

## Intelligent Agent based Mobile Learning System

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### Abstract

*We propose in this paper, that the popular e-learning process can also be pursued through the use of mobile devices, which we call as mobile learning (m-learning), another application under mobile commerce. It may be mentioned that it is difficult to pursue m-learning through PDAs or mobile phones because of their memory size being very limited and also the screen size is not that big enough to view the learning material or download them. In view of this we here propose considering mobile learning using Notebooks or Tablet PCs, since these have also become as mobile devices these days. Taking into consideration the constraints on the availability of internet connectivity and a human tutor to be physically present at the other end for information dissemination, we propose an intelligent agent, replicating the tutor, in the m-learning domain. The validation of the proposed scheme has been carried out using JADE development kit and the details are presented in this paper*

### 1. Introduction

Education and training [1] have become increasingly important as a means to achieve upward mobility in life. With the changes in the global landscape in terms of new technologies and methodologies, the need for retraining or retooling of the work force is becoming more important. To accomplish this task, many persons are seeking to go back to school to take further training and to better educate themselves. Many organizations are also seeking cost effective means of training their workforce to increase efficiency and productivity. Even as the thrust for increased training becomes evident, what cannot be lost is the fact that the modern man has increased responsibilities which limits him from being able to sit down in a class room for a fixed amount of time, at fixed dates, over

a fixed period. Many such issues have resulted in the growth of distance education system.

Even today, the distance education system functions through the student registering for the course in the University and then the necessary study materials were sent to the student. Students then meet the concerned teachers during the scheduled contact hours for clarification of doubts and on such other matters. Finally the student takes the examination on the prescribed date. With the growth of internet, e-learning [1-4] technique was introduced, wherein students can access their resources via internet; chat with their fellow colleagues and also with their teachers online.

The main disadvantage with this e-learning technique is that we have to be connected to the internet always and also when we move from one place to another, we cannot get access to these resources easily as we have to have the land line based internet connectivity in the new place. With all these in mind, researchers have come up with the mobile learning proposal [5][6] wherein one can get access to these resources from anywhere, as these days, everyone do have a mobile device in hand and also broadband wireless internet has come up. We cannot however, rely on PDA or mobile phones for this purpose as the memory capacity of these devices is too small and also the screen size is not sufficiently big enough to download and view the materials for reading. Also, with such an e-learning system, or for that matter with any learning system, normally we come across a situation with regard to judging the initial level of knowledge of the student in grasping the material of a course and also the availability of a human tutor.

Taking the above two aspects into consideration, we here propose in this paper, a new scheme, wherein we suggest employing a mobile agent (instead of the human tutor) to perform the same tutoring job but in the mobile environment. The proposed Agent possesses the necessary intelligence for tutoring the students similar to a human tutor. In essence, the agent would replicate the human tutor in

its activities. The remainder of the paper is organized as follows. Section 2 discusses on mobile learning and section 3 talks on the intelligent agent based Mobile Tutoring system. Section 4 provides the details on the proposed agent based architecture and section 5 provides the details of the implementation of agent based mobile tutor using JADE tool kit. Section 6 pertains to results and user acceptance. Section 7 pertains to the conclusion.

## 2. Mobile Learning- Brief Review

### 2.1 Trends in Distance Education

Distance education techniques have seen movements from the delivery of tutoring materials on portable storage devices such as CDs, DVDs, video tapes, etc., to e-learning. In e-learning [1-4] or Electronic Learning as it is familiarly known, the delivery of educational content is done by means of electronic media like the internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, CD-Rom, interactive CDs, and computer-based training. E-Learning based education today primarily occurs with the students connecting to a computer and accessing materials off the internet. Instructors still play a significant role in this learning process wherein, they have to engage with the students and answer to their queries, mark the assignments, give feedbacks, monitor student's online activities, etc. Students are not the focal point of the learning process as the focus is to facilitate the work of the instructor [5][6].

The advent of e-Learning has played a significant role in the area of training. This includes persons, wanting to do further studies to complete a degree course or a professional certification course with the flexibility of working from home; companies seeking a robust and efficient way to improve the skill level and competence of their staff; universities and colleges seeking to improve their student base in terms of the number of students enrolled; and persons wishing to receive education from a particular institution far away but lacking the funds or the time to travel get involved in the programme.

### 2.2 m - learning

The natural evolution from e-Learning is m-Learning or mobile learning [5][6]. Mobile learning, though often synonymous with mobile phones, actually covers a broader range or aspects, than just mobile phones. Mobile learning, in the context, may be defined as the "e-learning process that utilizes mobile devices to allow the user to physically move their learning environment as they move from place

to place". Very often, a user may have access to a dynamically changing repertoire of devices and services that will differ in speed, processing power, monitor and other output characteristics, etc. In the context, mobile Learning has now opened up many possibilities for distance learning and learning in general for persons who are in remote areas that may not have access to traditional communication systems such as telephone or cable or so in order to have access to internet. These persons can now get connectivity through a variety of wireless technologies. Also one of the fundamental advantages is the ability for the user to get learning done when they move from one place to another, since mobile devices through their portability allows this facility while being mobile.

**Table-1: E-learning – vs. - M-Learning**

<b>E-Learning</b>	<b>M-Learning</b>
<b>Terminology</b>	
Computer	Mobile
Bandwidth	GPRS, G3, Wi-Fi, WiMax
Interactive	Spontaneous
Multimedia	Objects
Distance Learning	Situated Learning
<b>Pedagogical Changes</b>	
More text and graphics based instructions	More voice, graphics and animation based instructions
Lecture materials via the internet	Learning occurring in the field or while mobile
<b>Communication to Students</b>	
Time-delayed (students need to check emails or websites)	Instant delivery of e-mail or SMS
Passive communication	Instant communication
Scheduled	Spontaneous
<b>Student to Student Communication</b>	
Face to Face	Flexible
Audio-teleconference common	Audio-teleconference possible
e-mail to email	24/7 instantaneous
Private location	No geographical boundaries
Possible travel time to reach internet site	No travel time since wireless connectivity

Table-1 compares the e-Learning and the m-Learning environments in terms of terminology, pedagogical changes and communication between actors [5][6]. M-Learning provides the user with the idea of learning "when we want, wherever we want, and however, we want" [5][6]. Even though it is m-learning environment, it still relies on the availability of the human tutor when the student desires. This is similar to the problem in the face to face teaching process. So, taking these aspects into consideration, we here propose a concept called an intelligent tutoring system for mobile learning.

