

Enhancing Environmental Friendliness through Mobile Phone Learning

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Abstract: *Mobile learning is any sort of learning that occurs when a learner is not at a fixed location or learning that takes place when the learner utilizes some learning opportunities offered by mobile technologies. M-learning technologies include handheld computers, MP3 players, notebooks and mobile phones. Mobile phone learning is a branch of mobile learning and is a relatively new concept which has attracted the interest of educators, researchers and developers of learning systems and instructional materials. Environmental friendly or eco-friendly refers to products or processes that are not harmful to the environment and people who want to protect the environment greens. The study investigated the use of mobile phones to increase students' use of mobile learning technology and to enhance environmental friendliness. Data was collected using "usefulness of mobile phone learning" questionnaire from a sample consisting of 30 male automobile apprentices and 30 female hair dressing apprentices in Iwaya community in Lagos, Nigeria. The students voluntarily participated in a four weeks programme using mobile phones to send SMS and jingles warning against environmental pollution, to transmit and exchange photographs of local environmental degradation. The participants learnt various ways to maintain clean environments which increased their awareness on environmental friendliness. Responses on the questionnaire differ significantly between genders.*

Key words: mobile phone, m-learning, environmental degradation, environmental friendliness and gender.

INTRODUCTION

The term mobile learning or "m-learning" has different meanings for different communities. It refers to a subset of e-learning, educational technology and distance education that focuses on learning across contexts and learning with mobile devices. Mobile learning has developed over several years resulting in several research projects (Moura and Carvalho, 2008; Sharples *et al.*, 2007). M-learning technologies include handheld computers, MP3 players, notebooks, tablets and mobile phones. Mobile phone learning is a branch of mobile learning and is a relatively new concept which has attracted the interest of educators, researchers and developers of learning systems and instructional materials. This technology provides the potential for collaborative interaction and learning opportunity for geographically dispersed persons and groups (Bristom, 2005).

In a knowledge society, mobility and ubiquitous learning (learning anytime, anywhere), the emerging paradigm of m-learning seems to meet the needs of the contemporary society (Edwards *et al.*, 2002). Modern technologies, especially mobile phones have become an integral part of modern life around the world, increasingly powerful, with more and more features and services; providing access to content anywhere, anytime (Prensky, 2004). The preference of these technological devices lies in the fact that they are in the learners' hands and can, therefore, give a greater contribution to the education system. Mobile technologies potentially promote, facilitate and enhance learners' collaboration and interaction processes that serve as a means of accessing, discovering, discussing and sharing environmental concerns via multimedia messaging services (MMS), SMS, electronic mail or MSN messenger. Learners can converse with each other, question each other and share opinions about environmental concerns (Waycott, 2004).

Mobile phones have become one of the fastest growing communication technologies; today the majority of them have the capacity of a PC of the nineties (Campbell, 2006). The common use of mobile phones for messaging facilitates friendships and socialization, hence the role of mobile phones as a means of collaborative learning (Bauman, 2003; Taylor and Harper 2002). Mobile telephones with cameras permit learners to photograph environmental problems, and serve as a means for sharing concerns with friends. Learners can thus pose questions related to the environment, collaborate with colleagues, learn new knowledge and formulate plans to solve environmental problems (Usunbolu *et al.*, 2009).

ENVIRONMENTAL FRIENDLINESS

The natural environment provides the infrastructure on which human societies are built. However, human actions are now affecting these foundations in quite unprecedented ways. Environmental friendly or eco-friendly refers to products or processes that are not harmful to the environment and people who want to protect the environment greens.

The role of education in understanding, protecting and solving environmental problems had long been recognized. Since 2000, researchers have considered the use of environmental education in schools, colleges and universities (Shin, 2000). In Iwaya community both the automobile and hair dressing apprentices are also involved in various kinds of environmental pollution.

