# Mobile Learning: The Effective Role of Multimedia "Analytical Approach via an Object Oriented Strategy"

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## ABSTRACT

Mobile-Learning is an important technology in Teaching/Learning process to realize requirements of student , teacher and instructional institution. Extended applications of M-learning are wide and increasing. The current study represents an attempt to cover the analytical aspects, features and mechanism of the environment's elements in Teaching / Learning process and application via M-Learning.

The aim of this paper is to study the analytical aspects covering factors and elements of the environment of teaching/learning process via mobile , concentrating on multimedia technique role particularly 2D and 3D animation. Such classification study is presented so as to be the appropriate approach for the systematic models of designing M-Learning as well as this study could assist in framing the stages/mechanism of developing and evaluating of M-Learning.

## Keywords
Mobile, M-Learning, multimedia, animation, 2D, 3D

## 1. INTRODUCTION

WMobile-Learning (M-Learning) represents a new technology in computer applications, IT and Instructional Computer. Several researches have been undertaken to study the environment , M-Learning systems , evaluating systems , etc. But the authors did not find an integrated vision of analytical study to cover all factors , attributes , behavior and elements of M-Learning particularly the major role of multimedia technique like 2D and 3D animation technique.

The current study is created to present the needful analytical study. Thus , such integrated analytical study could open the gate for many future studies related with same domain. The current study covered most factors of the environment of M-Learning. But it focused on multimedia elements.

The problem statement of this paper could be summarized in building professional table for attributes of the needful environment and behavior for each related attribute, it is the strategy of Object Oriented. Behavior regarding each attribute is considered by many elements deals with characters.

## 2. LITRATURE REVIEW

All the authors selected 5 studies related with M-learning to discuss the final conclusions and their relations with the current paper.

## 2.1 Daoudi Najima &, Ajhoun Rachida , " An Adaptation of E-learning standards to

M-learning" : This paper presents a brief about M-Learning and its relation with e-Learning. This study considered M-Learning as advance technology and due to the features of Mobile dynamic , it allows the student to use e-learning Modules wherever they like. Final conclusion ensured the advantages of M-Learning in active communications between users as well as the flexibility of usage in any time and place.

## 2.2 Nancy E. Kiplinger," Putting the Learning into M-Learning"

This paper explores the challenges M-learning must meet to ensure that learners are engaged with the content. The author proposes solutions to strengthen pedagogy and a strategy for ensuring that the learning design is effective before it is deployed via technology.

The strategy is illustrated through an example of a learning package that was evaluated for effectiveness, efficiency, and acceptability. The author discusses why instructional content to be delivered via technology must be designed to be economical in scope and learner centered.

## 2.3 Razieh Niazi and Qusay H. Mahmoud , "Design and Development of a Device-

Independent System for Mobile Learning "

This paper concentrated on the design and development of mobile learning systems. It presented a new applications and systems for both educators and learners to enable mobile learning. In this paper the authors present a mobile learning system which supports both educators and learners. Using this system, instructors are able to generate quizzes for various target devices. In addition, it offers learners seamless on-line as well as off-line access to the quizzes from any device.

The quiz generator in the system is part of a larger platform for mobile learning. The authors discussed the system architecture of the proposed system and the proof of concept implementation they have built using Java technologies.

## 2.4 L.E. Dyson , R. Raban , A. Litchfield and E. Lawrence ," Embedding Mobile Learning into Mainstream Educational Practice: Overcoming the Cost Barrier"

In this paper ,the embedding of mobile learning into mainstream educational practice is examined, that of the cost. Usage charges billed by telecommunications providers and the cost of mobile hardware are identified as the key cost barriers. However, there are also opportunities which can be leveraged to overcome the cost of implementation. The first of these is the fact that most students own a mobile phone or other mobile device. The second is provided by technological solutions such as the employment of packet technologies. The authors describe two experiments in low-cost mobile learning:

one which uses packet technology (mobile WAP/WML) to build low-cost interactivity in the classroom, and the second which involves mobile-supported fieldwork using several cost-saving strategies.

## 2.5 S. Cakula and R.Plesavnieks, "M-Learning: New Way to Access Knowledge library online"

This paper discussed a major problem in modern technology of using e-learning and e-libraries . it is the related information systems cannot communicate with mobile devices but more and more people use different mobile devices in their real life. Paper describes a developed system which gives possibility to communicate mobile device Pocket PC with knowledge library. This connection allows different searching requests of information in knowledge library, adding new documents, downloading files and uploading information from mobile device. The final conclusion shows the system gives an innovative solution for supporting mobile device communication with knowledge data base because there has never been a specific support for mobile devices and knowledge data bases before. The system gives possibility to browse the knowledge library, download files, add new patterns and provides different types of searching and requesting. The system is available to use for free.

