

# Factors That May Contribute to the Establishment of Mobile Learning in Institutions – Results From a Survey

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**Abstract**—This paper reports on a survey investigating the role that differences in expectations and perceptions of mobile learning and mobile devices play in establishing mobile learning at an educational institution. Responses from institutions with no institutional plans for mobile learning and others that do plan or currently have developed mobile learning programmes were compared. Various factors that may contribute to the establishment of mobile learning in educational institutions were therefore also investigated. These factors include, amongst other, expectations concerning the impact of mobile technologies on teaching and learning, and perceptions concerning mobile learning applications and mobile learning activities.

**Index Terms**—distance education, education innovation, mobile learning, mLearning, mobile devices, Introduction

## I. INTRODUCTION

Ellen Wagner, Director, Global Education Solutions, Macromedia, proclaimed “2005 is the year that mobile learning comes of age. Mobile learning brings a true ‘anytime, anywhere’ dimension to e-learning. Mobile learning will feature smart phones and personal communicators, while continuing to link learners with resources via laptop, notebook and tablet computers in a variety of physical settings”[1]. Whether this has indeed become current reality needs to be investigated.

An international survey was recently conducted which sought to explore current expectations of mobile learning for distance education. It was distributed within various professional distance education networks and was also sent to faculty and alumni of the Master of Distance Education programme at the University of Maryland University College (UMUC) in the U.S. The main findings have been reported [2].

## II. METHOD

This paper reports on further analysis of the survey results, investigating the role that differences in expectations and perceptions of mobile learning and mobile devices play in establishing mobile learning at an educational institution. Responses from institutions with no institutional plans for mobile learning and others that do plan or currently have developed mobile learning programmes were compared. Various factors that may contribute to the establishment of mobile learning in educational institutions were therefore also investigated.

These factors include, amongst other, expectations concerning the impact of mobile technologies on teaching and learning, and perceptions concerning mobile learning applications and mobile learning activities.

The following objectives were set for this study:

- To evaluate expectations of respondents from institutions with no institutional plans for developing course materials for use on mobile devices and respondents from other institutions that plan or currently have developed mobile learning programmes concerning the impact of mobile technologies on teaching and learning,
- To evaluate perceptions concerning mobile learning applications and mobile learning activities, and
- To identify envisaged constraints (weaknesses of mobile devices) that might hinder the distribution of mobile learning.

## III. RESULTS AND DISCUSSIONS

### A. Demographics

Eighty-eight responses were received from 27 countries. Table I provides information on the countries of origin and the number of respondents, while Table II presents information on the number of responses from all partaking higher education institution types. The highest percentage of respondents (59%) was from institutions that offer both face-to-face (contact-based) and distance learning programmes (mixed-mode institutions).

TABLE I  
NUMBERS OF RESPONDENTS FROM DIFFERENT COUNTRIES

Country	Responses	Country	Responses
Albania	1	Israel	1
Australia	2	Latvia	1
Austria	1	Malta	1
Barbados	1	Mexico	1
Canada	9	Netherlands	3
Colombia	2	Norway	1
Cyprus	1	Portugal	1
Finland	1	Romania	1
France	1	South Africa	15
Georgia	1	Sweden	1
Germany	15	Switzerland	1
Great Britain	8	Turkey	2
Hungary	1	USA	12
Ireland	3	Total	88

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TABLE II  
PLANS FOR THE DEVELOPMENT OF MOBILE LEARNING COURSE  
MATERIALS FOR INDIVIDUAL INSTITUTION TYPES

Institution type	Number	Percentage
A traditional distance teaching institution (single-mode)	9	10.3
A purely online teaching institution or virtual university	3	3.4
An institution offering both, face-to-face (contact-based) and distance learning programmes (mixed-mode/hybrid)	52	59.8
A traditional face-to-face or contact-based teaching institution (single-mode)	8	9.2
A corporate university or training institution	4	4.6
Other <sup>a</sup>	11	12.6
Totals	87	100

<sup>a</sup> The institutions that were referred to as 'other' included a community college, an e-learning service provider, a telecom vendor and a research centre.

*B. Expectations concerning the impact of mobile technologies on teaching and learning*

Responses were grouped according to non-existence of, or development in some or other form of course materials for use on mobile devices. The item: 'No, there are no institutional plans for developing course materials for use on mobile devices' was classified as 'Non-existent' while the following bulleted list of items were classified as 'Existent'.

- Yes, there are institutional plans for developing course materials for use on mobile devices, but there has been little done.
- Yes, our institution is now developing course materials for use on mobile devices. These are developed specifically for mobile devices.
- Yes, our institution is now developing course materials for use on mobile devices in a standard format for output on a variety of mobile and stationary devices.

Table III gives an indication of the number of institutions that were represented within the institution types that reported non-existence, or alternatively development in some or other form of course materials for use on mobile device.

No significant association was observed, following application of the chi-square test, between institution type and non-existence of, or development in some or other form of course materials for use on mobile devices. Therefore further analyses were performed without taking institution type into account.