### 3. Intelligent Agent based Mobile Tutor

A human being based tutoring system consists of three personnel viz., the lecturer, the tutor and the student. The tutor has the primary role as the disseminator of information to the students. Lecture's duty, as we know, involves preparing the lecture materials, setting examination questions, etc. The student or the learner, utilizes the different tools available to access the material content, complete exercises given, communicate with others and accomplish individual or group tasks [5][6]. If any new learning system shows improvement on the e-Learning and the traditional approaches to education, then that system must be able to deliver the benefits of having an interactive session with a human agent. But the problem we would generally face is the availability of the human agent at that time when the student is online. So as a solution to this problem, we propose the application of a software based mobile agent, which possesses sufficient intelligence as a human tutor being would possess, for tutoring the student [7-9]. In this context, an agent [10-24] is nothing but a software entity situated in its environment, reactive to changes in its environment, proactive in its pursuit of goals and social. The use of agents [2][4][5] in the development of e-Learning is to accomplish the characteristic use of its derived intelligence. Though software agents [7-9] have been introduced in e-learning, the problem relies on the availability of internet for communication with the tutor and also for viewing the materials.

The proposed agent based m-learning[25] is an approach/concept, which allows overcoming two problems existing in e-learning viz., i) getting tutored wherever you are and ii) availability of an agent based tutor. So, based on these two vital requirements, in our present approach we employ two agents viz., a Tutor Agent which is mobile and a Teacher Agent which is static. The mobile tutor agent will communicate with students, assist learners, making decision about a student's level, adopting tasks to the learner and adjusting to meet changes in the environment. The static teacher agent would access the required course material for delivering to the students based on his level through the mobile tutor agent. This way, we replicate the jobs of the Tutor (Tutor Agent) and the Lecturer (Teacher Agent) which are normally done in practice.

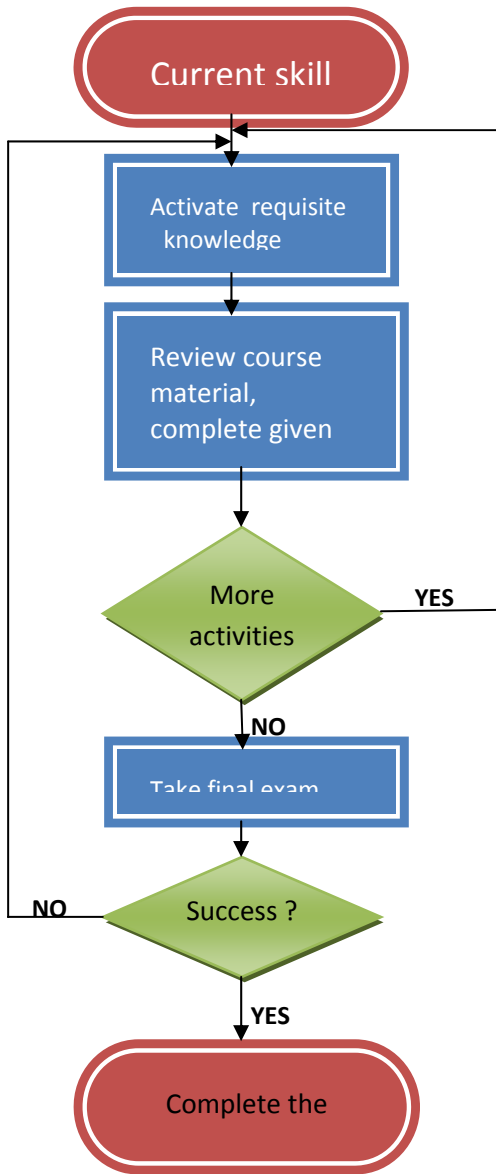
Mobile agents allow for adapting to the learning experience with a view to meet the learner's requirement or on changes in the learning environments. This is the significant advantage of using mobile agents in m-Learning environment. This feature allows us to deal with one of the major issues of distance learning viz., getting in touch with the

course material wherever we are with the availability of broadband wireless internet. This way lessons and assessments can be tailored to the user required base levels of complexity and learning styles. We would now be explaining in the next section, about the architecture of the proposed system and the appropriate algorithms developed for the implementation of the scheme.

### 4. Architecture- Intelligent Agent based Mobile Tutor

The learning process and the normal approach to learning may be summarised and demonstrated by a flowchart as shown in Fig.1. The flowchart demonstrates the learning process as applied to the completion of a course or training exercise. In the online environment[13] the learners come from varied cultural background, and levels of competence. Even though for many courses there are prerequisites that must be satisfied before a learner is accepted to pursue a particular course but still, with participants all satisfying the prerequisite for the course, does not eliminate the problem of the learners having varied levels of competence. The prerequisite only indicates that all learners have the minimum knowledge. Now how about those learners who have surpassed, that basic level of competence? Should they also be subjected to rehash materials they have already mastered and be weighed down by those who are at a lower level of competence? The situation becomes even more dramatic in an online learning environment where the learner may never come in contact with other learners. This is shown in Fig.2.

