Impact on Video Lessons using Mobile Learning Technology for Polytechnic Students

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Abstract—**This study used quasi experimental design to measure impact of the video lesson using mobile learning technology. Meanwhile, questionnaire is used to evaluate the effectiveness of the mobile learning technology (MLT). In this paper a pilot study survey results of 100 female polytechnic students of third year of Electronics and Communication Engineering (ECE) and Electrical and Electronics Engineering (EEE) diploma students at Chennai, India about their usage of video lesson using mobile learning technology. The video lesson can be used for this study is Electromagnetism, this subject is common subject for both disciplines, the duration of the video lesson is 30 minutes. The smart phones and wireless devices tablet pc; personal digital assistants are used for this study. The video lesson can be transferred via Bluetooth technology within classroom, library and corridors in their free hours.**

I. INTRODUCTION

In the modern world, the advanced technologies of mobile learning have been offering most powerful delivery of information from a small device. A video lesson is to enhance effective learning and teaching. Video lesson should be designed to teach specific knowledge and should involve the learners in the learning process to handle and manipulate the resource materials.

The use of video is only the beginning to meet the needs of today's and tomorrows learners. Video can help educators address the challenge of different learning styles and enhance the way in which today's children and youth access, absorb, interpret, process and use information. Video is clearly an essential tool that can have a powerful impact on student retention of information as well as on student engagement. There is no doubt that technology is a major contributor to the shift in the education landscape. Video, in its various guises and modalities (broadcast television, laserdiscs, camcorders, video cassettes, DVD's streaming video, satellite video, webcams, video conferencing, and lecture capture) has been a strong enhancer of education. It appears poised to be another powerful change agent value to the learning process while at the same time enhancing the quality of the learning experience. Video constitutes of electronic capturing, recording, processing, storing, transmitting and reconstructing of a sequence of still images that represent scenes in motion, and as a pedagogical aid that can be used in many ways.

- As a tool for learning,
- As a medium for collaboration and
- As a universal language

Video technologies can help students connect with peers located in different campuses and in different countries so that they can interact with different cultures, exchanging information and learning from each other. Students use video to enrich their classroom experience connecting with experts, expanding knowledge frontiers and embarking on virtual tours like visiting life from the classroom with a liver at a great barriers reef's exhibit.

- Video content stimulates discussions
- Video increases students motivation
- It helps teachers be more creative
- Video helps teachers be more effective
- Video is preferred by students
- Video directly increases student achievements

Adoption today is the learner's proficiency with technology and their affinity for video. Where teachers and learners alike may have been camera-shy in the past, today many of them are more willing than ever to be in front of or behind, the camera as the incorporate video into teaching and learning. This makes video in the classroom somewhat 'viral' as learners see their peers using video and adopt video themselves for learning.

II. LITERATURE REVIEW

The author has to develop platform independent mobile learning tool (ML-T) for structured programming course, and evaluate its effectiveness and usability using Analysis Design Development Implementation and Evaluation (ADDIE) instructional design model (ISD) as M-LT life cycle. J2ME and XML (Extensible Markup Language) were used to develop

platform. The preliminary survey was conducted from 90 undergraduate UTP students to get the weakness of conventional learning; identifying contents of the course; their experience and willingness to use the system; selecting samples of students for the implementation and evaluation phase; advantages of mobile learning; limitations of mobile devices and suggestions either written or orally. The selected topics from the case study course are selection statements, loops, function and file concepts [3].

The author has introduces the theoretical and technical foundations for designing and developing an effective Mobile Collaborative Learning (MCL) environment as well as describing a new approach for building a learning application towards mobile technology. The prototype system was designed and constructed using the Android operating system with a suggestive infrastructure of the system. The main contribution of this research is the design and development of a MCL prototype. Collaborative learning seems to be a teaching and learning innovation. It will make a student actively engage in building their own minds. Basically, the main objective of MCL is to obtain learning advantages on hand-held devices particularly mobile devices which allow accessing and sharing of learning materials anywhere and anytime. In this collaborative learning test, 106 users including 58 students, 23 teachers, 14 teaching assistants and 11 administrators from fifteen universities are involved. The results found that the pilot usability issues, these people would join in the test as online status, and classified the more valuable usability items, a heuristic based questionnaire test using the evaluation items [4].