To assess whether expectations concerning the possible impact of technology in general on teaching and learning differed between the 'non-existence' and 'existence' groups, a further comparison was performed. Items ranged from no impact on teaching and learning strategies and methodologies to radical changes being envisaged.

TABLE III  
PLANS FOR THE DEVELOPMENT OF MOBILE LEARNING COURSE  
MATERIALS FOR INDIVIDUAL INSTITUTION TYPES

Institution type	Number	Non-existent	Existent
A traditional distance teaching institution (single-mode)	9	4 (44%)	5 (56%)
A purely online teaching institution or virtual university	3	1 (33%)	2 (67%)
An institution offering both, face-to-face (contact-based) and distance learning programmes (mixed-mode/hybrid)	52	25 (67%)	17 (33%)
A traditional face-to-face or contact-based teaching institution (single-mode)	8	6 (75%)	2 (25%)
A corporate university or training institution	4	1 (25%)	3 (75%)
Other	11	4 (36%)	7 (64%)
Totals	87	41	46

Not one respondent thought that technological changes should not have an impact on our teaching and learning strategies and methodologies, while approximately 50% of the respondents of the 'non-existent' group and 15% of the 'existent' group (as defined) thought that technology changes should have an impact, although this is not currently the case (Table IV).

The 51 respondents that were of the opinion that teaching and learning strategies and methodologies adapt continuously due to new affordances that technology affords, were almost equally distributed between institutions with non-existent or existent programmes for mobile learning; the respective percentages were 59% and 64% for the institution groups (Table IV). Only 7% and 19% respondents from the 'non-existent' and the 'existent' groups respectively anticipated radical changes being introduced by technology (Table IV). The

TABLE IV  
PERCEPTIONS CONCERNING IMPACT OF TECHNOLOGY ON TEACHING  
AND LEARNING OF 'NON-EXISTENT' AND 'EXISTENT' GROUPS

Impact on teaching and learning	(n)	Non-existent	Existent
Technology changes should not have an impact on our teaching and learning strategies and methodologies.	0	0 (0%)	0 (0%)
Technology changes should have an impact on our teaching and learning strategies and methodologies, but this is currently not the case.	21	14 (34%)	7 (17%)
Teaching and learning strategies and methodologies adapt continuously due to new affordances that technology provides.	51	24 (59%)	27 (64%)
Technology changes bring about radical changes to our teaching and learning strategies and methodologies.	11	3 (7%)	8 (19%)
Totals	83	41	42

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association between group and expectation concerning the impact of mobile technologies on teaching and learning was not observed to be statistically significant.

A comparison was performed to establish what the impact of the attributes and the opportunities that mobile technologies could afford were anticipated to be. The most significant finding was that most respondents (64 of 83) were of the opinion that mobile technology would be very helpful in enhancing teaching and learning independent of time and space, 31 of which were from the 'non-existent' and 33 from the 'existent' group (Table V).

Once again, no significant association was observed between group and expectation concerning the impact of mobile technologies on teaching and learning.

The 'Other' opinions that were voiced by respondents from the 'non-existent' group were:

- Mobile devices will make learning even more flexible and spontaneous than "traditional" e-learning.
- Mobile technologies could allow education to be brought more effectively into different environments where technology is used appropriately/effectively.

Assessment of opinion on whether mobile learning would facilitate new strategies and methodologies for learner support as well as content development and delivery in distance education, showed no difference in opinion distribution between 'non-existent' and 'existent' group. Respondents from both groups were equally distributed between opinion groups, as is evident from Table VI.

No differences in expectations and perceptions of respondents from institutions with no institutional plans for mobile learning and respondents from institutions that do plan or currently have developed mobile learning programmes were thus observed.

TABLE V  
PERCEPTIONS CONCERNING IMPACT OF MOBILE TECHNOLOGIES ON TEACHING AND LEARNING

The expected impact of the attributes and opportunities that mobile technologies afford	(n)	Non-existent	Existent
Have no impact on teaching and learning.	1	1	0
Be widely applied mainly for administrative services and/or assessment purposes.	6	4	2
Be very helpful in enhancing teaching and learning independent of time and space.	64	31	33
Completely change the way we teach and learn.	10	3	7
Other	2	2	0
Totals	83	41	42

TABLE VI  
RESPONSES WITH RESPECT TO NEW STRATEGIES AND METHODOLOGIES BEING FACILITATED BY MOBILE LEARNING

Mobile learning will facilitate new strategies and methodologies for learner support and content development and delivery in distance education.	(n)	Non-existent	Existent
• Yes, mobile learning affords new opportunities for learner support and content development and delivery.	60	29	31
• No, mobile learning will not lead to anything entirely new. It's just another medium or channel for learner support and content delivery among others	23	12	11
Totals	83	41	42

*C. Perceptions concerning mobile learning applications and mobile learning activities*

Respondents were requested to rate

- the importance of learning 'tools' for students on mobile phones or smartphones;
- the importance of learning activities which are appropriate for mobile devices;
- the importance of applications (software) on mobile devices; and
- the usefulness of mobile learning 'tools' for learning and teaching

Ratings are reported as expressed by respondents, irrespective of 'non-existent' and 'existent' groupings. The percentage of respondents that rated the listed items as <3 on a scale of one to five, where one is the highest rating, are reported in Table VII.

