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Multimedia: An Effective Component in Digital Learning Environment

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Abstract

The Digital learning environment has been most powerful motivational force for both learners and teachers. It energizes the curiosity of student within the structured frameworks and reveals their own intellectual interests with the help of various components, like Multimedia and others. This technology has been power play of electronic media that embrace a set of standards for the creation and management of learning content in open market. This paper discusses the effectiveness of electronic media (like Multimedia), its various components and integrated framework.

1. Introduction

Intellectual excitement is probably the most powerful motivating force for students and teachers alike. Effective academicians are passionate about ideas. They stimulate the curiosity of their students, channel it within structured frameworks, and reveal their own intellectual interests. These structured frameworks are various digital or born digital components or may be non-digital material. In recent years digital media has influenced the education both in terms of what is taught, how the teaching is done and referred and how programmers are accredited. In Learning Environment, then it may be web based teaching, distance learning, electronic books and interactive (Digital) learning environments will play increasingly significant role in shaping what we teach, how we teach and how student learn.

In Learning Environment, Multimedia / Web-based multimedia represents itself in most compatible way. It means the way of representing the instruction, which involves more than one delivery media, presentation mode, and/or sensory modality. The basis for the use of multimedia is the assumption that when the user interacts within these various methods they learn more meaningfully. Recently, there has been an increase in the amount of multimedia research that is grounded in both theoretically grounded and educationally applicable.

2. What is Digital Learning Environment (DLE)?

A lot of terms are being used simultaneously in this field of research e learning, telelearning, virtual learning, Internet or web learning, and electronic learning environment and DLE.

We see e learning as the activities aimed at learning in which computers play a important role. One could say that this definition is also valid for Internet or web learning. But there is an important difference between the web (World Wide Web) and the Internet. The Internet is the network itself, and the web is the application of the Internet for, at this moment, mainly http/html-based communication.

2.1 A definition of Electronic / Digital Learning Environment could be:

> "*The technical infrastructure (hardware, software and tele and data communication facilities) that facilitate interaction between the process of learning, the communication needed for this learning and the organization of this learning.*" (1)

This description 'electronic' is little bit insufficient because it is not only electronic environment but also digital. It just considers the flash of facilitating aspect. When these aspects are perfectly arranged, there is just a *possible concept* DLE.

The above definition consist three aspects
- *Process of learning*
- *Communication needed for this learning*
- *Organization of this learning*

This definition is incomplete one because it has not mention the *content / object* aspect. It is the content / objects that adds learning to the environment. To sum it up, with above aspects to complete the definition of a DLE:

> "*The consistent entirety of hardware, software and educational content that supports the learning process, the organisation of that learning process and the communication about that learning process.*" (1)

2.2 Various Digital learning (DLE) Components

The components of DLE are following.
- Various Digital Assets (image, chart, formula, Presentation, etc.)
- E-mail
- Quizzes
- Multimedia
- Video Conferencing
- Tele Conferencing / Tele-course

- E-chat
- Internet Tuition
- Digital library / repositories
- Various open source / Commercial Software.

3. Defining Multimedia

Multimedia may be defined in multiple ways, depending upon one's perspective. Typical definitions include the following: (2)

- Multimedia is the "use of multiple forms of media in a presentation"
- Multimedia is the "combined use of several media, such as movies, slides, music, and lighting, especially for the purpose of education or entertainment"
- Multimedia is "information in the form of graphics, audio, video, or movies. A multimedia document contains a media element other than plain text"
- Multimedia comprises a computer program that includes "text along with at least one of the following: audio or sophisticated sound, music, video, photographs, 3-D graphics, animation, or high-resolution graphics"
- Multimedia is the use of several different media to convey information (text, audio, graphics, animation, video, and interactivity). Multimedia also refers to computer media (1).

4. Multimedia Framework

The basic principle of multimedia is to give a better Visualized environment from word and picture, sound than from word alone. The most important thing is that when presenting coupled text and images, the text should be embedded within the images. And with the help of animation and narration should provide coincide meaningfully way. Investigation says that, the effect of multimedia on learning and performance required a solid foundation in learning theory as well as the framework would be the

important one. Here, I try to describe the framework, which tells us how different system might work together and provides a visual representation of the components that make up an e-learning environment and the objects that must be moved among these components. The Multimedia is based upon three primary assumptions (2)

- Visual and auditory experiences/information are processed through separate and distinct information processing "channels."
- Each information processing channel is limited in its ability to process experience/information.
- Processing experience/information in channels is an active cognitive process designed to construct coherent mental representations.

5. Benefits of Multimedia in DLE (3)

Well-designed multimedia helps learners build more accurate and effective mental models than they do from text alone. Research studies showing potential benefits of well-designed multimedia, including:

- Alternative perspectives
- Active participation
- Accelerated learning
- Retention and application of knowledge
- Problem-solving and decision-making skills
- System understanding
- Higher-order thinking
- Control over pacing and sequencing of information
- Access to support information

6. Multimedia effects on learning (4)

Andy Hede (Professor of the University of the Sunshine Coast, Australia) offered the most widely and more generic model of multimedia has an

associative relationship between conceptual elements. For ease of clarification the element in the model can be grouped as follows.