III. METHODOLOGY

The preliminary survey was conducted from 100 female polytechnic students to get the following data. Technology enabled learning, usage of video lesson in learning, advantages of mobile learning, and limitations of mobile phones or wireless devices and comments either written or orally. The result of the survey showed that more than 90% of students were very eager to use for their study and also keep that as a supplemental source of learning. At the mean time, two main objectives were identified which have impact on video lesson and usage of video lesson in different learning modes. The mobile learning technology was evaluated through quasi experimental design, the design involve two groups which are control group and experimental group (m-learning). The control group attended the treatment of using conventional learning method and experimental group used for mobile and wireless devices for mobile learning.

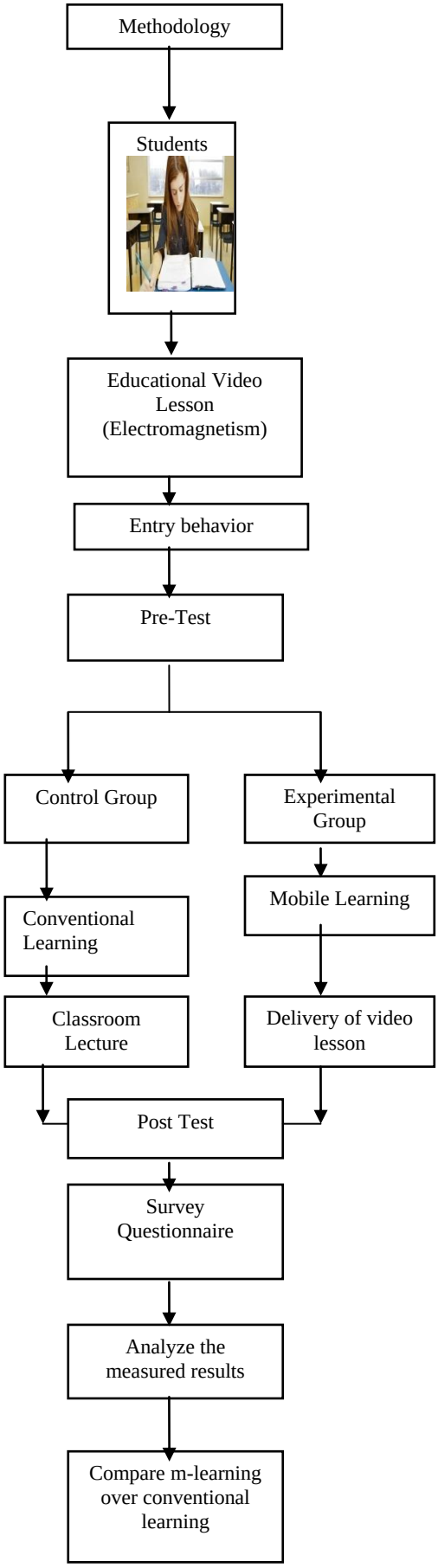

Figure 1 Methodology of the Research Study

IV. RESULTS AND DISCUSSIONS

The survey conducted into three phase of survey, First phase conducted the pre-test for control group and experimental group before attending the classroom lecture and watching the video lesson. Second phase conducted by attending classroom lecture for control group and delivered the video lesson for mobile learning to experimental group through Bluetooth technology in their free hours. In the third phase the students from control group and experimental group go for the post-test to evaluate their performance. Finally, the effectiveness of mobile learning technology data were examined and questionnaires given to the experimental group about usage of video and different modes of delivery of content in learning. The impact on video lesson using mobile learning technology and different learning methods questionnaire included 15 indicators.

The Table I shows the sample frequency of the control group and experimental group on pre-test and post-test. 100 female students from each of the following discipline, ECE and EEE students of third year polytechnic (diploma engineering) students have taken part in the study. The contents of the video lesson is consists of electromagnetism, Magnetic field theory, Faraday's law, right-hand grip rule and magnetic field patterns and field distribution. Hence these topics were used to evaluate the effectiveness of the video lesson using mobile learning technology, with the pre-test and post-test correspondingly.

