

**Student Evaluation of the “mLearning LTE Overview” course  
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IE-MINERVA-M,  
The role of mobile learning in European education**

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## **Introduction**

The Socrates Project proposes to develop and trial mobile learning (mLearning) courses for current and new mobile handsets. This report presents the feedback from an mLearning trial of the LTE (Long Term Evolution) Overview course. The latter section of the report then suggests further recommendations based on these results.

## ***Evaluation methods and procedures***

During this trial the mLearning LTE Overview course was adapted in accordance with recommendations for mobile device development. The trial ran in May for 3 weeks during which twenty students from Ericsson, and elsewhere, completed the course on Sony Ericsson K800i & K750i phones and filled out post-evaluation forms.

## **Results**

The evaluation method takes feedback from the overview course under five separate headings.

- Section 1 gains an understanding of the participant's personal background.
- Section 2 then measures the participants' evaluation of the user-friendliness of mLearning
- Section 3 is of particular interest to this study as the technology and methods used to design this mLearning course have resulted with considerable increases in the didactic efficiency perceived by the participants.
- Section 4 provides further insight into the participants' evaluation of the technical feasibility of this module; the results from this section again show noticeable increases from the previous trial.
- Section 5 presents the results of the cost effectiveness of the course.

Throughout the report the results from this trial are compared with a previous mLearning trial performed by Ericsson Ireland in 2007 [1], and additional references are taken from a Study Critique of eLearning vs. mLearning by Bernadette Simpson [2].

## ***Personal Background***

As mentioned previously twenty people participated in this trial. Fifteen listed their occupation as "Teacher/Trainer", four as "Technical", and one as "other". The age group of the participants was not greater than 30 years, with all of them having at least one to three years of post-secondary education, but the majority having a minimum of four years post secondary education.

|                                  | n                         | %   | n                                 | %   | n                  | %   | n                                    | %   | n       | %  |
|----------------------------------|---------------------------|-----|-----------------------------------|-----|--------------------|-----|--------------------------------------|-----|---------|----|
| <b>1.Occupation</b>              | Manager                   |     | Non-Technical Employee            |     | Technical Employee |     | Teacher/Trainer                      |     | Other   |    |
|                                  | -                         | -   | -                                 | -   | 4                  | 20% | 15                                   | 75% | 1       | 5% |
| <b>2.Age Group</b>               | 24 or younger             |     | 25-29                             |     | 30-40              |     | 41-59                                |     | Over 50 |    |
|                                  | 8                         | 40% | 12                                | 60% | -                  | -   | -                                    | -   | -       | -  |
| <b>3.Gender</b>                  | Male                      |     |                                   |     | Female             |     |                                      |     |         |    |
|                                  | 12                        | 60% |                                   |     |                    |     | 8                                    | 40% |         |    |
| <b>4.Level of Education</b>      | High school Matriculation |     | One to three years post secondary |     |                    |     | Four or more years of post-secondary |     |         |    |
|                                  | -                         | -   | 1                                 | 5%  |                    |     | 19                                   | 95% |         |    |
| <b>5.Mobile Device Ownership</b> | Mobile Phone              |     | PDA                               |     | Both               |     |                                      |     |         |    |
|                                  | 17                        | 85% | -                                 | -   | 3                  | 15% |                                      |     |         |    |

## **Student User-Friendliness**

The results from this section of the questionnaire show that for the most part the participants were positive about the user-friendliness of the mobile devices and mLearning in general.

6. Students were asked if it was easy to use the equipment in this mobile learning course. The responses were satisfactory with 80% in agreement that the equipment was easy to use. This is similar to the result observed in the 2007 study [1]. In this trial two of the participants, which accounts for 10% of the overall figures, disagreed with this statement. This negative result can be attributed to the participants dissatisfaction with these particular mobile device's screen size.

*“Too small a screen is not recommended for long mLearning courses.”*

*“The course was easy to access but hard to visualise due to the small screen”*

7. The next question asked if the mobile learning experience was fun. 80% of the participants did agree that the experience was fun, which is an encouraging response. 10% of the participants disagreed with this statement. There are a relatively low percentage (10%) of uncertain replies. As this was the first time many of the participants had completed a course on a mobile device, factors such as familiarisation with the device and the course content may have influenced this result. The feedback from this question suggests that mLearning is a fun experience for its participants.
8. The next question asks, “According to my experience I would take another mobile learning course if relevant to my learning needs”. 80% of the participants were in agreement with this statement, which is an increase from 76% in the 2007 study [1]. 15% of the responses were uncertain about this statement and 5% disagreed with this statement, so it is important to perform further research in order to ensure mLearning can be improved and used as part of a blended learning solution by all.
9. The participants are then asked, “I would recommend mobile learning as a method of study to others”. This question had similar feedback to the last question, where a large percentage of the participants, 70%, were in agreement about the statement. 15% were undecided that they would recommend mLearning, but 15% disagreed with the statement, which is a repeat of the result in 2007[1]. This result suggests that further improvements to the mLearning solutions are required to ensure mLearning is widely implemented.

