims, content and teaching/learning methods in the NKI online courses and programmes generally were very different from most e-learning courses (often designed with self-instructional programmed learning materials) (see e.g. Dichanz 2001).

To us, learning is a change in the student's perception of reality related to the problem areas studied and increased competence in solving problems in a field, ability to differentiate between focal and more peripheral questions, analytical skills and competence in using the tools within a field in appropriate ways. This means that learning results are shown in a qualitative change in the student's understanding, academic, social and technical competence. The learning is a result of active processing of learning materials and solving problems individually and/or in groups. This view is different from what often we can find in many so-called e-learning programmes, where knowledge often is seen as a larger amount of information or ability to recall and reproduce facts. In addition to cost considerations, this is why NKI in general has put little emphasis on developing interactive programmed learning courses or modules based on a tradition more related to behaviouristic pedagogy and knowledge transmission (see e.g. Marton et al. 1987, Marton et al. 1997, Morgan 1993 on students' conceptions of learning, deep level and surface level approaches to learning). We also hold the view that learning is an individual process that can be supported by adequate interaction and/or cooperation in groups (Askeland 2000), as stated in the NKI Strategic Document (2007).

Enhancing the flexibility of distance education through mobile learning.

Our main objective, already when starting the first developments in the first m-learning project, was to extend the distribution of learning materials and communication to lighter equipment, specifically PDA and mobile phone. We should also add that NKI parallel to the m-learning projects have been engaged in projects on developing '*universal accessibility of distance learning*' (Mortensen 2003) (which has similar consequences concerning server side solutions for making content available to anyone independent of physical handicaps or technology on the receiver side).

It was our aim in designing the environment for the mobile learner to extend and enhance (or, in fact, restore) the flexibility of distance education, that to some extent took a step backwards when converting from paper based to online learning, where students largely were required to study at a place (and at a time) where a computer with access to the Internet was available. This aim has still been in focus during the subsequent, including the present, m-learning projects.

Evaluation method

We decided to carry out the survey on students' views on mobile learning services by applying the standard evaluation module in SESAM. As the general evaluation was carried out partly in the same survey as the specific survey on experiences and views on SMS services, the questionnaire included an 'overweight' of questions on SMS applications. As the use of SMS may be an important part of mobile learning in many distance education settings, perhaps specifically in developing countries (see e.g. Brown 2004), we have decided to include all the answers concerning SMS services also in this article.

The questionnaire was published on the NKI SESAM LMS web pages 21st August 2007 and was open for students to respond until 11th October. The questionnaire could be accessed from the introductory course *Learning to learn* and from 12 different study programmes (3 higher education studies, 2 secondary school studies and 7 vocational training studies). Information about the survey was given by message to the course forums. Forum messages is also distributed by 'push' solution – e-mail – so that students do not have to access the forums to

look for new messages. During the period, when the questionnaire was active on the web, it was answered by totally 279 students. Although the number of respondents only represent a small percentage of the NKI online students, there is little or no reason to assume that the respondents in this survey should be biased concerning attitudes towards mobile learning and applications of mobile technology as part of their distance study, except for the fact that relatively newly enrolled students are overrepresented among the respondents. This is a result of many respondents accessed the questionnaire from the course, *Learning to learn*, that is an introductory course for all new students. Whether an expressed positive attitude towards an aspect of mobile learning will last, increase or decrease during an extended period of online study is not known. Presently, the technology behind the web based questionnaire makes cross tabulations impossible. This situation makes it also impossible to control for study experience or other situational or background variables. Thus, we do not know about possible differences in attitudes between new students and more experienced students. We deliberately published the questionnaire with access from the introductory course, because all students have access to this course as long as they are studying. However, in practice it is mainly accessed by newly enrolled students. As new students have less experience with online learning generally, it might be that they are less certain about their needs for and/or the usefulness of mobile access and services.

Results from the web questionnaire

In the following we will present and discuss the results from the web based questionnaire on the possible use of mobile technology as part of the NKI distance education online learning system and services.

As mentioned, the questionnaire was answered by 279 students.

Some background information

Table 1. Gender.

	N	%
Man	54	20
Women	221	80
Sum:	275	100

Among the total NKI online students the gender distribution is approximately 70 percent women and 30 percent men. The respondents in the mobile learning evaluation study have a somewhat higher representation of women. Whether this difference makes any difference in attitudes toward mobile telephone applications in online learning is not known.

Table 2. Age.

Age	N	%
Under 20 years	22	8
20-24	64	23
25-29	61	22
30-34	36	13
35-39	35	13
40 years or more	60	22
Sum	278	100

All age groups are represented among the respondents and the distribution in accordance with the age distribution of NKI online students. The age distribution of NKI online students differ between different courses and study programmes. Interior design students and students taking general secondary school subjects are younger than students on Management and some vocational programmes. However, in our connection here it is important to notice that all age groups are well represented.