Table – I Marks obtained by the students from control group(CG), experimental group (EG) (M-Learning)

	Pre-Test		Post-Test	
Scores	**CG frequency**	**EG frequency**	**CG frequency**	**EG frequency**
00-03	30	31	21	0
04-06	32	32	24	22
7-10	35	34	32	35
11-15	3	3	33	43
Mean	5.37	5.32	7.18	9.63
SD	2.707	2.781	3.683	3.314
Mean Diff	0.05		2.45	
t value	0.301		6.703	
df	99		99	
Sig 2-tailed	0.764		0.000	

The quantitative data were collected through pre-test, post-test and questionnaire. Pre-test was used to obtain a baseline performance of students and compare with their post-test result. Finally, questionnaires were used to measure the impact on video in providing assistance to the learners. Meanwhile, the qualitative data were collected using subjective questionnaires and also comments either written or orally which cannot be represented numerically. Qualitative data is used for decision making process. The comparison of the pre-test and post-test will indicate the effectiveness of the mobile learning technology in education system in terms of improving performance.

To analyze the quantitative data both effectiveness and usage of video analysis were used. The following section will discuss the two analyses of elements.

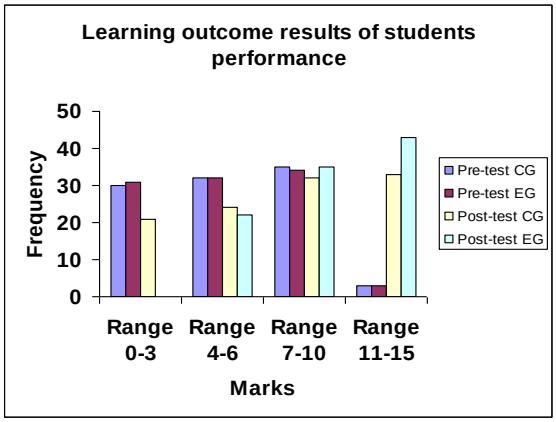

Figure 1 Students performance results of CG and EG

Figure 2 Images in the video lesson of Electromagnetism

1. Impact on video lessons using mobile learning technology
2. Is the mobile learning is effective than conventional learning

Effectiveness is used to determine the efficiency of the video lesson through enhancing students' understanding and conducted pre-test and post-tests to measure its efficiency. The maximum mark of test is 15. The analysis was done by comparing the control and experimental groups.

The first objective of this survey is impact on video lesson using mobile learning was measured using first seven indicators, Table 2 shows the mean value of the effectiveness of mobile learning. Responses to each of the indicators on effectiveness of mobile learning were measured on a Likert scale of 1 to 5 ranging from "Strongly agree to Strongly disagree" scores greater than 3.0 indicate relative importance, below 2.0 indicate relative unimportance; a score of 2 to 3 shows it to be neither important nor unimportant.

The results of this study has been explained in Table 2 which gives the results of extracted communalities of all the variables into two components, impact on video lesson using mobile learning and different learning methods. From the first component impact on video lesson using mobile learning has highest mean value 3.95 is 'Watching video lesson in mobile phones or wireless devices is convenient when compared to television' and least mean value 3.74 is 'Watching the video lesson can be increased the learning effect'. From the second component under different learning methods has the highest mean value 4.11 is 'Learning through teacher centered with technology enabled learning i.e. e-learning and m-learning is suitable for students' and the least indicator mean value 3.74 is 'Watching educational video lesson through You tube'. The proportions of the variable variance are explained by the common factors. From table 2, the parameters under the impact on video lesson using mobile learning, it is very clear that the 'Video lesson is more useful for teachers to teach the subject' has the least percentage (56.4%), of variance that can be predicted or explained by other six variables. And 'Understanding of difficult concept is possible through video lesson' (87%) that can be accounted for by other six variable. From different learning methods, it is very clear that the 'Learning is more effective through blackboard' has the least percentage (69.1%), of variance that can be predicted or explained by other seven variables. On the other hand, 'Watching educational video lesson through You Tube' has the highest variation (93.8%) that can be accounted for by other seven variables. These results reveal the importance attached to the fact that 'Watching educational video lesson through You Tube' can be predicted by the usage of other variable studies.