*“Helpful course, but not that effective on a mobile platform”*

10. Although the majority (80%) of the participants in this trial studied the course at the office or work, the main advantage to mLearning is the ability for ‘any-time, any-place’ learning. In this trial only two participants (10%) studied while travelling and two studied at home, whereas in the 2007 trial 23% studied while travelling and 8% at home. Most of the participants from this study work in jobs that involve a lot of travel and it is our challenge to provide mLearning solutions that can be widely adopted by everyone.

*“I think this would be a great way to distribute overview courses to people”*

|   | n              | %   | n                 | %   | n                | %   | n        | %   | n                 | % |
|---|----------------|-----|-------------------|-----|------------------|-----|----------|-----|-------------------|---|
|   | Strongly Agree |     | Agree             |     | Uncertain        |     | Disagree |     | Strongly Disagree |   |
| 6.Easy to use equipment                   | 5              | 25% | 11                | 55% | 2                | 10% | 2        | 10% | 0                 | - |
| 7. mLearning experience was fun           | 2              | 10% | 14                | 70% | 2                | 10% | 2        | 10% | 0                 | - |
| 8.I would take another mLearning course   | 9              | 45% | 7                 | 35% | 3                | 15% | 1        | 5%  | 0                 | - |
| 9.I would recommend mLearning             | 3              | 15% | 11                | 55% | 3                | 15% | 3        | 15% | 0                 | - |
| 10. Where did you study mLearning course? | At Home        |     | At work or office |     | While Travelling |     | Other    |     |                   |   |
|   | 2              | 10% | 16                | 80% | 2                | 10% | -        | -   | -                 | - |

## ***Didactic Efficiency***

The next section of the questionnaire determined how the participants gauged the didactical and educational benefits of mLearning. The answers to this section help establish the attitudes of the participants to mLearning and determine how well this particular trial met some of the essential requirements of an educational setting such as communication and easy access to course material.

11. 65% of the participants were in agreement that mLearning increases the quality of eLearning, 5% were in disagreement with this statement, and 30% uncertain. There could be a number of reasons for this level of uncertainty, but as mLearning begins to offer similar functionality to traditional eLearning the two are more comparable, however when mLearning solutions are compared to their eLearning counterparts, the limitations of the mLearning device such as screen size and functionality mean that the expectations of participants are not always met. In comparison to the previous trial in 2007 [1], these results are an improvement from the agreement response of 53%, and disagreement response of 35%, however, there was an increase of uncertainty with only 7% in the 2007 trial compared with 30% in 2008.

*“Bigger screens are needed to view diagrams clearly...a zoom feature should be available to enable clearer viewing of diagrams.”*

12. 60% of the participants were in agreement that learning objectives can be met by mLearning, an increase from 2007's 43%. Only 15% are in disagreement but again there is a considerably large percentage uncertain at 25%, which is still a reduction from 2007's 43% [1]. The result is positive overall but the results do highlight the need for improvement in the mLearning solutions offered.

*“Good course to take when it is taken supplementary to an instructor led course.”*

13. The results of the next question, about access to course material, shows that 95% of the participants agree that access to course content was easy. In the 2007 trial 50% of respondents agreed with this statement, so these results show a considerable jump from the previous trial [1]. This result shows that decisions regarding how to provide, display and arrange material on mobile devices have resulted in satisfactory download times, good display of content and easy navigation experience.

14. The next question asked if the approach taken in the mLearning course produced a satisfactory learning environment. It too yielded a positive response, where 75% of the participants felt the approach taken did produce a satisfactory learning environment. 25% of the participants were uncertain with this question and on further investigation it emerges that these participants remarked on the physical limitations of the mobile device, which they felt have a negative impact on the learning environment offered, and suggested some features that would enhance the learning environment.

*“Size of images on screen can be an issue.”*

*“A better description of graphs and diagrams is needed.”*

*“A voice-over to discuss the content would be a good benefit to the learning experience.”*

*“Videos and animations would also add to the learning experience.”*

15. Finally the questionnaire asked if the participant felt there were real benefits from learning this module by mobile learning. 70% of the participants were in agreement that there were real benefits, while 20% were uncertain and 10% were in disagreement.

