

Mobile learning and SMS services - student views on the use of mobile phones in distance education

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Introduction

The article presents evaluation results from the NKI sub project on the use of SMS services and adaptation of the learning management system, SESAM to the students' mobile phones.

The development work and trials in the project, [*Incorporating mobile learning into mainstream education*](#) (2005-2007) build on experiences from the two preceding Leonardo da Vinci projects on mobile learning, [*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), Russell (2005).

When developing system solutions for mobile learning, it is assumed that the NKI students normally will have access to a desktop or laptop computer with Internet connection. This means that the equipment and technologies used when mobile are additions to the students' equipment used when studying at home or at work. It should also be noted that developments were based on the absolute assumption that mobile learners would study in the same group as students not having access to mobile technology. Thus, the design of the learning environment has to cater efficiently for both situations and both types of students.

During the first project NKI developed solutions for mobile learning applying mobile phones and PDAs with portable keyboard. Learning materials were developed mainly for downloading to the PDA and off line study, while online access to forum discussions, supplying forum messages, reading in forums and communication with fellow students and tutors and submitting assignments were handled online via mobile equipment when students were on the move.

During the second project NKI developed and tested solutions for an "always online multi-media environment" for distance learners based on the use of PDA with access to wireless networks. During the project NKI first developed one specific course for mobile access with PDA. However, cost efficiency considerations require server side solutions that make access independent on devices on the user side. Thus, during the second year of the second mobile learning project NKI installed software and solutions that in principle made all online courses accessible independent of devices on the receiving side, e.g. most types of pocket PCs or mobile phones.

Norway and mobile telephony

Norway, and 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).

Specifications for the project

The aim of the third and present project has been to develop mobile learning course content and services that will enter into the mainstream and take mobile learning from a project-based structure and into mainstream education and training.

The project '*Incorporation of mobile learning into mainstream education and training*' was started in October 2005 and was finished in September 2007. The project was based on the partners' experiences during the two preceding projects and on the views that it is now time for mobile learning to transform from its project status and enter into mainstream education and training in Europe. Equally important aims of the project are to develop and test solutions for mobile technology in distance education and to disseminate information to interested parties in Europe and worldwide.

For NKI, the 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. In this situation the project decided to develop services using primarily SMS technology to support online distance education within the context of cost-efficient large-scale distance education. The infrastructure for the additional new services was developed to be applied in all courses.

The term, '*mobile*', as used in the project, included all types of devices that are connected to the mobile phone system. These devices will always include voice communication, and normally also have SMS (Short Message Service) functionalities. It is common for these devices also to have the capability of receiving and sending MMS (Multimedia Message Service) messages. Advanced versions of these devices will also include WAP (Wireless Application Protocol, a secure specification that allows users to access information instantly via handheld wireless devices such as mobile phones and smart phones) and/or Internet access enabling e-mail communication and access to web pages.

Mobile technologies can be divided into two basic categories:

Push:

MMS and SMS are the two leading push technologies for mobile devices. SMS functionality is available on nearly 100% of all mobile phones in use, thus making it the lead platform for push technologies for uses where 'guaranteed' delivery is needed. MMS is close to becoming as standard as SMS.

Pull:

Key technologies will include WAP, different versions of HTML and E-mail. For optimal use an analysis of the market penetration of these technologies was required, and also the penetration of JAVA/Flashlite and other relevant technologies. The more valuable – or critical – a service is to the student, the more important it is to make certain that the student has

technology to make use of the service. Hence, important/valuable services would probably have to be delivered on SMS because of its availability and reliability.

Hardware

The project had to set up a basic infrastructure. We needed an SMS gateway that included the ability to send and receive SMS messages. Received SMS messages should be made available to a computer, so that they can be processed either by a student counsellor or by other staff for handling of errors etc. The in house SMS service consists of one GSM modem terminal, some software to 'talk' to the terminals and a server to run the software.

Service requirements

The mobile service development process started with the smallest and easiest service that deliver a business function to NKI, which means increasing the quality of distance education. From this we may move onwards to dealing with more complex and advanced services. All services should handle error messages and log them. It was also required that a record of the costs of mobile services to NKI was registered.