Table 3. Previous education.

Previous education	N	%
Basic ed./primary school (9 years)	23	8
Primary + 1-2 years (10-11 years)	71	26
Secondary school completed	102	37
1 year or more higher education	82	29
Totalt antall svar:	278	100

The respondents also represent all levels of previous education. This is a result of the distribution of study programmes that were included in the study.

Based on the background data collected, we have reason to believe that the respondents constitute a representative sample of the population of NKI online students, except for the next variable, presented in table 4, how long time it is since they enrolled for the present course.

Table 4. Time since enrolment.

Time since enrolment	N	%
Less than 2 months	165	59
2-6 months	37	13
6-12 months	52	19
More than 12 months	24	9
Sum	278	100

As mentioned above, many of the respondents accessed the questionnaire from the introductory course, *Learning to learn*. Many of these were quite newly enrolled students. As the questionnaire was published on the web pages shortly after summer holidays, “less than 2 months” really means that many of these respondents have quite short and probably meagre experience as online students. As mentioned, is not known whether this makes them more, less or equally positive towards the use of mobile technology and mobile services.

Technology and access

Table 5. Modern mobile phones include possibilities for access to web pages. Do you know whether your mobile phone includes this function?

	N	%
Yes	219	79
No	58	21
Sum	277	100

79 percent of the respondents say that their mobile phone can access web pages. Whether the remaining 21 percent of the students have mobile phones without web access functionality or whether they do not know is not certain. But we can conclude that at least approximately 80 percent of NKI online students possess a mobile phone that can access web pages (assuming the respondents are representative for the population of NKI online students).

Table 6. If your phone has the possibility, do you use your phone for accessing web pages?

	N	%
Yes	70	30
No	167	70
Sum	237	100

This question should have been answered by only the 219 students who answered that their mobile phone had the possibility of accessing web pages. But at least we may conclude that 70 respondents, i.e. 25%, use their mobile phone for accessing web pages.

Table 7. Today all NKI course pages can be accessed by mobile phones or handheld devices. Did you know about this possibility?

	N	%
Yes	35	13
No	243	87
Sum	278	100

As a result of the projects on mobile learning all NKI online courses are made accessible via mobile phones. Information on this functionality seems not to be sufficiently known. Only 35 students (13%) answer that they knew about the possibility of accessing the NKI course pages. It is good reason to increase the information work concerning mobile learning possibilities for NKI online students.

Among the students who knew about the possibility of accessing and reading NKI web pages on mobile phones and other handheld devices, only 9 of the respondents say that they use the possibility of reading the NKI course pages on their handheld device.

We also asked whether they found this functionality useful in their studies. Although this question should be answered by those 9 students only, it was actually answered by 74 students of whom 30 (41%) answered that they found the functionality useful. However, as we have no possibility of separating the responses from the 9 students who have experience of accessing the NKI course pages, these answers are difficult to interpret.

The following questions were to be answered by all the students and concern the students' attitudes toward mobile phone applications in connection with online studies at NKI.

Attitudes toward different applications of mobile phones in online learning

Table 8. Would you find it useful to receive NKI course pages on your mobile phone?

	N	%
Yes	78	29
Don't know	99	36
No	96	35
Sum	273	100

The respondents are nearly equally divided in three groups, who are positive, uncertain, and negative, respectively, towards the usefulness of accessing the course pages via mobile phones.

Table 9. Would you find it useful to be able to access and read course literature and study guides from your mobile phone?

	N	%
Yes	96	35
Don't know	77	28
No	103	37
Sum	276	100

Although it might be difficult to see the difference between the two questions above, the respondents express a little more positive attitudes towards reading access to course literature from a mobile phone. About 1/3 of the respondents believe that it would be useful to be able to access and read course literature from their mobile phone. This is possible in all NKI courses today.

Table 10. Would you find it useful to be able to read forum contributions from your mobile phone?

	N	%
Yes	123	45
Don't know	51	19
No	99	36
Sum	273	100

When it comes to reading forum contributions there is an even larger group of students who believe that this is a useful functionality to have on the mobile phone. Nearly half of the students believe that reading forum messages on the mobile phone would be useful, while only about 1/3 find this functionality not useful. This functionality is available in the system today.

Table 11. Would you find it useful to be able to write contributions to the forum from your mobile phone?

	N	%
Yes	115	42
Don't know	58	21
No	98	36
Sum	271	100

It is also over 40 percent of the students who believe that it would be useful to be able to contribute to the forums from their mobile phone. While this was possible at the time of the survey, this functionality is not yet implemented in new LMS launched December 2007.

Table 12. Would you find it useful to be able to plan your studies, submit assignments or update your personal data from your mobile phone?