As a general discussion of the previous papers , they covered some practical systems , cost , e-learning and educational fundamentals related to M-learning . Also some papers suggested a professional system to present   ability of communication between  systems .

The authors did not find an analytical study to describe the process of M-learning deals with its environment (attributes and behavior). Thus the current paper will present such research work considering the Object Oriented strategy.

## 3. OBJECTIVE OF RESEARCH

Please This paper aims at :

Building a systematic analysis study for the environment  of teaching/learning via mobile concentrating on the major role of multimedia as the powerful tool in M-learning. The needful analytical system should be built on the strategy of Object Oriented so as to realize the maximization of instructional outcome of M-Learning , meaningful learning and effective learning

## 4. THE ANALYTICAL SYSTEM

The System shown below represents the core of the work. As an Object Oriented approach , the table includes 16 rows and 5 columns.

Rows refer to the attributes of the system ( factors , elements , aspects , properties, etc.) and columns represents the behavior ( mechanism) regarding each attribute through the environment of M-Learning.

The authors focused on multimedia in learning material because multimedia presents information in a way that is more interesting and easier to grasp than text alone. Animation is the core of multimedia particularly 3D animation which became a modern and updated technology for most computer application.

| Attributes / Factors | Behavior aspects regarding related factors (mechanism process in M-Learning) | | | | |
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| | Teacher | Student | Expressing Messages | Multimedia2D &3D | Multimedia Sound &Images |
| 1. Tutorial lessons | Preparing the required text presentation for the tutorial unit with the related images , multimedia elements. Also he must prepare a Q&A for the unit and the suitable friendly feedback for the incorrect answer and powerful reinforcement for the correct reply. | Read the tutorial unit with related multimedia, considering the text book and references, answer the question of the unit , receive the needful feedback. If need, communicate with teacher via message or call. Finally move to the next instructional task. | The message should be short , concentrated on the core of the concept , clear language suitable with the student level. The whole M-Learning lesson period does not exceed fifteen minutes. Thus texts must be short and enhancement with multimedia technique. | Images , 2D animation suitable for diagrams texts charts flowcharts flashing ,lighting objects. 3D images, animation and videos are important for real world objects. Images present full view vision. and perception for the instructional material subject. | Simple and clear Icons, simple images to represent the material. Images , pictures ,cartoon and other visual objects. Visual multimedia should express and indicate to the corresponding meaning of the desired text, question and dialog without visual noise. About sound and music effects also should be clear, simple and don't cause any audio noise to the lesson. |
| 2. Exercises | Short presentation of | Student must | Simple , clear and | Exercises with | For more |

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|  | exercises ,guides , feedback and scores (if any). Teacher should prepare his exercises considering less text of submission by the student. Multiple choices are ideal example. | expose the required solution for the exercise after practicing tutorial lesson and real class. Answers could be framed by simple submission. Student may receive immediate feedback visually or auditory. Friendly feedback of animation , pictures , sound and lighting objects are highly recommended in M-Learning. | short exercises enhanced by multimedia mobile technique . Mobile Multimedia technique must be designed to present a friendly meaningful learning tool to the student. | their immediate feedback could exposed by images ,charts flashing , animation. Some selected 2D flashes and video to be presented and ask the concern question. For more powerful exercises 3D movies for the related exercise would be recommended , then ask the desired question. | interesting environment of drill and practicing exercises , sound , images , lighting , animation , charts , diagrams and music are considered to express the drill and practice lesson via M-Learning. |
| 3. Experiments | Experiments are a breeding ground for M-lessons. Lecturer should prepare the experiment in the laboratory and record the video of HD resolution and enhanced with voice of lecturer. Also he must develop some effects on the final images and video of the experiment , that montage effects of sound , music , lighting , text high lighting is developed in high quality level, in order to grasp the mechanism of the experiment. | Student receives the experimental lesson via his mobile. He would see , study , listen and read related text on the video. Then he would be ready to answer any question deals with experiment. Student can express some inquires , dialog items ,and responses to the lecturer for effective interaction between learner and lecturer. | Messages of experiment are expressed through video of experiment and other images , charts, diagrams and plans. Experiment is a major part in e-lessons as well as training lessons. The lecturer may find an intelligent system includes message and video of working process of experiment. It is preferred to present messages in experiments through diagrams and graphs. | Experiment elements : videos ,maps ,charts, curves ,diagrams and other related images with the experiment, all should be carefully developed in 2D aspect and 3D technique via professional software like Maya , Director and Flash. Thus software technologies present facilities and abilities to produce an excellent environment for the experiment into Mobile. | Effects of sound and animation for related experiment are well considered in M-learning. Effects of sound ,colors, animation ,etc. of real world of the experiment must be simulated carefully via mobile lesson of experiment. |
| 4. Testing and Score Representation (if required) | Teacher must prepare multiple kinds and amount of questions with the correct answer for each and rate of scoring. There are five major kinds : multiple choices , true or false , fill in blanks , matching between two columns and answer in one word. Teacher should focus on questions of multimedia features rather than text only. | Student may answer the needful exam , but after taking the lesson in tutorial and drill and practice. The output of all kinds of e-learning lesson led to input of exam lesson. Student will receive immediate score of evaluation regarding his performance during the exam. | Less text and mathematical details of questions concentrating on the core of question , if possible the question should be enhanced with multimedia technique. The student can receive and understand the question individually as well as can answer individually. Process of submission the answer must be simple and takes little time. | Multimedia technique of images and videos are major part of exam. Exam must be expressed through multimedia elements not only text. 3D animation prepares full view vision to the learner to exam the problem and study the case statement. It is expected that , student will answer correctly after right and smart study of the question via | Sound , colors effects , lighting effects , zooming , marquee texts and images , rotating the objects in 3 axes , cartoon pictures ,etc. all should support the student to process the exam with many successful attempts without attention and with some trust in himself. |