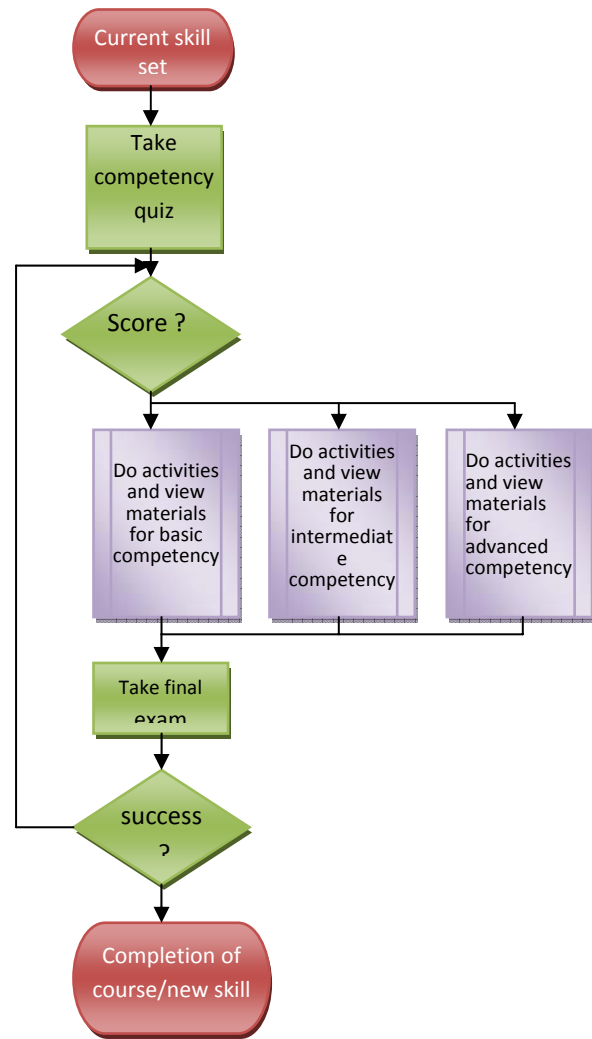
As globalization increases and the requirement for new types of training advances, the need for increased distance education, the challenges posed by e-learning so far, is the requirement for a fixed line connection [26]. As mentioned earlier, there is also the challenge of availability of the tutor/teacher. This is very difficult when working with a human agent and hence we have proposed the use of "intelligent" agents in our present research work. The Intelligent Agent-based Mobile Learning (IAML)[25] proposed here is intended towards improving the E-Learning and M-Learning experience of learners. The design details of this scheme, now proposed by us, have addressed all the challenges outlined above, with a view to meeting its objective. This has been done through carefully building into the system the intelligence of the human teacher and tutor, particularly the reasoning process involved in determining learner's competency level and directing materials towards their level of competence. This has resulted in a more efficient use of the available network resources and an overall



**Fig.1 The Learning Process**

improved learning experience as the learner can truly learn at his/her own pace, time and place. We now present, step by step, the details of the design, implementation and features of the intelligent agent based mobile learning system, which we have conceived.

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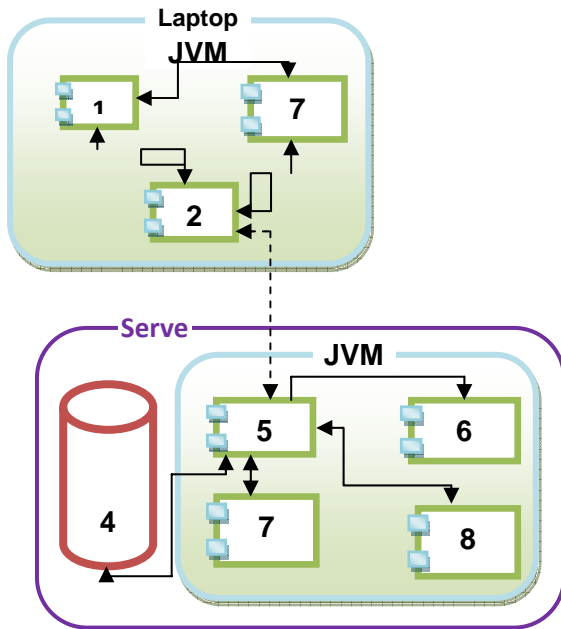


Fig.3 Intelligent Agent based Mobile Tutor

This architecture of the proposed system has eight major components as shown in Fig. 3. The corresponding software development uses mobile agent technology integrated with Java's GUI building features. These are explained in brief now.

- **Tutor GUI (1):** This is the main component through which the user interacts with the Tutor Agent. Its main features are (i) providing log-in information to verify student (ii) administers a pre-test to the student upon first log-in (iii) allow the student to retrieve course content and (iv) allow the student to progress towards the final tests.
- **Administer Test component (2):** This administers the varying tests the student will take throughout the course. The idea is success through continuous assessment.
- **Tutor Agent (3):** This is also an intelligent agent that performs actions much similar to a human tutor would otherwise do. The student does all interactions through the Tutor Agent only who in turn retrieves all the relevant information from the Teacher Agent and dispatches them to the student.
- **Question Bank (4):** This is a reservoir of Questions which the Teacher agent pulls for

testing the competency of the student by means of Tutor Agent.

- **Teacher Agent (5):** This agent acts as a main reference point for the course. The Teacher Agent plays the same role and exerts the same control that a Lecturer would have over his/her class. The Teacher Agent is however, responsible for allowing entry to the course, providing the relevant course materials and setting pre, mid and final tests/exams.
- **Course Material Distribution (6):** This is done by the Tutor Agent through the Course Material Distributor. This component locates the relevant material based on the students' level and current progress through the course.
- **Create Question Bank (7):** The creation of a bank of questions is handled by the 'Create Question Bank' component. Here the human instructor can create a reservoir of questions from which the TeacherAgent will build varying examination papers and other assessment tools.
- **Learner Registration (8):** This allows for the adding (registering) of students to the course database and also verifying that a student has the relevant access to take the course. This is done through login.