	N	%
Yes	75	27
Don't know	73	27
No	126	46
Sum	274	100

There are some more students (nearly half of the respondents) who are sceptical to the usefulness of planning studies, submitting assignments or changing personal data from their mobile phone or handheld device. This is functionality that presently in the new SESAM version, because of client (mobile phone) java technology, does not work. It is a matter of technology development and systems development priority when these solutions will be available.

It is all reason to emphasise that many online students appreciate to be able to use their mobile phone for different learning activities, such as reading the course pages, planning studies and submit assignments and communicating with other students in the course forums. Today, within the present LMS access to course pages is easy. For NKI to keep its position in the forefront line of online learning and e-learning, continuous adaptation of the LMS, SESAM, to function satisfactory on mobile devices is important.

SMS Services

A large majority of the students express positive or very positive attitudes towards SMS messages from NKI related to their studies. The number of students who believes in the usefulness of SMS services is considerably higher than the number of students who is positive towards the other mobile functionalities related to their online studies discussed above.

Table 13. What is your opinion on receiving SMS on incorrect e-mail address when NKI is not able to contact you by e-mail?

	N	%
Very positive	196	71
Positive	70	25
Neutral	9	3
Negative	2	1
Very negative	1	0

Sum	278	100
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There is no doubt that an overwhelming majority of NKI online students are positive to a system sending out SMS messages in a situation where they are not reached by e-mail. 96 percent is positive towards such a service, while only 1 percent is negative.

Table 14. What is your opinion on receiving SMS for following you up if you fall behind your personal study schedule?

	N	%
Very positive	117	42
Positive	110	40
Neutral	31	11
Negative	15	5
Very negative	3	1
Sum	276	100

A large majority also expresses positive attitudes towards SMS in connection with student follow-up. A few more students are neutral or negative to this type of service. It is a general experience that a small minority of students is negative to being followed up when falling behind their schedule. It is mainly the same group that is generally against planning as well. They wish to be completely free and autonomous in their studies with no intervention related to study progress. It is probably mainly the same group of students that is negative to SMS following up services that is negative in general towards the planning and following up system.

Table 15. What is your opinion on receiving SMS for reminding you about time and place for examinations?

	N	%
Very positive	207	75
Positive	57	21
Neutral	10	4
Negative	3	1
Very negative	0	0
Sum	277	101

Again, most of the students, over 95 percent are positive to a service by SMS that reminds them of time and place for examinations. Only 1 percent (3 students) expresses negative attitudes to such a service.

Table 16. What is your opinion on receiving SMS about examination results?

	N	%
Very positive	193	70
Positive	52	19
Neutral	21	8
Negative	9	3
Very negative	2	1
Sum	277	101

Only very few students express negative attitudes to receiving information on examination results on SMS.

At the end of the above sequence of questions on different SMS services, we asked if they could think of other desirable SMS services.

These possible services were mentioned:

- *When there are new contributions to the forum and when the commented assignment is returned from the tutor.*
- *I believe it would be an advantage if the students could tick which type of messages or reminders they wished to receive by SMS.*
- *Information when assignments for submissions were returned.*
- *It would have been positive if grades on submissions could be sent by SMS.*
- *Specific information, such as when tutors or advisors were reported sick.*
- *Deadlines for project work.*
- *Information about new NKI courses within my interest/subject field.*
- *Grades perhaps – light up the ordinary day with some good news :-)*
- *Send and receive questions and answers, communicate with the tutor when one has a small question.*
- *Information about interesting links related to the course.*
- *Messages from the tutor when commenting is delayed for some reason.*
- *Reminder on assignment submission if it is a long time since one submitted an assignment.*
- *Everything that relates to my online studies.*
- *I feel that the alternatives mentioned in the questionnaire are sufficient.*

From the different answers/suggestions above one may conclude that the students have many suggestions and seems to express a positive attitude towards receiving SMS messages related to their studies. Information about grades and the return of assignments from the tutor are mentioned by several students.

Discussion and conclusions

The survey supports the experiences from the previous m-learning projects that students may appreciate the use of handheld devices in connection with their online studies at NKI. Recent technological developments have made mobile phones owned by the majority of students capable of accessing course pages and other uses previously dependent on the use of pocket PCs/PDAs.

SMS services are among the most used, and perhaps useful, applications for mobile phones. SMS services have, as mentioned above, also proved to be very useful in distance education, especially in developing countries (Brown 2004). Brown (ibid.) at the University of Pretoria in South Africa has shown that the use of SMS services has a wide variety of application possibilities for both administrative and academic support to distance students. While Brown's experiences have taken place in a developing country, our research has shown that these services also can be useful and are positively accepted by the students in an advanced online learning system in Norway.

As adaptation of the learning environment for mobile access is an additional service to online learners, it is important to make sure whether the extra resources and costs connected with the development and operation of these services are acceptable in relation to the value of the services as experienced by the students. Our experiences so far from previous and present research and evaluations indicate that NKI should continue its effort to design its learning environment to function on mobile phones.

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