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| 5. Instructional Games | Teacher may prepare the proper scenario for the stages and actions of game . However the final goal of the game is an instructional goals not only fun and enjoyment. This kind of M-Learning systems is proper for primary as well as pre-primary schools. Instructor can send messages to the student through his progress in playing the game. | Kids must read instructions of the game and progress of scores. Student must understand and feel the instructional goals of the game via mobile. Messages , scores and feedback can prove and ensure performance of learning process. | Message of games could be presented in many cases , instructions , moving from stage to another, getting rate of scores , some kinds of selected submission, etc. game and its scenario depend on message displayed on Mobile screen. | Multimedia is the core of the game, all kinds of games depends mostly on multimedia technique. 3D games represents a modern aspect and updated versions for most game applications. It is highly recommended to produce 3D clips of games. | Other multimedia techniques are considered in games , graded scores , instructions , flashes , music ,etc must be reviewed carefully. 3D animation with the right sound effects and music as well as high lighted texts and colors all present a prefect environment of instructional game via mobile. |
| 6.Simulation | Simulation represents advance stage of learning process via mobile. Teacher may design the mathematical model of simulation regarding the needful real world case or experiment. He must also decide kind of data to be submitted by the learner and expected out of the simulation process. | Student should be qualified enough to process simulation instructional system. His task to submit the needful data regarding simulation subject. Output expected of simulation system would match output of real world subject in the similar situation. | simple simulation messages could be acted while student practices simulation lesson. Students needs to receive continuous messages to ensure his learning process via mobile regarding that real world case or experiment. | It is better to display the real world case in 3D animation technique. Because purpose of simulation is simulating a real world case or real laboratory experiment via mobile screen. But such kind of M-Learning is oriented to high level of study like under graduated and post graduated candidates. | Due to goal of simulation is to simulate a real world case or experiment , we expect such lesson need to be enhanced by sound effects , lights effects , colors , animations , charts , diagrams , curves , sheets and maps. Multimedia and the mathematical model represent the core of simulation M-Learning lesson. Output of simulation system could be represented by multiple features like figures , sound , animation , charts ,etc. |
| 7. Class level | Teacher must prepare his M- lessons to be suitable with class level of student and skills of student in both instructional material , mobile usage and level of language presentation. | Student should be able to process requirements of M-Lessons , concentrating on instructional material concepts and details. | Messages should be enhanced with simple images and cartoons particularly for primary schools and secondary schools. | It is important to expose multimedia in all levels of classes. For primary and secondary school , simple cartoon, images simple and clear clips 2D and 3D. for graduations , multimedia could extend to wide quality and complex features | Sounds , visual effects , music , etc. all should be available among process of teaching/learning via Mobile. |