In the next section, we will explain how these blocks are implemented.

## 5. Implementation using JADE

The Agent based Mobile Tutoring System just described above has been implemented for validation using JADE - Java Agent Development Environment [27-30] which is shown in Fig. 4.

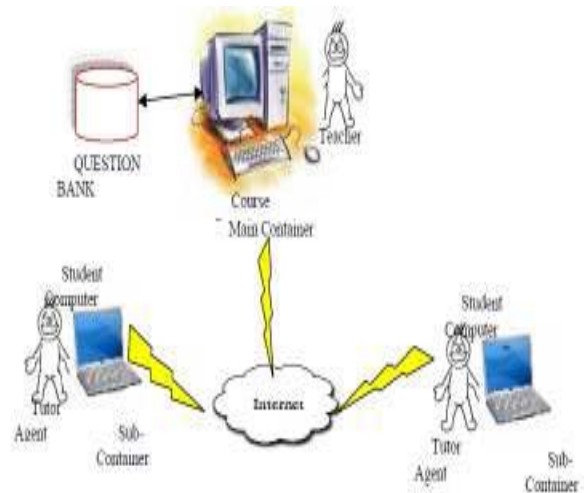


Fig. 4 JADE Physical Architecture

JADE [27-30] is a full agent middleware platform developed using Java. This facilitates easy integration of JADE's agent components with Java's GUI components and other features. The JADE Platform is composed of agents and containers in which they "live". The agent platform contains two default agents, Agent Management System (AMS) and directory facilitator (DF). The former is responsible for the management of agents and the latter is used to discover and manage the services an agent offers through its yellow page functionality. The agent containers can be distributed over the network.

In our implementation, we have a main container on a server/a main computer that houses our Teacher Agent and sub container which are the Tutor Agents on the student's computers, that are linked to the main container. Each student has one Tutor Agent and upon creation, registers itself in the main container's DF. When a Tutor Agent is created and wishes to send a message, it searches the DF of the main container for the Teacher Agents. Currently in our proposed system Tutor Agents only, communicate with the Teacher Agent. For simplicity, in our implementation, we have considered only one Teacher Agent responsible for each course.

## 5.1 Algorithm

The following is the algorithm that has been developed for the implementation. The Course server and the student must both run a Jade container.

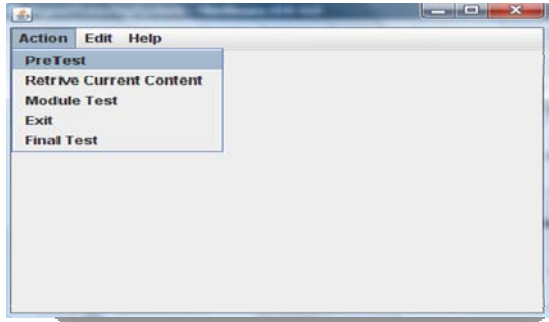
- The student starts the application to begin accessing the course material. If this is the student's first time logging-in the student's competence level in subject area is requested. The competence level is based on the student's own perception of his/her competence. Competence is placed into three following categories:
  - Basic
  - Intermediate
  - Advanced
- The Tutor Agent takes the student's competence response and requests a pre-test from the Teacher Agent.
- The TeacherAgent then pulls questions at random from a Questions databank stored in the Course Materials Database. The questions in the Pre-test covers the basic, intermediate and advanced topics in the course. The Pre-test is then sent to the Tutor Agent. Each level of pretest got 10 questions and given a time limit of 15, 20 and 30 minutes respectively.
- As soon as the appropriate test starts, the appropriate time limit gets decremented (student to note the left out time)

- The Tutor Agent begins the pre-test by pulling questions from the area of the databank with questions that lie in the Basic category. If the student is competent in this area (a mark of 6 or higher out of ten questions) then the tutor pulls additional questions from the Intermediate area of the databank. If the student is found competent, then the Tutor Agent moves on to questions from the next competence category (Advanced). Each category will have 10 questions with the student being required to obtain a score out 6 of the 10 questions within the time to be considered competent in the category. If a student obtains a mark less than 6, additional questions are given to the student but within the current competence category and time only. Each student will receive 30 questions on the pre-test except students who fail at the basic level; they will only be asked 20 questions. At the end of the pre-test, the results are displayed to the student indicating what the student claimed his/her competence to be within the time and what was assessed.
- Based on the assessment on the pre-test the student is given access by the Tutor agent to the material based on that category. The Tutor Agent gives the material to the student by sending the student's pre-test score and requesting the material from the Teacher Agent.
- After reading one section of the course material, student calls the tutor agent for test before he can access the next section. Once he has passed the section, student can access next section of the course material. The test for each section of course is also timed say 30 minutes and got 10 questions.
- When the student has completed reading the material for the section given and is ready to take the final exam, he notifies the tutor agent which then retrieves the final exam paper from the teacher agent which is timed again say an hour.
- In all cases, the time allotted gets decremented, as soon as the test starts.

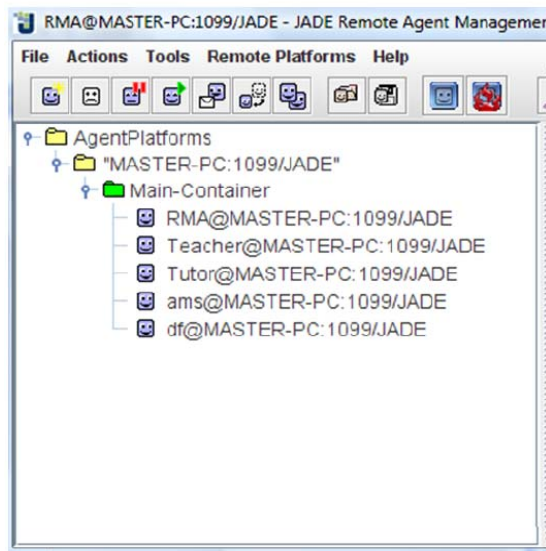
## 6. Results

### 6.1 Performance of the package

The implementation of the Agent based mobile tutor, as mentioned earlier, has been carried out using the JADE Agent development kit. The graphical user interface for Tutor is implemented using Java. The JADE agent environment of Tutor and Teacher are respectively shown in Figs. 5 and 6.