Wastes from automobile workshops include worn out vehicle parts, broken glasses, used carbide, used engine oil and rubber wastes. The automobile apprentices usually drop the worn out vehicle parts and broken glasses by the road side thus obstructing the movement of vehicles and pedestrians. The broken glasses do puncture the tyres of vehicles and are also harmful to man and animals. Carbides and engine oil are being disposed into water bodies and drainages where they pollute the water.

The presence of engine oil in the water deprives aquatic animals of air which can cost them their lives and deprive man and other land animals of drinking water and aquatic livestock. Carbide is a flammable and reactive chemical and a dangerous fire and

explosion hazard. It blocks drainages, increasing mosquito breeding. When breathed in carbide can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath. Contact can severely irritate and burn the eyes and skin causing permanent eye damage and ulcers on the skin. Exposure can severely irritate the mouth, nose and throat causing sores, cough and wheezing. The rubber and other wastes are burn in the open which pollutes the surrounding air.

Wastes from hair dressing saloons include empty containers of hair products such as relaxers, shampoos, pink oil and conditioners. Chemicals from the hair products, threads, attachments, used weavons, used cutest bottles, used artificial nails, dirty water and rubbers. The hair dressing apprentices either throw away the empty containers out along the road or into gutters blocking the drainages and causing environmental blight. The chemical wash outs from the hair products and dirty water are poured into water bodies and drainages endangering aquatic lives (Childs, 2000).

The various means of waste disposal by the two sets of apprentices are detrimental to the environment and need to be checked hence the researcher intend to use this project to educate them on how to be environmentally friendly.

PURPOSE OF THE STUDY

The study investigated the use of mobile phones to increase the apprentices' knowledge of mobile learning, enhance environmental friendliness and prevent damaging of the natural foundations of our society while striving for our living.

Specific Objectives

- (i) To ascertain the usefulness of mobile phone in increasing the apprentices' knowledge of mobile learning.
- (ii) To access the use of mobile phone learning in enhancing environmental friendliness.
- (iii) To prevent the damage of the natural foundation of our society
- (iv) To determine the role of gender in mobile phone learning and environmental friendliness.

Research Questions

- (i) What is the usefulness of mobile phone in increasing the apprentices' knowledge of mobile learning?
- (ii) What is the usefulness of mobile phone learning in enhancing environmental friendliness?
- (iii) What should we do to prevent the damage of the natural foundation of our society?
- (iv) What role does gender play in mobile phone learning and environmental friendliness?

METHODOLOGY

Participants

The volunteer sample in this study consisted of 30 male automobile apprentices and 30 female hair dressing apprentices from automobile workshops and hair dressing saloons in Iwaya community in Lagos, Nigeria. The age of the participants ranged from 20 - 27 years. Each participant completed a pre-project and post-project questionnaire. The four-week project and study - not part of their regular training, was completed during April-May, 2013.

Instrument of the study

A questionnaire titled “The usefulness of mobile phone learning” (UMPL), adapted by Motiwala (2007) was used to collect data. New items were added for use in this study to measure the apprentices’ satisfaction with mobile phone learning. The 20 item Likert scale questionnaire focused on the usefulness of mobile phones for enhancing apprentices’ environmental friendliness. This includes functions aimed to indicate: (SD), Strongly Disagree; (D), Disagree; (U), Undecided; (A), Agree; (SA), Strongly Agree. The respondents were personally approached and briefed about the purpose as well as the significance of the study by the researcher. Those who were chanced filled in the questionnaires and returned immediately while the researcher visited the next day to collect from the others.

Validation and Reliability of Instrument

The instrument for the data collection was validated by experts in educational technology. They canceled irrelevant items from the questions and suggested areas of modifications. Selected items were revised based on their comments and recommendations to improve the quality and content validity of the instrument before administration. The test-retest reliability scale yielded reliability coefficient of 0.92. The instrument is thus considered valid and reliable to be used for enhancing environmental friendliness through mobile phone learning.