*“The course can be done anywhere, this is the main benefit.”*

When a full size screen and keyboard are available for a learning environment, it does not make sense to perform learning modules over the small mobile device. However the huge advantage to mLearning is the fact that it is mobile and this freedom of mobility outweighs the interface limitations of the mobile device. With 70% of the participants in agreement that there were real benefits, the future looks bright for mLearning.

|  | n              | %   | n     | %   | n         | %   | n        | %   | n                 | %  |
|--|----------------|-----|-------|-----|-----------|-----|----------|-----|-------------------|----|
|  | Strongly Agree |     | Agree |     | Uncertain |     | Disagree |     | Strongly Disagree |    |
| <b>11. mLearning increases the quality of eLearning</b>  | 6              | 30% | 7     | 35% | 6         | 30% | 1        | 5%  | 0                 | -  |
| <b>12. Learning objectives can be met by mobile learning</b>   | 2              | 10% | 10    | 50% | 5         | 25% | 3        | 15% | 0                 | -  |
| <b>13. Accessing course content was easy</b>   | 4              | 20% | 15    | 75% | 1         | 5%  | 0        | -   | 0                 | -  |
| <b>14. Did the approach taken in the mLearning course produce a satisfactory learning environment?</b> | 2              | 10% | 13    | 65% | 5         | 25% | 0        | -   | 0                 | -  |
| <b>15. There were real benefits from learning this module by mLearning</b>                             | 4              | 20% | 10    | 50% | 4         | 20% | 1        | 5%  | 1                 | 5% |

### ***Technical Feasibility***

The technical feasibility of mLearning is hugely important. Indeed the interface limitations such as screen size and keyboard can often lead to negative mLearning experiences. Over the last few years there have been huge breakthroughs in mobile devices including improved displays that allow for more intuitive Graphical User Interfaces requiring less user interaction.

16. The first question in this section measures how the participants felt navigating through the course. 90% of the participants agree that navigation through the course was easy. This is quite a majority and confirms that the technical decisions made on how to provide the course have led to an efficient mLearning solution. This result is a significant increase from 79% in the trial in 2007.

17. 95% of the participants are in agreement that, for effective mLearning graphics and illustrations, are essential. Participants often expect multi-media to be

integrated into eLearning and hence into mLearning also. Further research into design of graphics and multimedia for mobile devices could be explored as a result of this trial.

18. Feedback and assessment is an essential part of the learning process and any new learning environment must incorporate an adequate feedback and assessment procedure. Only 25% of the participants agree that the evaluation and questioning from this course was effective, which is a result that needs to be improved upon and is in sharp contrast from 72% in agreement in the previous trial [1]. The use of feedback and assessment can stimulate the students and maintain interest and enthusiasm when studying an mLearning course. 100% of respondents in an eLearning vs. mLearning study agree with the statement that, self assessment tasks increase understanding of subject matter [2]. The results in this question might suggest more feedback and assessment should be introduced into mLearning courses.

*“Very light on details...no exercises”*

|  | n              | %   | n     | %   | n         | %   | n        | %   | n                 | %  |
|--|----------------|-----|-------|-----|-----------|-----|----------|-----|-------------------|----|
|  | Strongly Agree |     | Agree |     | Uncertain |     | Disagree |     | Strongly Disagree |    |
| 16. Navigation through mLearning course was easy                     | 7              | 35% | 11    | 55% | 2         | 10% | 0        | -   | 0                 | -  |
| 17. Graphics and illustrations are necessary for effective mLearning | 16             | 80% | 3     | 15% | 1         | 5%  | 0        | -   | 0                 | -  |
| 18. Evaluation and questioning in the course was effective           | 1              | 5%  | 4     | 20% | 11        | 55% | 3        | 15% | 1                 | 5% |

### **Cost Effectiveness**

19. As mentioned previously, the foremost advantage to mLearning is the ability to learn anywhere and anytime. This is reflected in the results from the study, which repeat the previous trial results [1], where 90% of the participants agreed that mLearning increases access to education and training. This is another encouraging result that shows the acceptance of mLearning as a method to educate and train society in general.

20. Even though this was a trial study, the participants were aware to some degree of the actual costs related to completing the course. Therefore 85% of the participants thought that cost is a factor in accessing mobile course material, in contrast to only 42% in agreement in 2007 [1]. Also over 15% of the participants replied with uncertain feedback due to not knowing the price of downloading the course.

|   | n              | %   | n     | %   | n         | %   | n        | %  | n                 | % |
|---|----------------|-----|-------|-----|-----------|-----|----------|----|-------------------|---|
|   | Strongly Agree |     | Agree |     | Uncertain |     | Disagree |    | Strongly Disagree |   |
| <b>19. mLearning increases access to education and training</b> | 9              | 45% | 9     | 45% | 1         | 5%  | 1        | 5% | 0                 | - |
| <b>20. Cost is a factor in accessing mobile course material</b> | 3              | 15% | 14    | 70% | 3         | 15% | 0        | -  | 0                 |   |

## Comments

Participants were given the opportunity to offer any further comments about the course or the equipment functionality and user-friendliness. A sample of these comments is presented below.