The first service that was tried out in the project was SMS messages with practical information on 'how-to' log on to the NKI Internet College and information such as username, password, etc. sent to new students whom we for some reason were not able to reach by e-mail. We also included a link to the course called '*Learning to learn*' (introductory course in all online programmes) describing how to study and what to expect as an online student at NKI. This was developed as a lightweight WAP version of the original course.

As part of the project we also used the system to get in touch with students who were registered with invalid e-mail addresses. The plan is in the future to develop a solution that automatically sends an SMS message to the student if an invalid e-mail address is detected by the system.

Possible future services

There are numerous possibilities for the use of SMS/MMS services that could be suitable for supporting online distance learners. NKI practices flexible pacing and free start-up times and has developed advanced support systems to follow-up both students and teachers in this study context.

The following services might be developed and implemented for mobile technologies as a result of the experiences in the present project (Russell 2005):

- Password retrieval for students who have forgotten their password.
- Welcome message with user name and password. Included would also be basic 'how-to' log on to the web pages. This message could also include contact information for easy storage on a phone, as well as links to other services that are designed by NKI to be used from a mobile device. The message may also include a question for permission to communicate to the student via mobile phone.
- The introductory course '*Learning to Learn*' will be designed specifically for delivery to mobile devices, preparing the student for what to expect as a distance student at NKI. We hope to also to give the student an introduction to study techniques in a lightweight version made available for mobile via WAP.

- Reminders to students who fall behind their planned progressions schedules.
- Reminders to students for exam registration. We would also like this system to include the possibility for the students to enrol for exams via the mobile phone.
- Delivery of interactive quizzes.
- Notification to teachers when students have submitted an assignment; it would also be useful for notification to be sent only when the teacher is late in responding.
- Notification to students when grades on submitted assignments are registered.
- Introduce a web interface to allow teachers and administrators to send SMS messages to students and allow students to send messages to other students.
- Allow students to upload pictures and text to their presentation.
- Allow students to upload pictures and text to their blog.
- As much of the NKI teaching/learning site as feasible to be made available to mobile web browsers.

Evaluation methods

Actually the main evaluation method in this specific project was planned to consist of internal records and control of effects of distributing SMS messages, practical uses as expressed by student support staff and extra costs involved.

In addition we planned to carry out qualitative evaluation by telephone interviews with students who had received SMS messages as part of their study. Only 6 students were interviewed by telephone. The low number of respondents was a result of an unexpected experience of real difficulties getting in contact with a larger number of students, a fact that supports the usefulness of SMS services. It is obviously easier to reach a student by an SMS than to get in contact with the student on the phone. As the time for getting in contact a sufficient number of students by phone turned out to become quite extensive, we decided that we would put the main effort on the distribution of a more quantitative questionnaire to a larger group of online students to get more student viewpoints on the use of SMS services and mobile telephone applications as a supplement to the NKI online distance learning system.

The questionnaire was published on the NKI SESAM LMS web pages 21st August 2007 and was open for students responding 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). During the period that 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 in any way 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*. We deliberately published the

questionnaire with access from this course, because all students have access to the course. However, in practice it is mainly accessed by newly enrolled students. As new students have less experience with online learning, they may be less certain about their needs for and/or the usefulness of mobile access and services. Presently, the technology behind the web based questionnaire makes cross tabulations difficult, so we do not know about possible differences in attitudes between new students and more experienced students.

Internal NKI experiences – costs and effects

NKI Distance Education has used SMS services both for marketing purposes and for sending information to distance students. We have adapted our LMS, SESAM, to serve content to a mobile device fitted to the small screen as well as to send SMS messages to our students. This has been both a success and a challenge.

In the previous, above mentioned, projects on mobile learning the focus has been mainly on course content and communication. In this third project NKI wanted to focus on extra services that could increase the online students' experience of being closely followed up by adding new mobile services, such as SMS messaging integrated with the Internet based content and communication services. At the beginning of the project NKI implemented a SMS gateway capable of sending and receiving SMS messages to and from the server. This service was integrated in NKI's administration system for online students and available to staff.