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| 8. Instructional Computer aspects | Teacher must select proper instructional computer model when developing his M-Learning. M-learning presents kind of e-learning.<br><br>First , analyzing the instructional material , technical design (choosing method of instructional computer , software design , implementation and evaluation) | Student must take the major role in the teaching/learning process via Mobile He must approve an effective interaction with mobile to receive immediate feedback. Student can evaluate himself while learning via Mobile. | Messages between mobile and student should be designed and framed well so as the student receive continuous messages some visually the other auditory. | Multimedia is considered in major elements of instructional computer particularly in training modules , games , simulation , experiments and tutorial lessons. | Other multimedia elements are essential for instructional computer systems. Online interaction via real sound of instructor and messages are includes in the e-learning modules via Mobil. |
| 9. supervised and unsupervised learning | Teacher must design his M-Learning lessons so as to be unsupervised , candidate can use M-lessons individually far from the teacher. | Student using M-Learning should prove his performance of achieving the targets of lessons without supervising of teacher.. | Supervised messages of teacher are expected. | Multimedia technique is well guided and controlled by teacher while presentation of lesson | Some effects and music , some sound should be expressed by teacher himself. |
| 10. Feedback and Reinforcement | friendly feedback & reinforcement tools like cartoons and visual clips, music as well as sound of the teacher for more interaction. | Student must read carefully feedback and prepare to the next step accordingly | Friendly feedback & reinforcement tools like cartoons and visual clips 3D and 2D. friendly pictures and clips even on incorrect answer to expect meaningful and interesting learning process. | Multimedia frames the main features of any exposed feedback | Friendly feedback & reinforcement tools like cartoons and visual clips. Such feedback should encourage the HI student to carry on his lesson. Use little words which are represented by finger spelling. |
| 11. Virtual (Internet) Communication | Easy use of online M-Learning as well as flexible connection between community of M-Learning environment ( teacher student and insinuation members). Teacher must prepare the chance to realize such effective connection. Facebook good example for virtual communication between communities of M-learning. | Student can communicate other members of M-Learning community ( the teacher , group of learners , members of institution members offices as well as some selected experts in the concern topic. Student can browse easily and flexibly to access the required instructional task. | Messages should be short , due to features of M-learning. Messages present interaction action between members of communities. | Text and online chatting represent main aspect between communicates. Online life chatting give the chance to the student to communicate his instructor and his colleagues in the class. | Real sound of chatting community and videos are important to realize virtual communication. |
| 12 .Mobile features and Special requirements if needed | Teacher may recommend any selected tools if any. | Student must prepare and practice using of the needful tools | .messages are available easily on screen. | Clips need not for special tools to be displayed on mobile screen | All multimedia elements are proper to mobile. |
| 13. Fun & Enjoyment as well as motivation | As per modern and recommended theories and strategies of instruction technology as well as | Student receives continuous feedback and reinforcement in a friendly method. | Messages may include elements of fun & enjoyment as well motivation to enhance the student | Multimedia elements provide breeding ground to fun , enjoyment and interesting | Sound , simple icons , animated images can share the needful environment of fun |

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| | instructional computer and e-Learning , all ensure and prove role of fun and enjoyment through teaching/Learning process. Thus fun and enjoyment should be framed so as to express continuous fun and enjoyment while receiving feedback and reinforcement. | Fun and enjoyment allows the environment of teaching/learning process via Mobile to be a friendly tool. Student must approve real motivation and zeal to carry out learning process | and encourage him to carry out learning. | environment of teaching/learning process. Funny cartoon , music , clips , charts lighting text , some 3D cuts , 2D animated images , etc , they all can provides factors of fun, enjoyment and motivation to learner. | & enjoyment. Due to providing environment of friendly learning tool via multimedia elements , it is expected to realize motivation to learn for student. |
| 14. Economy | Teacher may decide the economy outcome regarding M-learning. For online learning it is satisfactory because student receives learning material any place and any time. | Student use mobile anywhere and any place , so it is economy | Messages in mobile are economy both in cost and time. | Mobile multimedia clips , images , etc. do not cost in time but need technical skills by insinuation members | Multimedia elements are easy to be displayed via mobile and do not coat in money or time but need professional members. |

**Fig 1: The Analytical System**

## 5. CONCLUSION AND RECOMMONDATION

The authors summarized conclusion of the current research as listed below:

1- This study and table of analytical environment could be considered while designing and developing M-learning systems. This study could be selected as pre-request before designing and developing M-learning modules and systems. output of this study offers the input of designing and developing M-lessons. Developers may consider all elements of environment.

2- The aspects and features of the current study are technical attributes and behavior, not only software and programming design. It is expected when considering such integrated vision for the environment , M-learning can realize meaningful learning , maximization of instructional outcomes , continuous and immediate interaction via reinforcement and feedback as well as a friendly learning tool to the learner providing fun & enjoyment , economic tool of teaching/learning and it is modern feature of technology in teaching/learning process.

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