Table 2 Questionnaire Indicators

S. No	PARAMETERS	Mean	SD	PCA
1.	**Usage of video** lessons in classroom is **easy to understand** for students.	3.90	0.948	0.772
2.	Understanding of **difficult concept** is possible through video lesson.	3.77	0.897	0.870
3.	The **duration of the video lesson** is very important in mobile learning technology.	3.84	0.982	0.715
4.	Watching the video lesson can be increased the **learning effect.**	3.74	1.050	0.628
5.	Watching video lesson in mobile phones or wireless devices is **convenient** when compared to television	3.95	1.009	0.822
6.	Usage of video lesson in classroom **motivates** the students to learn.	3.77	1.136	0.699
7.	Video lesson is **more useful** for the teachers to teach the subject.	3.80	1.172	0.564
8.	No Technology can **replace the Teacher.**	3.87	0.950	0.736
9.	Learning is more effective through **blackboard.**	3.29	1.328	0.690
10.	Learning through **web** is interesting than other learning methods.	3.82	0.968	0.738
11.	Learning through **teacher centered with technology enabled learning** i.e. e-learning and m-learning is suitable for students	4.11	0.952	0.854
12.	Learning is possible through **social networks** site like Face book, Orkut, and Google	3.86	0.932	0.934
13.	Watching educational video lesson through **you tube.**	3.74	0.939	0.938
14.	More educational **Television channels** are needed	3.80	0.964	0.679
15.	**Community radio** can also be used for learning the subject	3.82	0.881	0.733

Table 3 Rotated Component Matrix, Cronbach's Alpha and Mean Ranks

S. No.	Rotated Component Matrix		Cronbach's Alpha	Mean Ranks	Chi-square	Sig
	1	2				
1.	0.879			4.05		
2.	0.931			3.73		
3.	0.760			3.98		
4.	0.653			3.80	17.59	0.002
5.	0.906		0.801	4.25		
6.	0.826			3.92		
7.	0.745			4.02		
8.		0.841		4.85		
9.		0.820		3.65		
10.		0.735		4.69		
11.		0.740	0.756	5.45		
12.		0.815		4.48	43.87	0.000
13.		0.878		4.21		
14.		0.812		4.29		
15.		0.816		4.41		

In this study, there are four hypotheses which are analyzed as follows:

1 Hypothesis 1 : Pre-test scores between the two groups : Null Hypothesis (H01)– There is no significant difference in the pre-test scores between the Control group and experimental group. Table 1 indicates the test mean scores of control group were 5.37 while the experimental group was 5.32. However, the significant (2 tailed) value of p = 0.764 which is greater than (Alpha) α = 0.05. The result failed to reject the null hypothesis H01 and there is no significant difference in the pre-test scores of both groups. Hence the null hypothesis 1 (H01) is accepted.

2. Hypothesis 2: Post-test scores between the two groups: Null Hypothesis (H02) – There is no significant difference in the post test scores between the control group and experimental group. Table 1 indicates the test mean scores of control group were 7.18 and the experimental group was 9.63. The mean score comparison shows that the experimental group achieved significantly more in the posttest compared to control group. However, the significant (2-tailed) value, p = 0.000, is less than (Alpha) α = 0.05 which implies that H02 should be rejected. This means that thee is a significant difference in the post test scores between the two groups; thus mobile learning technology is effective.

3. Hypothesis 3: Impact on video lesson using mobile learning: Null Hypothesis (H03): There is no significant difference between the mean ranks of parameters in impact on video lesson using mobile learning assessed by the students. Friedman test for significant difference between the mean ranks of parameters is presented in Table 2, it can be arrived that in impact on video lessons, since P value is less than 0.01, the null hypothesis is rejected at level 1% level of significance. Hence it is concluded that there is significant difference between mean ranks of parameters in impact on video lessons with respect to the effectiveness of Mobile Learning Technology (MLT). Based on mean ranks, it is inferred that, watching a video lesson in mobile phones is convenient when compared to television 4.25 is the most effective parameter on analysis of impact on video lessons, followed by difficult concept is possible through video lesson 3.73 and the least effective parameter.