For testing purposes NKI decided to send SMS messages manually to selected students asking them to correct their e-mail address after receiving an error from trying to send them an e-mail. This approach proved to be a success, and after a while some of the NKI online tutors started generating messages they wished to be sent to one or more of their students.

When NKI was satisfied with the logging of the service, it was put in production and used to send messages to students which had an error with their e-mail address. This was sent as bulk SMS messages to test the response. After sending several hundred SMS messages we found that approximately 70 percent of the students, who had received an SMS message, changed their e-mail address and make NKI again able to send information to these students.

NKI then proceeded to developing SMS services that could benefit most of our approximately 9000 online students. One of these services was the course *Learning to learn* that we developed as a light-weight WAP course. This course was linked to in an SMS after enrolment. The translation of that message is:

“Welcome to the course Learning to Learn - available at <http://www.nettskolen.com/multimedia/mobilkurs01a.wml>”.

The link takes the student to the course and gives a quick introduction to what it is to be a student at NKI. Other services that NKI developed through the project were (in English translation):

E-mail error message:

NKI can not reach you at the email address xx@yyy.zz, please log in and correct the address

Exam reminder:

Your exam in “Learning to learn” is on the 27th. September, hope you are on schedule. Kind regards from NKI

Forgotten password:

Your password is xxxxxx

New comments on assignments:

Comments for "Learning to learn" is available, please log in to see the comments

Exam results are available:

Congratulations on finishing the exam, your grade is available online

These are the services that NKI have developed and so far the greatest success is the message to alert students that their e-mail address is unavailable. The technical challenges have been small and the cost of sending SMS messages are far lower than sending letters by post or making phone calls to the students.

Results from telephone interviews

6 students were reached for telephone interviews before we decided change to the web questionnaire solution. These were two men and four women. They had all more than six months experience as online students; four had over one year experience with and two years as the maximum. Their age varied from 29 to 41 years and previous education varied from below completed secondary school to over two years of higher education. One man, 51 years old, was taking his third study programme as online NKI student.

All interviewees were approached in connection with NKI sending an SMS because their e-mail addresses resulted in error messages. The interviews took place one month after the distribution of the SMS messages. Five of the respondents reported that they had received the SMS message, while the fifth, 40 year old woman, who in practice was presently quite passive, had not reacted to the message, but could not remember whether the message from NKI on the incorrect e-mail address came as SMS or as ordinary letter.

Concerning the experience of receiving SMS message from NKI, all five (who remembered were very positive), and in fact they all answered that they immediately took action and logged in to correct their e-mail addresses.

On the question on how they experienced receiving the SMS on incorrect e-mail address they all were very positive and looked at this as an unexpected positive service. Expressions such as "This was really superb" or "Very good service" were typical for the answers.

On the following-up questions on how they would look at receiving SMS messages concerning information on support from study advisors when falling behind, reminders on examination time and place, deadlines for examination registrations or information on results etc., they were all enthusiastic. There were no reservations against SMS messages in connection with their studies.

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. Whether this makes them more, less or equally positive towards the use of mobile technology and mobile services is not known.

In the introduction to the questionnaire the students were presented the following statement:

“NKI has participated in a number of EU projects where we have carried out different adaptations of the online education for application of mobile technology both for access and reading of the web pages, including study guides and web based course materials, for communication via e-mail and for communication and discussions in the forums. In our last project we have worked specifically with SMS messages in different connections”

The first question concerned whether the respondent had received any SMS messages from NKI.

Experience with SMS messages in connection with online studies at NKI

Table 5. Have you received any SMS messages during the time you have been studying online at NKI Distance education?

	N	%
Ja	4	1
Nei	273	99
Sum	277	100

There is no surprise that only 4 (1.44%) of the respondents have received any SMS messages. The last bulk of SMS messages went to students with incorrect e-mail addresses in May 2007. Since then new students with wrong e-mail addresses get an SMS. However, in total SMS messages have been sent to only 3-4 percent of the students, and as the majority of the respondents are enrolled quite recently, 1.44 percent is close to expectation.