> **6.1** Multimedia input
> (Three elements: visual input, auditory input, learner control);
> 6.2 Cognitive processing
> (Two elements: attention, working memory);
> **6.3** Learner dynamics
> (Three elements: motivation, cognitive engagement, learner style);
> **6.4** Knowledge and learning
> (Four elements: intelligence, reflection, long term storage, learning).

The model helps designers consider what factors are likely to make multimedia more or less effective for learning.

6.1 Multimedia Input:

The first group of elements contains the instructional material, which is accessed by the learner. Visual input can take the form of text, pictures, diagrams, video and animation. Auditory input can consist of narration or commentary, instructions, cues, and music and the learner control is input modalities for vision and hearing.

6.2 Cognitive Processing:

The next group of factors is those involved in processing the information accessed through the input sources. There are two elements namely, attention and working memory. Attention serves to focus the learner's concentration various level. The main processing takes place in working memory. There are a number of factors that affect the way working memory processes multimedia information. The final factor in working memory is that of cognitive linking which establishes referential connections between verbal and visual representations.

6.3 Learner Dynamics

There are three conceptual elements relating to learner dynamics. The first is motivation for which there is considerable evidence that it is a key variable in learning. It consists of two factors Extrinsic and Intrinsic, which gives the some initial incentive for learner to access the material. After that it leads to cognitive engagement which motivated learner to take a full control of their learning process. The third one is the learner style, which expose that in which depth the multimedia influence the learner. This third approach is based on the activity versus passivity of learners.

6.4 Knowledge and Learning

The final group of factors involves four elements, namely, (a) intelligence: (b) reflection, (c) long-term storage, and (d) learning. Among them the intelligence is multifaceted and more effective, which stimulate the multimedia package. The process of reflection relates to self-directed learning and entails learners thinking critically about their current knowledge and their learning strategies. The next step is storage important where one's knowledge is stored because it established the connection between new content and what is already known. That means different multimedia strategies varies with level of learner knowledge and experience of learner. The final element of multimedia learning model is learning process which comprises the immediate level of comprehension of material accessed through multimedia plus the ability to recall and apply one's acquired knowledge.

7. Various Digital learning Open Standards (5, 6)

E-learning as a technology enable learning that squeezes a range of electronic media. E-learning covers a wide spectrum of applications and processes, including computer-based learning, Web-based learning, virtual classrooms, and digital collaboration. It also covers the use of technology to enhance educational experiences. The contents in e-learning can be delivered in various ways, including the Internet, intranets, extranets,

satellite broadcasts, Web TV, portable digital assistants, eBooks, ePens and CD-ROMs (Multimedia).

In an ideal world, all organizations in the e-learning industry would embrace a set of standards for the creation and management of learning content, allowing active trading of reusable knowledge objects in open markets. But there are some challenges regarding the standards in e-learning industry.

- Technical standards for successful platform independence.
- A categorization system for classifying content into meaningful, easily accessible, and inter-related content areas.
- A categorization system for educational approaches and levels.
- Standards for tracking and managing the administration and delivery of instructional materials.
- Standards for testing and tracking learners' mastery of instructional content
- Standards for students' profiles.
- Systems for tracking students in terms of instructional materials.
- Systems for protecting the intellectual property rights of content providers.

These challenges can be met by adopting specifications/standards in the following. Here is the list of some open standard for Digital learning Environment. (7)

- OASIS Open Document Format for Office Applications (For office documents: .ott, .ots, .otp, .ptg, .otc, .otf, .oti, .oth)
- TXT, RTF (A text format: .txt, .rtf)
- HTML/XHTML (A markup language: .html)
- PDF (A document description format: .pdf)
- EPS (A document description format: .eps, .epsf, .epsi)
- TIFF (An image format: .tiff)
- JPG/JPEG (An image format: .jpg, .jpeg)
- PNG (An image format: .png)
- GIF (An graphics format: .gif)

- IGES (An graphics format: .iges Initial Graphics Exchange Specification)
- SVG (An image format: .svg Static Image Generated)
- CGM (An image format: .cgm Computer Graphic Metafile)
- FLAC (An audio format: Free Lossless Audio Codec)
- OGG Vorbis (An audio format: .ogg)

8. Conclusion

Technology-based innovations offer special challenges and opportunities in Digital Learning process. But many exciting applications of information technology in electronic era validate that new technology-based models of teaching and learning have the power to dramatically improve educational outcomes. As a result the society will move towards "island of innovation". But, we need such models, policies and practices, which will accelerate the proper usages of multimedia in DLE. I believe that systematic reform is not possible without utilizing the full power of high performance computing and communications to enhance the reshaping of society.

9. References

1. E-learning. *http://en.wikipedia.org/wiki/Elearning*
2. Multimedia Learning: Empirical Results and Practical Applications, *http://www.ftsm.ukm.my/th2723/A83723/ multimedia%20element.pdf*
3. The value of Multimedia in Learning *http://www.adobe.com/motiondesign/content/en/Think_Tank/The_Va lue_Of_Multimedia/The_Value_Of_Multimedia.pdf*
4. An Integrated Model of Multimedia *http://www.aace.org/dl/files/JEMH/JEMH112177.pdf*
5. File formats. *http://www.formatguide.com/fileformat/fileformat.asp*
6. Open formats. *http://en.wikipedia.org/wiki/Open_format#Examples_of_open_form ats*
7. E-learning Standard. *http://www.itsc.org.sg/synthesis/2000/itsc-synthesis2000-kinchew-elearning-standards.pdf*