4. Hypothesis 4: Different Learning methods or modes of delivery of video lesson: Null Hypothesis (H04) - There is no significant difference between the mean ranks of parameters in different learning methods assessed by the students. Friedman test for significant difference between the mean ranks of parameters in different learning methods or modes of delivery of video lesson is presented in Table 2, it is arrived that the analysis of Different Learning Methods, since P value is less than 0.01, the null hypothesis is rejected at level 1% level of significance. Hence it is concluded that there is significant difference between mean ranks of parameters in Different Learning Methods with respect to the effectiveness of Mobile Learning Technology (MLT). Based on mean ranks, it is concluded that students interested in teacher centered with

technology enabled learning with the combination of e-learning and m-learning mean rank is 5.45 is the most effective parameter and learning through black board is effective mean rank is 3.63 is the least effective parameter under different learning methods.

Another statistical analysis instrument is reliability coefficient. Cronbach's alpha [1] to estimate the scale of consistency among items in the group [2]. Table 3 illustrates the factors extracted from Principal Component Analysis (PCA) factor analysis and the Cronbach's alpha from reliability analysis of the data. Factor analysis loaded fifteen questionnaire indicators into two components, indicators 1-7 and 8-15 respectively. The first component represents the most contributory element to the impact on video lessons using mobile learning. Alpha value of this factor is 0.801 representing a high internal consistency of this component. The alpha value of the second component is 0.756 is consistency to the different learning methods.

V. CONCLUSION

This paper presented a survey from 100 female from polytechnic students ECE and EEE diploma engineering students on the impact on video lesson using mobile learning and different learning methods. From the above results it is concluded that the there is a significance difference between the mobile learning and the conventional learning. From the parameters or indicators to the mobile learning video lesson is powerful and easy to understand the concept of the subject in the education system. For future research, to conduct the pre and post test for students in universities and engineering colleges and compare the analysis for m-learning and other learning methods like classroom learning and e-learning.

REFERENCES

1. Cronbach I.J (1951), Coefficient alpha and the internal structure of test. Psychometrical, 16, 297-334.

2 Hair. J. F Anderson, R.E., Tatham, R.L., & Black, W.C., (1998). Multivariate Data Analysis. 5th ed. Upper Saddle River, New Jersey; Prentice – Hall

3 Sahil Wendeson Sahilu, Wan Fatimah Wan Ahmad, and Nazleeni Samiha Haron, 'Development and Usability Evaluation of Platform Independent Mobile Learning Tool (M-LT)', World Academy of Science, Engineering and Technology 80 211.

4 Kwang B. Lee, Raied Salman, 'The Design and Development of Mobile Collaborative Learning Application Using Android' Journal of Information Technology and Application in Education, (JITAE), vol. 1 No.1, 2012 PP-1-8, World Academic Publishing.

5 Dr.Fahad N.Al-FAHAD,'Student's Attitudes and Perceptions towards the effectiveness of Mobile Learning in King Saud Unversity, Saudi Arabia', The Turkish Online Journal of Educational Technology – TOJET April 2009 ISSN 1303-6521 volume 8 issue 2 Article 10

Appendix - I

ELECTROMAGNETISM

Multiple Choice (Pre-Test)

Choose the correct answer and tick in the box provided or fill in the blanks

1. Magnetic line of force is known as:
   a. Magnetic flux b. Electric flux
   c. Flux Density d. Intensity of flux
   [ ]

2. Electromagnetism is the:
   a. Magnetic field caused by a permanent magnet
   b. Action between a permanent and an artificial magnet
   c. Magnetic field action with a current-carrying wire
   d. Current in the coil
   [ ]

3. Electromagnetic induction is the generation of :
   a. Electricity from magnetism b. Electricity from electricity
   c. Magnetism from electricity d. Magnetism from magnetism
   [ ]