Procedure

The researcher through the union executives of both automobiles and hair dressers in Iwaya community, Yaba – Lagos, announced the need for apprentices to volunteer to participate in the study using mobile phones to enhance environmental friendliness. After deliberation on this project by both unions, the researcher was given a positive feedback to go ahead with their full consent on participation. The researcher later met with the interested apprentices and enrolled them. The purpose and expectation of the study were explained to the potential participants. During this preliminary stage, the group discussed the environment and its related concerns. The researcher explained that the apprentices did not rate the environment as high as supposed to be. Data were collected as per the brand and the models of the apprentices’ mobile phones.

During the four weeks that followed, the researcher used a mobile phone to take photographs of local environmental degraded areas. Each week, the researcher forwarded a minimum of five photographs to the participants via MMS and electronic mails. The photographs were sent to the participants with environmental friendly

messages. The participants used their mobile phones to connect to their electronic mail boxes to view the photographs after which they sent their comments to the researcher through SMS or electronic mails. The participants reviewed the photographs and suggested ways of solving environmental problems. At the end of the project the apprentices completed the questionnaire a second time. The participants met for discussion every week during which they reviewed the photographs and suggested possible ways for overcoming the environmental problems with the help of the researcher.

Analysis of Data

The questionnaire (UMPTL) was used to access learners’ attitudes towards mobile phone learning and their awareness of environmental degradation problems. A paired t-test was used to compare pre-project and post-project means while an independent t-test sample was used to compare pre-project and post-project means between males and females. Turkey’s HSD test was used to identify the source of significance difference at 0.05 level of confidence.

RESULTS AND DISCUSSION

Mobile phone learning and environmental friendliness

The pre-project mean of 52.4 (SD = 22.56) and a post-project mean of 94.7 (SD = 11.48) was recorded on the UMPL. The mean difference was 42.3 (Table 1). The results from the paired sample comparison of the means differed significantly ($t_{60} = 1.67, p = 0.05$). Generally, the apprentices’ knowledge of mobile phone learning increased significantly.

Table 1: Paired T Test for Pre-Project and Post-Project Means on the UMPTL

UMPL	Mean	N	SD	Mean difference	t	Significance (two-tailed)
Pre-project	52.4	60	22.56	- 42.3	1.67	0.05
Post-project	94.7	60	11.48			

*significant at 0.05 level of significance; SD = Standard Deviation

Table 2 shows the pre-project-post-project means and standard deviations for each UMPL items. On the post-project survey, a mean of 4 or above is obtained for items 2, 4, 9 and 18. Before the commencement of the project, the participants did not associate the use of mobile phone with environmental friendliness. At the end of the project, mobile phone learning increased their knowledge of environmental friendliness. The participants observed the environment more carefully with the use of mobile technologies (SMS, MMS and electronic mail) and this increased their awareness of environmental degradation. Item 9; “MPL is useful for enhancing environmental friendliness” before the project commenced, the participants did not relate the use of mobile technologies with environmental friendliness (M = 1.40).



Figure 1: Environmental degradation in the area

At the end of the project, their attitude changed such that they became more conscious of environmental degradation by observing the environment carefully ($M = 4.21$). Item 2; “MPL adds values to e-learning environmental friendliness” the post-project mean ($M = 4.36$) was significantly higher than the pre-project mean ($M = 1.85$).

The participants are now highly regarding the benefits the mobile technologies and their use for considering environmental issues. Item 4; “MPL allows converting idle time into productive in respect to environmental issues” the participants evaluated the use of free time and its use to address environmental problem giving a post-project mean of 4.08. Item 18; “MPL can be used as a supplemental tool for any proposed project”. At the end of the project, the participants appreciated the potential use of mobile technologies for undertaking any research work.

Participants expressed satisfaction with using mobile phones to enhance environmental friendliness. This is in agreement with the findings of Van't Hooft and Swan (2004). The majority of the sample of 217 students liked using mobile devices, regarding ML as fun and a vulnerable learning tool.