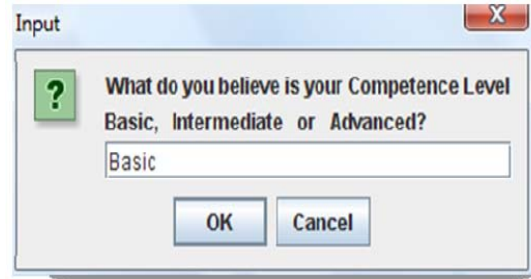
**Fig.5 GUI of Tutor Agent**



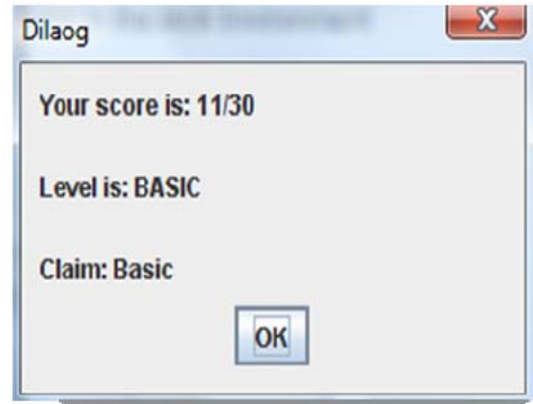
**Fig.6 Teacher- Tutor Agent in JADE**

Tutor GUI has got the 'pretest' facility which allows the students who have enrolled in the course to take the pretest. 'Retrieve the current content' allows the student to retrieve the course material if student loses them. 'Module test' is for student to take the test after completing each module in the course. 'Final Test' allows the student to take the final exam towards the end of the course. All these are performed by the Tutor Agent on initiation by the student.

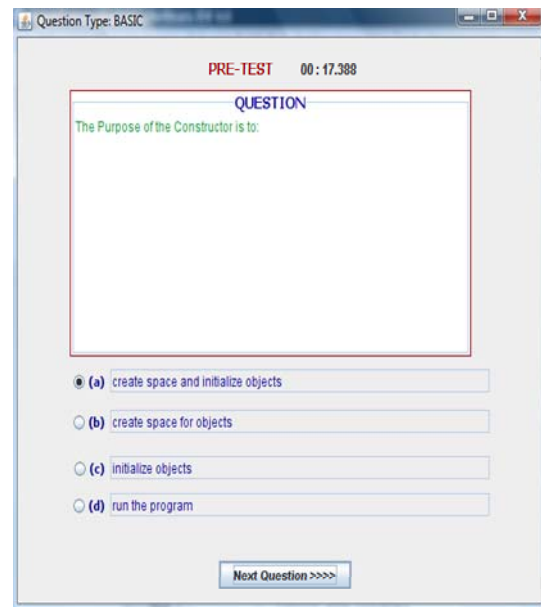
Student may claim his competence level as basic, intermediate or advanced. Based on the level claimed, Tutor Agent gives pretest for student and based on his performance tutor agent makes the judgment about student's competence. These are shown in Figs. 7 and 8. The pretest screens for the basic level competence are shown in Figs. 9-11.