To summarise the most significant findings reported in Table VII, items that were perceived as being important (rating of 1 or 2 on a scale of 1 to 5, where 1 is the highest rating by 50% or more of the respondents) were:

- 'Being connected anywhere, anytime' was perceived as being both the most important and the most useful learning 'tool' for students on mobile phones or smartphones;
- 'Accessing class notes, schedules, documents, websites, etc via wireless connections' was also regarded as a useful mobile learning tool, which links up closely with the preceding comment; and
- 'Collaborative learning' and 'Field work' were regarded as the most important learning activity for mobile devices.

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TABLE VII  
RATINGS OF MOBILE LEARNING APPLICATIONS AND MOBILE LEARNING ACTIVITIES

<b>Rating of importance of learning 'tools' for students on mobile phones or smartphones</b>	<b>Percentage</b>
Text messaging (SMS) for communication and interaction. (#: 86)	47
Voice calls for communication and interaction. (#: 87)	40
Text messaging to e-mail and vice versa. (#: 86)	47
Sharing texts, notes and documents. (#: 86)	31
Being connected anywhere, anytime. (#: 86)	69
<b>Rating of usefulness of the mobile learning 'tool' that were perceived as being most useful</b>	
Sharing texts, notes and documents via Bluetooth or wireless connections. (#: 82)	42
Accessing class notes, schedules, documents, websites, etc via wireless connections. (#: 82)	50
Using the scheduling and diary applications for organising their learning environments. (#: 81)	44
Using mobile Office or the like applications for their normal learning activities. (#: 82)	31
Being connected anywhere, anytime. (#: 82)	62
<b>Rating of importance of learning activities which are appropriate for mobile devices</b>	
Coursework (accessing and reading learning materials) (#: 85)	21
Assessment (quizzes, tests, questions-and-answers, etc) (#: 85)	34
Collaborative learning (interaction with tutor, discussion with other students, group work) (#: 85)	54
Field work (location-based learning: gathering and sharing on the site information) (#: 84)	58
Information retrieval (search in databases and encyclopaedias) (#: 85)	45
<b>Rating of importance of applications (software) on mobile devices</b>	
Mobile Office (Word, Excel, PowerPoint, etc). (#: 85)	48
Diary and scheduling. (#: 77)	49
Audio and video applications. (#: 84)	43
Imaging. (#: 75)	33
Additional accessories (notes, calculator, etc.). (#: 78)	31
Browser for internet connection/online data services. (#: 85)	61

Immediate accessibility of information from any location, particularly information that can be accessed via a browser, seems to be the affordance respondents appreciate most about mobile learning. New possibilities in terms of active and authentic learning appear to be anticipated with the use of mobile devices. Successful implementation of mobile learning at an institution will probably imply that learning opportunities be created that challenge students to source information with a certain degree of immediacy.

*D. Identification of weaknesses of mobile devices that might hinder the distribution of mobile learning*

Respondents were requested to either agree or disagree with defined statements concerning mobile devices. Table VIII lists the statements and also the percentage of respondents that agreed with a rating of >3 on a scale of 1 to 5 where 1 = strongly disagree and 5 = strongly agree.

Although 62% of respondents agreed that screens are currently too small to present complex learning material, the general expectation is that sufficient memory for small images, audio and video clips, as well as sufficient data transmission capacity, will be available in future. However, limited battery life of mobile devices was regarded as a problem for extensive use by 59% of respondents. Approximately half of the respondents felt that screen size is not as important as mobile devices should rather be used for communication and interaction purposes rather than for content distribution. Half of the respondents were also not convinced that cost of networks will not play an important role in the future.

Whether these factors will affect implementation of mobile learning in distance education needs to be investigated further.

TABLE VIII  
RATING ON STATEMENTS CONCERNING MAJOR WEAKNESSES OF MOBILE DEVICES THAT MIGHT HINDER THE DISTRIBUTION OF MOBILE LEARNING

Statement	Percentage
Displays and screens are too small to present complex learning material. (#: 85)	62
Screen size should not be important as mobile devices should be used for communication and interaction purposes rather than for content distribution. (#: 84)	48
Costs of mobile network services will continue to decrease and should not play an important role. (#: 85)	55
Technological advancements make it possible to have sufficient memory for small images, audio and video clips. (#: 85)	78
Device capabilities and mobile network infrastructures are improving to provide sufficient data transmission capacity (e.g. 3G and HSDPA). (#: 83)	71
Limited battery life of mobile devices is a problem for extensive use. (#: 85)	59

#: Number of responses

*E. Conclusion*

The following conclusions are drawn from this study:

- Perceptions concerning the impact of mobile technologies on teaching and learning appear not to have an influence on an institution's planning for, or development of course materials for use on mobile devices.
- Opinions concerning mobile learning applications and mobile learning activities clearly express the significance of learning supported by mobile devices.
- No prohibiting technical constraints of mobile devices, as defined in the questionnaire, were identified in this survey.
- Having institutional plans for mobile learning in place does appear to have an impact on the involvement in projects and the implementation of mobile learning at institutions

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