4. When an electromagnet reaches maximum strength, it is considered to be:
   a. In field condition b. At saturation
   c. In habited d. At field strength
   [ ]

5. What is magnetic flux?
   a. The number of lines of force in webers
   b. The number of line of force in maxwell's
   c. The number of lines of force in teslas
   d. The number of lines of forces in flux density
   [ ]

6. Faraday's law states that the:
   a. Direction of the induced voltage produces an opposition
   b. Direction of an induced current produces an aiding effect
   c. EMF depends on the rate of cutting flux
   d. EMF is related to the direction of the current
   [ ]

7. As current travels within a conductor:
   a. The magnetic field aids the current
   b. A magnetic field is developed around it
   c. The wire tries to point north
   d. An electrostatic field opposes the current
   [ ]

8. Electricity may be generated by a wire
   a. Carrying current b. Wrapped as a coil
   c. That has neutral domains d. Passing through a flux field
   [ ]

9. The unit of magnetic flux density is the webers
   a. True b. False
   [ ]

10. A magnetic field is produced around a current-carrying conductor
    a. True b. False
    [ ]

11. Magnetic flux flows from the North Pole to the South Pole within the magnet
    a. True b. False
    [ ]

12. In empty space, conduction current is -------
    a. Infinity b. Unity
    c. Zero d. None of these
    [ ]

13. EMF is closed ------ integral of non-conservational electric field that is generated by battery
    a. Line b. Surface
    c. Volume d. None of these
    [ ]

14. When a current carrying conductor is moving ---------- is developed
    a. Torque b. Force
    c. Acceleration d. Mass
    [ ]

15. Left hand rule indicates that the :
    a. Motor action b. Generator action
    c. Rotor action d. Stator action
    [ ]

(Post-Test)

1. The MKS unit of magnetic field H is
   a. Ampere b. Weber
   c. Weber per square meter d. Ampere per meter
   [ ]

2. When the conductor is stationary, magnetic field is moving is known as:
   a. Statically induced EMF b. Dynamically induced EMF
   c. Induced EMF d. None of the above
   [ ]

3. The electric field lines and equi-potential lines
   a. Are parallel to each other
   b. Are one and the same
   c. Cut each other orthogonally
   d. Can be inclined to each other at any angle
   [ ]

4. Force due to a current carrying conductor states that
   a. Ampere's Law b. Biot's Law
   c. Coulomb's Law d. Gauss's Law
   [ ]

5. Where the sinewave is unidirectional form
   a. At the commutator b. At the rotor
   c. At the stator d. At the motor
   [ ]

6. Maxwell's equation shelter on ------ Law(s)
   a. Faraday's b. Gauss's
   c. Ampere's d. All of these [ ]

7. At the point of discontinuity, --------- component of magnetic flux density is continuous
   a. Tangential b. Normal
   c. None of these d. Cannot say [ ]

8. Magnetic force is the force that produces a magnetic field
   a. True b. False
   [ ]

9. The direction of a magnetic field within a magnet is
   a. From south to north b. From north to south

c. Back to front d. Front to back
[ ]

10. When the current through the coil of an electromagnet reverses, the
    a. Direction of the magnetic field reverses
    b. Direction of the magnetic field remains unchanged
    c. Magnetic field expands
    d. Magnetic field collapses
    [ ]

11. The induced voltage across a stationary conductor in a stationary magnetic field is
    a. Zero b. Reverses in polarity
    c. Increased d. Decreased
    [ ]

12. When a solenoid is activated, the force that moves the plunger is
    a. An electromagnetic field
    b. A permanent magnetic field
    c. Varying voltage
    d. A steady current

[ ]

13. If a loop in a basic dc generator suddenly begins rotating at a faster speed, the induced voltage
    a. Remains unchanged b. Reverses polarity
    c. Increases d. Decreases

[ ]

14. Electromagnetic induction is the force that produces a magnetic field
    a. True b. False

[ ]

15. If the cross-sectional area of a magnetic field increases, but the flux remains the same, the flux density
    a. Increase
    b. Decrease
    c. Remains the same
    d. Doubles
    [ ]