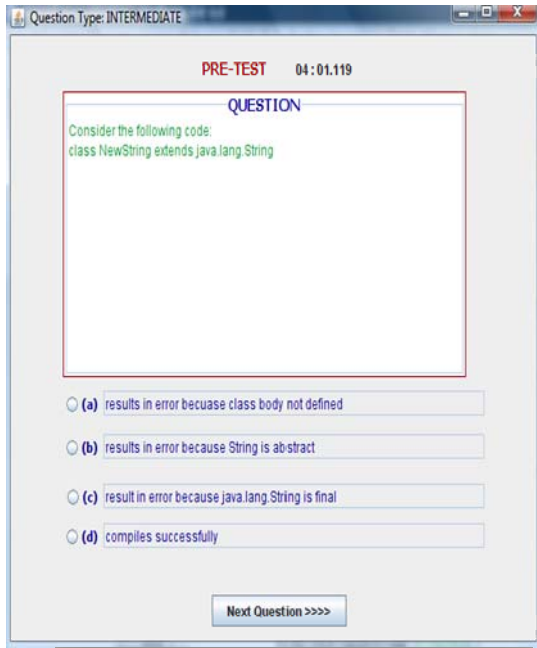
**Fig.7 Agent tutor: Basic**



**Fig.8 Student competence: Basic**

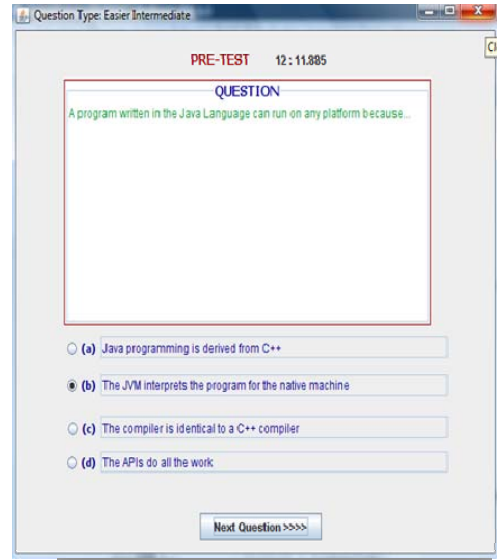


**Fig.9 Basic Pre Test Screen**



**Fig.10 Intermediate Pre Test Screen**

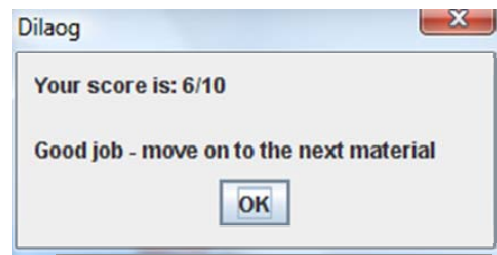
Agent tutor here possesses the intelligence of what a human tutor would do. Based on what student claims his level as basic or intermediate or advance, the tutor agent starts asking questions from the basic level. If he performs well in basic in a time frame of 15 minutes as seen in the screenshots, it asks questions in the intermediate level. If he cannot answer well in the intermediate level in a time frame of 20 minutes, it asks some simpler questions in the intermediate level for the same time frame of 20 minutes only but would not proceed to the advanced level even if he performs good in the simpler intermediate questions. Once the student has been judged as at basic level, the agent tutor brings the respective course material for student to start learning. This is shown in Fig 12. It is shown that student has passed the unit by scoring of 6 and then the second unit is made active. These are shown in Figs. 13 and 14. If say the student scores below 6, student is asked to review the same unit again and retake the test before giving access to second material. This is shown in Figs.15 and 16



**Fig.11 Easier Intermediate Pre Test Screen**



**Fig.12 Course Material- Basic level**



**Fig.13 Result of successful Test**





Fig.14 Course Material- Basic level

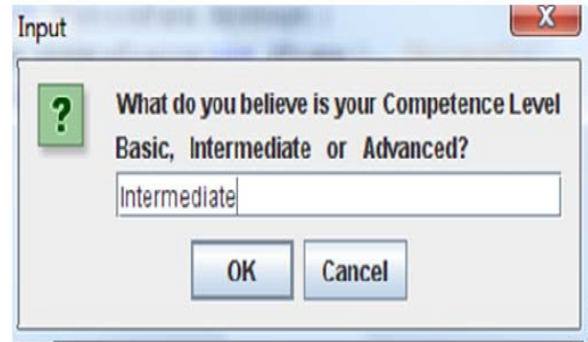


Fig.17 Student Competence- Intermediate

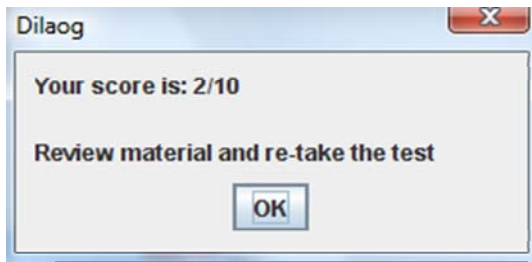


Fig.15 Result of Unsuccessful Test

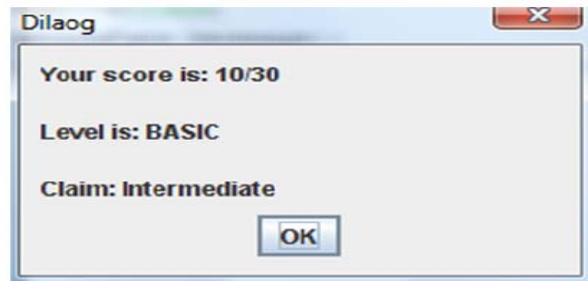


Fig.18 Agent Tutor:Basic



Fig.16 Course Material: Basic Review

Agent also possess the intelligence to judge if the student claims his level is intermediate and finally achieves score of basic level. In this case the tutor agent asks questions for the basic level even though the student claims that his level is intermediate. If he performs bad in the first ten questions in the basic level, in a time frame of 15 minutes, the tutor agent asks simpler questions in the basic level but does not proceed to the intermediate level. This way the tutor agent makes a judgement towards the level of the student viz., basic but not intermediate. These are shown in Figs. 17 and 18. The pretest screens for Intermediate competence level claimed by student and achieves only basic competence, are shown in Figs. 19 and 20.

Here again, the student gets access to the course material as what the basic level student would get, which is shown in Fig.10. Also Agent possesses intelligence to judge if the student's level is higher than the level he has claimed. If he performs good in the first ten questions in the basic level in a time frame of 15 minutes, the tutor agent asks 10 questions in the intermediate level for 20 minutes. If he performs good, then the tutor agent proceeds towards asking 10 more questions in the advanced level, in a time frame of 30 minutes. If he does good in this level also, the tutor Agent makes a judgement

regarding his level as advanced but not basic. These are shown in Figs. 21 and 22. The pretest screens for basic competence level claimed by student and achieves advanced competence is shown in Figs. 23 - 25.

