

INTERPLANETARY SPACE EXPLORATION

An "Interactive Learning Environment"

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Introduction :

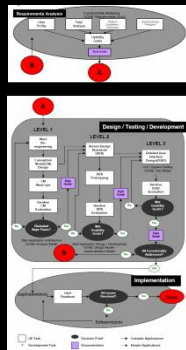
I have designed a prototype named "Interplanetary Space Exploration" (mentioned here as ISE). This work of mine is mainly to help the students to develop their own interest in space research in an interactive manner. In this prototype, I have focused on our solar system and illustrated its very basic facts. Since I am trying to encourage children age of 7 to 9 years old, I tried to make this tutorial full of multimedia functionalities including audio and video effects which makes the interactive educational prototype a successful teaching aid.

Literature:

This prototype covers the major learning theories. ISE Prototype contains five different modules. Each module is based on different learning theories such as behaviourism, cognitive and constructivism in education. While developing a learning environment, it is necessary to consider about the occurrence of learning process in an individual because each of them learns in a different way than others (Lee Dunn, 2000). It is also important to consider the various factors which influence the learning process such as intellect, emotions, desire, institution, imagination etc. and the activation of the same is important for an effective learning (Laird, 1985, p. 121).

Prototype Development Plan :

The prototype development plan is used to represent a life cycle model that captures a set of activities and how these activities are related to each other. A few life cycle models have arisen from the field of HCI (Human-Computer Interaction). They include the star lifecycle model and the usability engineering lifecycle model. (Preece, Rogers and Sharp, 2002). I used "Usability Engineering Lifecycle model" for prototype development.



Implementation:

1) Video Tutorials

Description: This module is based on behaviourism theory. The cartoon character of sun is developed to deliver the information in all videos.

Implementation: A 3D model of the sun is designed using 3D Max software. Character animation and lips synchronizing technique used for making animated character. The movie has been produced using story board in 3D Max and later exported into Director™.



2) Spaceship Simulator

Description: The "Spaceship Simulator" module is a virtual space exploration. This module is based on cognitive and constructivism theory.

Implementation: This module is designed in Director™ Lingo. Shockwave 3D is used as a 3D environment. Lingo script is used to navigate the space ship and to create the planets and their behaviors.



3) Game

Description: The purpose of the "Game" module is to give the children opportunity to test their knowledge which they have gained from other modules. This module is based on cognitive and constructivism theory.

Implementation: This module is designed in Director™ Lingo. The robot animation is designed in Flash™ and imported in Director™.



4) Encyclopedia

Description: The purpose of the "Encyclopedia" module is to add more help for the unfamiliar words.

Implementation: The XML file is used for data storage. The ISE prototype reads the external XML file. This XML file is stored on the server and can be downloaded at any time. With the help of Extra (XML Parser) Lingo commands parsed the XML file in Director™.



5) Quiz

Description: The purpose of the quiz module is to test the children knowledge about the subject. It is a highly interactive and entertaining module. This module is based on cognitive theory.

Implementation: The Quiz module is developed in Director™. Two animations used for feedback were designed in Flash™ and imported in Director™. The ISE prototype reads the external XML file, which contains all the questions data and the respective answers.



Prototype Testing:

> **Performance Testing :** The performance testing was carried out throughout the development phase. The aim of this testing is to test application's performance.

> **Structural Testing :** Is also known as "White Box testing". The main aim of this testing is to examine the code written in Director™.

> **Functional testing:** Is also known as "Black Box testing". The main aim is to test the functionality of the application.

> **Usability Testing :** User feedback is vital for good application development. The aim of this testing is to encourage the user to test the application and to get the feedback.

Analysis of Usability Testing:

Eight participants were chosen from different cultures and from different schools. This Usability testing was pre-planned and carried out in a formal way. Each participant was allocated a specific time where the evaluation was scheduled for 40 minutes. As soon as Usability Testing was finished, the Analysis of findings was carried out.

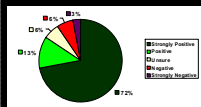
1) Visuals and Design

The evaluation data shows that 82% felt that the design of the prototype was eye-catching and their needs had been considered in the design. While 10% were unsure about the design and their needs.



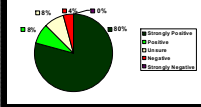
2) Transparency of Instructions

The participant's feedback was positive towards the instructions, 85% said that the instructions are very helpful to handle the prototype, without this it might be difficult to know what to do when we are on "Spaceship simulator" and "Game" module. Where as 9% response was negative as they said that it is still confusing what to do when we are on "Spaceship simulator" module. 6% were unsure about the instructions.



3) Easy to Use

The 88% response about the ISE prototype was it is very easy to use, 4% response was negative as they claimed that it's difficult to use the "Spaceship simulator" module. 8% of the response was unsure about the use of the ISE prototype.



Future Work :

The above attempt of designing the ISE prototype is just the beginning of an excellent "Interactive Learning Environment". The positive evaluation of the ISE prototype is an evidence of the above statement. And it is a very good example of the application of multimedia in delivering education. There is a lot of scope for the development of "Spaceship simulator" module such as implementing all the planets exploration, providing real time information like proportional distance, speed of spaceship etc., to give the indications of hazards which expected on the way i.e. create a radar simulator which identified the hazards like asteroids etc.

Conclusion :

An interactive ISE prototype was developed based on the research conducted. The objectives behind the development of this prototype are to generate interest in children about the space science and to develop an "Interactive Learning Environment". This will help the children to understand the topic more clearly and easily. The major learning theories which were discussed in literature were carefully studied and foremost research was done on the implementation of this theories. The applications based on these theories were reviewed. The positive feedback of the user testing proves that the objectives were satisfied. The success of the ISE prototype lies in its undoubted ability to contribute to the self learning through the use of enjoyable, interactive and motivating multimedia.