*“This is a great idea and I was very impressed with the course.”*

*“The course was very user friendly and easy to navigate.”*

*“One thing I found was that the diagrams were too small on my mobile screen – otherwise it was very good.”*

*“Content was fine. Diagrams and detail with diagram hard to read in some cases.”*

*“The layout is very user friendly but is very set, if I didn’t understand an acronym, it would be great to select it and a pop-down explanation to appear.”*

*“A zoom option on diagrams would be brilliant too.”*

*“Good idea, but it cannot substitute a proper course.”*

*“This course could be useful as extra material/recap.”*

*“Easy to use, maybe addition of sound or speaker.”*

*“An audio commentary would be very helpful”*

*“Easy to navigate....”*

*“Great for introductions/ overviews/ snapshots”*

*“User friendly GUI – exciting to use!”*

## ***Conclusions***

This trial has taken feedback in the form of formal questionnaires from all the participants and also performed further informal interviews to expand and clarify answers to certain questions.

Overall the results are positive and show that the participants enjoyed their mLearning experience. As with all trial experiments, a large quantity of feedback has been compiled that can be used to improve the mLearning solution offered in the next phase of this project.

In particular this trial has provided invaluable feedback on what aspects of the course worked and also, more importantly, what aspects were not well received. Areas that were well received include accessing course material, the course content itself and the layout of the GUI (graphical user interface). In general users found mLearning environment and the course satisfactory. Areas to improve on include, the creation of a zoom function to allow better viewing of diagrams, the inclusion of exercises on the subject material (feedback & assessment), and a voice commentary.

The participants were generally content with the technical and didactical environment provided.

The next chapter uses the results from this section to suggest future areas of research and also highlights areas that were particularly effective in this trial that can be focused on and improved in the future.

## **Further Recommendations**

### ***Introduction***

This chapter offers various recommendations based on the evaluations as outlined above. The recommendations are based solely on the feedback received from those who completed the course and looks at how to improve the mLearning solutions offered by the LTE Overview course.

### ***Increase Assessment Modules***

The feedback about evaluation and questioning in the course wasn't very positive in this trial. This result suggests that evaluation modules need to be included in this course, as they lead to interaction and active participation in the learning module. Further investigation in the use of interactive medium and evaluation in mLearning courses could result in a more enjoyable and pleasant mLearning experience.

*“Some more interaction is needed to help maintain concentration/ interest – questions and exercises would be of benefit to this mLearning course.”*

### ***Inclusion of a Zoom Function and Voice Commentary***

It was always recognized that the physical limitations of the mobile device were very real limitations. However the benefits that mLearning provides, such as anywhere, anytime mobility far outweigh the disadvantages presented by the physical restrictions, and demands further research on how to reduce the side-effects of these physical limitations.

There were a number of comments made about the size of the text being uncomfortably small and difficult to read for prolonged periods. Design ideas such as a zoom function were suggested as possible work-a-rounds. Also many participants suggested the use of more multimedia such as access to sound, more graphics or movie clips, to enhance the course. In a previous study critique of eLearning vs. mLearning, 75% of respondents were in agreement with the statement that listening to audio files while watching animation is an effective way of learning [2].

These types of media would bring their own difficulties such as longer download times etc. However the use of small multimedia clips to enhance mLearning courses should be investigated.

*“Zoom function needed for graphics and diagrams”*

*“Movie clips/animations would greatly add to the learning experience.”*

### ***Suggestions for Course Design***

It has become apparent from the feedback of this course that long periods studying on this particular device are not conducive to learning. This does not come as a surprise but as mLearning is a new learning experience for all, there are no guidelines on how to effectively “sit” an mLearning course.

Nevertheless many of the comments from participants advised that smaller modules of reference material would be more appealing than full size overview courses. Further research into best practices for manageable-sized learning modules on mobile devices is needed.

*“I wouldn’t like to study anything too in depth in this manner as I do like mulling over sheets of paper...”*

## Conclusions

In general the feedback from the questionnaires was positive, especially regarding the technical decisions made to provide the course. The use of graphics and easy access to material were especially complimented. However there is still much room for improvement and this document has outlined the most common issues highlighted in the questionnaires and offered areas for further research.

It is a difficult environment to design for, especially considering the limitations of the interface and keyboard, yet Ericsson has made significant improvements in their mLearning solutions over the last number of years. It is hoped that further improvements can be made to the overall learning environment so that in the future the option of mLearning can be a fluid, fun and real solution.

Ericsson, Ireland looks forward to meeting this challenge to improve mLearning solutions and remain at the forefront of mLearning research.

## References

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