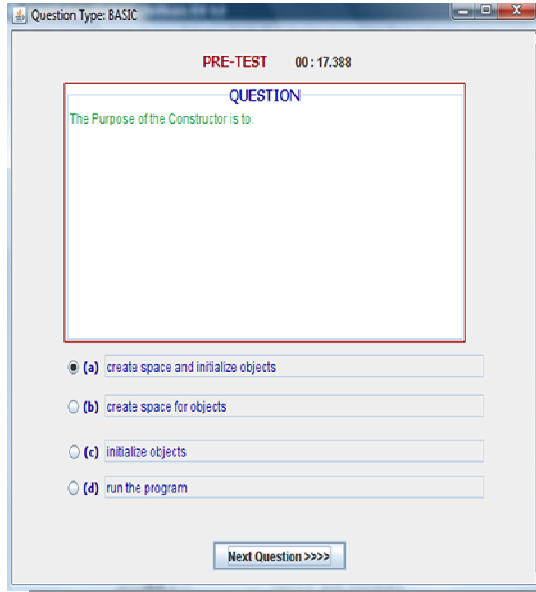


Fig.19 Basic Pre Test: Screen-1

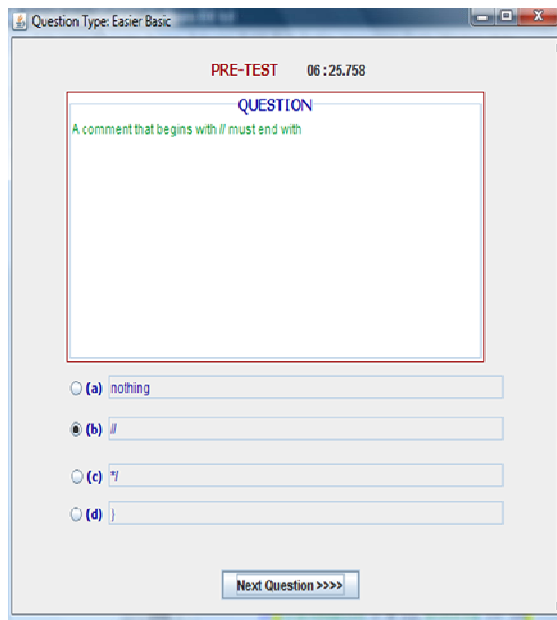


Fig.20 Easier Basic Pre Test: Screen-1

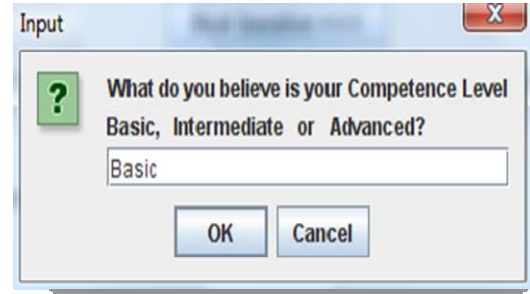


Fig.21 Student Competence: Basic

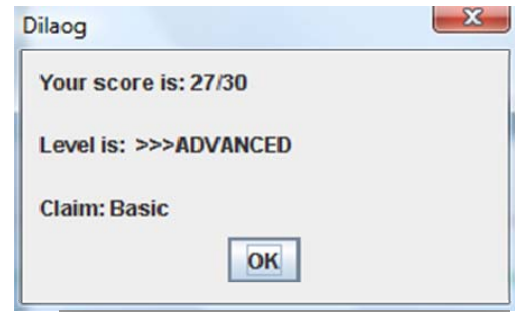


Fig.22 Agent Tutor: Advanced

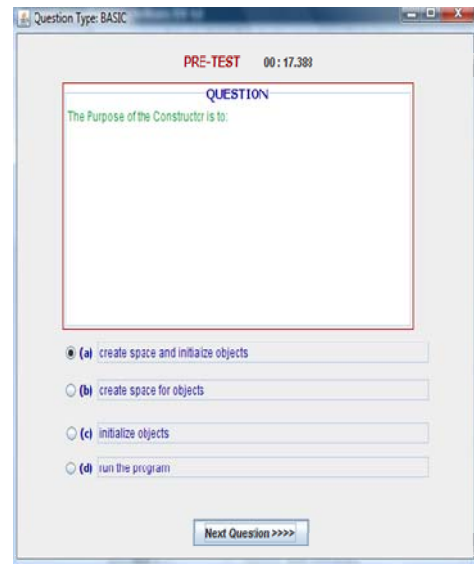
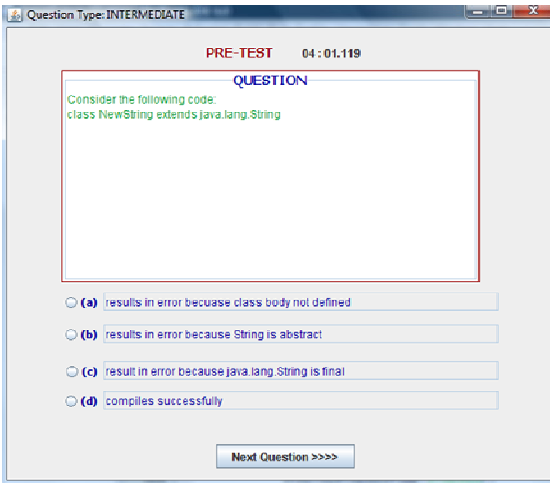
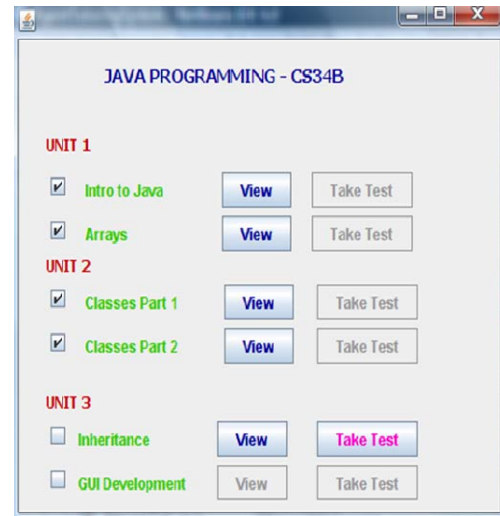