Attitudes towards text messages as part of online study

Two of the four students answered the question: What was the message about and what is your opinion on receiving text messages from NKI in connection with your studies?

- I had forgotten to change my e-mail address in my personal data at NKI after change of account.

- The text message was a response from NKI after an inquiry about exam registration – receiving text messages is excellent, especially in situation with close deadlines.

Table 6. 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

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 7. 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 8. 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 9. 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

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.

Technology and access

Table 10. 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 (if the respondents are representative for the population of NKI online students).

Table 11. 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 12. 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 of little value.

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 13. 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 to the usefulness of accessing the course pages via handheld devices.

Table 14. 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.

Table 15. 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 a much larger group of students who believes 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.

Table 16. 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.

Table 17. 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

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.

While a very 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 useful of the other functionalities of mobile access and mobile applications related to their online studies is considerably lower.

Still it is all reason to emphasise many online students would 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. It is also possible to read and write in the forums, although a little more cumbersome. For NKI to keep its position in the front line of online learning, continuous adaptation of the LMS, SESAM, to function satisfactory on mobile devices is important.

Discussion and conclusions

The experimentation with SMS messages in this project was a natural continuation of the research on mobile learning in the previous EU projects. We have learned from the previous 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 also proved to be very useful in distance education, especially in developing countries (see e.g. 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.

NKI is presently developing a new generation of its LMS. 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 in the new system 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, including SMS services.

Bibliography

Aftenposten (2007): Nordmenn elsker mobilen. Aftenposten 26. October 2007. Nyheter, pp. 4-5. Andreas Bakke.

Brown, T. (2004): mLearning: Doing the unthinkable and reaching the unreachable. Paper to the mLearning conference, M-learning: The future of Mobile. Ericsson Education, Dun Laoghaire, September 2005.
<http://learning.ericsson.net/mllearning2/files/conference/keynote.pdf> Retrieved 23. Nov. 2007.

Dye, A., Fagerberg, T. & Midtsveen B. (2004): Technical working paper 2004, NKI Distance Education. Exploring online services in a mobile environment. Retrieved 26.6.2006 from http://learning.ericsson.net/mllearning2/files/workpackage2/NKI_technical_workingpaper_2004.pdf.

Dye, A. & Fagerberg, T. (2004): Mobile Learning Management System specification. Retrieved 27.6.2006 from <http://learning.ericsson.net/mllearning2/files/workpackage1/nki.pdf>

Dye, A. & Rekkedal, T. (2005): Testing of an “always-online mobile environment”. Evaluation paper for the project, *mLearning- the Next Generation of Learning*. Retrieved 26.6.2006 from <http://learning.ericsson.net/mllearning2/files/workpackage6/testing.doc>

Fagerberg, T., Rekkedal, T. & Russell, J. (2002): Designing and Trying Out a Learning Environment for Mobile Learners and Teachers. Sub-project of the EU Leonardo Project “From e-Learning to m-Learning”. Retrieved 27.6.2006 from <http://www.nettskolen.com/forskning/55/NKI2001m-learning2.html>

Rekkedal, T. (2002a): Enhancing the Flexibility of Distance Education – Experiences with a Learning Environment for Mobile Distance Learners. Paper presented at the conference “mLearning: The Cutting Edge. Dublin, 22.11.2002. Retrieved 26.6.2006 from http://learning.ericsson.net/mllearning2/project_one/presentation/torstein1911.ppt

Rekkedal, T. (2002b): Trying Out a Learning Environment for Mobile Learners. Evaluation of the course “*The Tutor in Distance Education*” – Phase 1 of the NKI sub-project of the EU Leonardo Project “*From e-learning to m-learning*”. July 2002. Retrieved 26.6.2006 from http://learning.ericsson.net/mllearning2/project_one/NKI2001m-learningevaluationFinal.doc

Rekkedal, T. (2002c): 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*”. December 2002. Retrieved
26.6.2006 from
http://learning.ericsson.net/mlearning2/project_one/student_use_year_2_nki.doc

Russell, J. (2005): SMS, the in house development experience, NKI Distance Education
(unpublished technical working paper)