Table 2: Descriptive Statistics for UMPL Items

S/N	Items	Pre-project		Post- project		Mean Difference
		M	SD	M	SD	
1	MPL is an effective learning aid for learners with regard to environmental issues.	1.67	0.85	3.76	0.68	2.09
2	MPL adds values to e-learning environmental friendliness.	1.85	0.96	4.35	0.73	2.5
3	MBL is an effective method of providing information concerning environmental friendliness.	2.22	1.33	3.89	0.98	1.67
4	MPL allows converting idle time into productive in respect to environmental issues.	1.76	1.04	4.08	0.84	2.32
5	MPL allows convenient time for discussions related to environmental friendliness anywhere and at any time.	1.98	1.27	3.21	1.06	1.23
6	Information sent by MPL via message is very effective.	1.72	1.20	3.44	1.01	1.72
7	MPL has the potential to become a good learning tool with respect to environmental issues.	2.15	0.98	3.88	0.85	1.73
8	MPL allows instant access to environmental issues regardless of your location.	2.18	0.90	3.92	0.78	1.74
9	MPL is useful for enhancing environmental friendliness.	1.40	1.32	4.21	1.08	2.81
10	MPL is a good discussion tool for enhancing environmental friendliness.	1.89	1.05	3.74	0.94	1.85
11	MPL is an easy way for enhancing environmental friendliness.	1.93	1.29	3.90	1.04	1.97
12	MPL made is easier to understand environmental friendliness.	2.31	1.40	3.80	0.09	1.49
13	MPL makes a good forum for interaction.	2.29	1.37	3.73	1.02	1.44
14	MPL makes it easier to discuss environmental issues with colleagues.	2.44	0.99	3.86	9.87	1.42
15	MPL makes it easier to discuss environmental issues with the researcher.	2.69	1.36	3.99	1.10	1.30
16	MPL is a good platform to access information about the environment.	1.59	1.07	3.69	0.92	2.10
17	Overall satisfaction with MPL with regards to environmental friendliness is encouraging.	1.64	1.06	3.81	0.91	2.17
18	MPL can be used as a supplemental tool for any proposed project.	1.93	1.09	4.13	0.92	2.20

Gender

The descriptive statistics collected from the UMPL regarding gender are shown in Table 3. From the sample t-test of the independent sample, the mean post-project score for females was 95.25 compared to 90.88 for males. There is no significant difference between genders ($P = 0.05$). The pre-project difference between the genders was however significant ($P = 0.05$). This is in line with the findings of Rees and Noyes (2007) who found that females and males used mobile phone differently, males using voice callings more than females, but females using SMS more than males. It was found that females approach environmental issues more sensitively while males use mobile

technologies such as SMS, MMS and electronic mails more than females. Several researchers had also found that a greater percentage of females than males are more concerned about environmental degradation (Gardos & Dodd, 1995).

Table 3: Pre-Project –Post-Project Scores on UMPL Gender

Gender	N	Pre-project		Post-project	
		M	SD	M	SD
Male	30	56.80	18.46	90.88	7.98
Female	30	42.15	16.98	95.25	9.66

CONCLUSION

Mobile phone was used in this study to increase apprentices' knowledge on mobile learning and to enhance environmental friendliness. The project allowed participants to observe the deteriorated environment and to comment on them. At the end of the project, their environmental friendliness and attitude towards maintaining clean environments devoid of pollution increased. Mobile phone provided the means to engage males and females to be environmentally friendly. The participants expressed satisfaction with their capability of using mobile phone learning anywhere, any place and any time. They were satisfied with the technology used and it is hoped that similar projects will be carried out by other researchers.

RECOMMENDATIONS

From the findings of the study, the following recommendations are made:

- (i) The use of mobile phone as a means of enhancing environmental friendliness should be encouraged.
- (ii) The participants should be provided the opportunities to engage in other activities that involve mobile learning.
- (iii) Mobile phones providers should sponsor educational projects.
- (iv) More research work should be carried out in mobile learning to increase its knowledge.

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