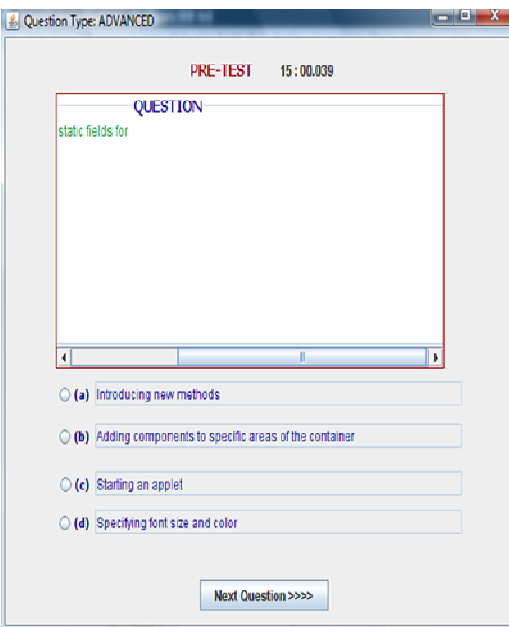
Fig.23 Basic Pre Test Screen



**Fig.24 Intermediate Basic Pre Test Screen**



**Fig.26 Course Material-Advanced level**



**Fig.25 Advanced Pre Test Screen**

Once the student has been judged as advanced level, the agent tutor brings the respective advanced course material for the student to start learning and for taking the test. But the basic course material is available to view but need not take the test, as the student has got good knowledge at the basic and intermediate levels. This is shown in Fig. 26.

With a view to determine the usefulness of the package for users, a user acceptance testing was conducted. A sample size of 30 users, consisting of students, teachers and other education officials at both the secondary and tertiary levels was taken for the testing.

The system was assessed on i) the ease with which the lecturer could add and remove test items from the system and also ii) the ease and user friendliness of the system to students. The login section of the system was accessed to ensure the validity of the user that is accessing the system. The system was tested to ensure that it was compatible with the more popular operating system environment to ensure that little or no disruption occurs while the system is being run. Feedback from users on such activities, or otherwise, was recorded. All such recordings, whether positive or negative, were evaluated to improve on the system's functionalities. The check sheet for the submitted user acceptance test is outlined below in Table-2. The satisfaction level has been assessed by the following criteria:

Good (being very satisfied, Fair (have a few concerns but its ok) and Not Satisfied (don't think it was properly implemented), which are outlined below in Table-3:

**Table-2 :User Acceptance Test Instrument**

Action	Pass/Fail	Satisfaction Level
System add users successfully	PASS	GOOD
Test items correctly entered into question bank and displayed.	PASS	GOOD
Test items correctly grouped by level of competence	PASS	GOOD
Pre-test items are randomly pulled from question bank of appropriate levels of competence and appropriate points during the test	PASS	GOOD
Test scores were accurately displayed	PASS	GOOD
Content materials were correctly shown based on competence level	PASS	GOOD
User was not allowed to move to next competence level with completing current level	PASS	GOOD
Module test and unit test correctly and randomly pulled questions of a relevant competence level	PASS	GOOD
User friendly	PASS	GOOD
Shown Content Material were correctly displayed	PASS	GOOD
Seamless progression through system from basic to advanced level of competence.	PASS	GOOD

**Table-3 : Overview of feedback on the systems major components**

Users	User friendly	Pre Test	Module Test Features	Final Exam
High School Student	Yes	Good	Good	Good
University Student	Yes	Good	Good	Good
Education Official	Yes	Good	Good	Good

The high school and the University students as well as the Education officials tested the functioning of the package and found the system has been easy to use and also found the performance to be good. Some of the positive comments are that the students really liked the idea of Pre test before giving the course material as it tests the student's level. Students also liked idea of moving through the system at their pace either fast or slow. They appreciated the idea of making next course material available based on the module test performance only and not like the face to face teaching where the lecture keeps going even

though the student understands the material or not. Only in the assignments and midterm exam lecturer could know how much the students understood which is complemented here with module test after finishing each module. They were happy at being able to omit areas of a course that they were already competent in so that they could spend more time on the aspects not familiar or more difficult. Also students loved the idea of making all lower competencies course material available for view even though the student has good knowledge of the content as this allowed for easy review if necessary. On the negative side it was commented that system could be improved to allow the students to enter answers rather just restricting to multiple choice only. Also the course material should be made available as web based so any lecturer can use the software to add the material. Some lecturers were concerned about the awarding of marks to students for transcript purposes, if the student is able to repeat the tests as many times as necessary to allow the student to pass. The system should possess the facility for answering the queries raised by students too. Some students made the suggestions that allowing the system to be accessible via smart phones and other similar devices would make the software more marketable and truly any place, anytime, anywhere. Those respondents remarked that they often have internet on their phones but no fixed line internet. They could then retrieve the material on their phone and then transfer to the computer later. In general the high school, University Students and Education Officials liked all aspects of the system and their comments have been noted for future work in the area.

## 7. Conclusions

In conclusion from the user acceptance trials it is seen that the university students and Education officials did like the software and have give lot of positive criticism too to improve the system more to be available on smart phones. Also they have found the system quite interesting to get tutored online anywhere. For such Learning applications, normally we employ a human agent i.e. Tutor and Lecturer to disseminate the information to the students. But in an e-learning environment the availability of the human being becomes an issue as mentioned earlier. So we here have introduced the Agent based approach. But with the upcoming of mobile device availability and the internet connectivity is not a problem, as each device come with Wi-Fi technology and also broadband wireless internet is available everywhere. In the context, agent based m-learning seems to be a correct approach, wherein one can get tutored wherever he/she is through software agent and also the availability of internet is not a problem. The tutor

agent here possesses adequate intelligence to assess the student level and interact with the Teacher Agent for getting the required material for progressing in methodical fashion in the course. Teacher Agent gets the required material based on what the tutor agent reports.

The results of our research have been shown through the output screenshots and been reviewed too. Also system been experimented and tested with students in real time, to improve the learning and higher order outcomes in colleges/university for a course and got their feedback too. Last but no the least, we also propose to work on implementing answering queries raised by the student by means of Tutor or Teacher Agent and also pick questions from the question bank by setting level of difficulty. It is also proposed to test the system in regards to agent migration with different kinds of mobile devices with the upcoming of the smart phones too.

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