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Information Communication and Technology Tools for Education and Learning by Animation and Multimedia Learning System

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Abstract
The purpose of this paper aims to bring together the findings and key points from a review of significant part of the available literature associated with ICTs for effective learning and teaching and ICTs in Education. This review set out to understand this thesis works in a simple way, the following basic concepts such as Education, Memory and Learning, Attention, Sensation and Perception, Learning and Teaching, multimedia and Learning, Multimedia Learning System are very useful. This section explains the basic aspects related to this research work.

Keywords : ICT Tools, Education, Memory and Learning, Multimedia and Animation, Memory, Sensation and Perception and Etc

1. Introduction

Research on various aspects of the multimedia learning materials such as animation, sound, graphics, interactive video and its impacts on learning has been conducted. For the development of any comprehensible educational system, the learning materials and methodology play a very important role. The students' inner psychology is an integral part of any learning system aiming at personalized information material delivery. Personalized information material delivery can be described as a process of building the learning materials according to the students' personal inner psychology, his/her behavioural aspects, goals, likes and dislikes. The inner psychology of a student is generally represented in the form of his/her intelligent quotient, emotional quotient, personality, stress and attitude quotient. The research works differ in the way they represent the student psychology, how they update the student's inner feeling and the teaching–learning strategies they adapt for providing the personalized information learning materials.

In this research, a simple multimedia learning system for learning is also investigated. It focuses on the 3-D animation attributes in the learning materials and its impacts. The 3-D Animation materials' impact, learner's differences and the learner's current state of inner mind are studied. To allow the multimedia learning system to remain comprehensible, the basic structure of our system based on the design principles and user interface technology is used. In this chapter, we have discussed the related work on various aspects of the learners' personal factors, attributes, such as video, sound, graphics and 3-D Animation.

2. Basic Concepts

To understand this thesis works in a simple way, the following basic concepts such as **Education, Curriculum, Memory and Learning, Attention, Sensation and Perception, Learning and Teaching, multimedia and Learning, Multimedia Learning System** are very useful. This section explains the basic aspects related to this research work.

2.1 Education

The word "education" is developed from the Latin word "educare, educere and educatum". It means "to bring up-to lead-act of teaching and training". The Latin words "educare" and "educatum" mean growth from outside. Educere means growth from within.

Swami Vivekananda said that "education is the manifestation of divine perfection, already existing in man". According to him "the aim of all education, all training should be man making… we want that education by which character is formed, strength of mind is increased, the intellect is expounded and by which one can stand on one's own feet. What we require is "life-building, man-making and character-making education". He expected education for the following reasons:

- Character building
- Self-reliance
- Serving fellow human beings
- Developing brotherhood
- Physical development

Though Vivekananda would acknowledge the value of the various methods of education, he deemed concentration is the method of education. At the level of classroom teaching, he emphasized the need for the use of audio-visual aids. He enthusiastically approved the application of educational technology in the spread of literacy and knowledge. According to Aristotle, education is "the creation of sound mind in a sound body. It develops man's faculty, especially his mind so that he may be able to enjoy the contemplation of supreme truth, goodness and beauty of which perfect happiness essentially consists". According to Ross, "philosophy and education are the two sides of the same coin; the former is contemplative while the latter is the active side".

Philosophy

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Goals of life

Aims of education

Curriculum Method of teaching Discipline Role of teacher

Every educational system must have some goals. The educator selects the material for instruction and determines the methods or procedure for the attainment of those aims. Philosophy formulates what should be the end of life, while education offers suggestions how this is to be achieved.

According to Mahatma Gandhi, education is "an all-round drawing out of the best in child and man's body, mind and spirit". All round development—physical, intellectual, aesthetic, moral and spiritual—and not mere literacy is the true goal of education. He emphasized crafts as an essential part of curriculum and expected it not only as an additional subject but also as the medium of education. During his curriculum, craft was the medium of instruction. It was called as craft-centred education (Nag, 2011). Craft Work in School ,the Modern educational thought is practically unanimous in commending the idea of educating children through some suitable form of productive work. This method is considered to be the most effective approach to the problem of providing an integral all sided education (Meenu, 2013).

2.2 Curriculum

Curriculum is the means through which we realize the aims through education. Aims are determined by philosophy and the curriculum differs depending on the individual's interest. Naturalists select the subjects, according to the present needs, interest and activities of the child. It is called child-centred curriculum. Idealists select the subjects, according to higher needs. Realists select the subjects, according to vocational needs and scientific

discipline. Pragmatists select subjects according to a life-centred approach.

According to International Society for Technology in Education [ISTE], curriculum integration with the use of technology involves the infusion of technology as a tool to enhance learning in a content area or multidisciplinary setting. Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyse and synthesize the information, and present it professionally. Technology integration is the use of technology tools in education in order to motivate students to advance their technological skills, analytical problem-solving skills and provide them with a good learning experience. Technological Pedagogical Content Knowledge [TPACK] framework has to be considered to attain the overall learning objective.

According to cognitive psychologists, "learner–content interaction is perhaps the most important endeavour of instructional technology", whereas constructivism psychologists views "learner–instructor and learner–learner interactions are more important than learner–content interaction. According to Razavi et al. (2005), "educational technology covers instructional technology and it is broader area than instructional technology". According to his view, "instructional technology covers two major areas: teaching technology and learning technology". Constructivism psychologists view educators as "facilitator, collaborator, curriculum developer, team member, community builder, educational leader and information producer". Technology can be a powerful tool for transforming learning. It can help affirm and advance relationships between educators and students, reinvent our approaches to learning and collaboration, shrink long-standing equity and accessibility gaps, and adapt learning experiences to meet the needs of all learners (Arne et al,2016).

2.2 Memory and Learning

Memory is the power of the nervous system to recall any information. It is very important because if there was no memory, there would be no learning. It is the power to remember the stored information that has been learnt. It is a series of things happening one after the other. Remembering is a process that must be leaned, just like talking, identifying music and colours. Re-learning and visualizations are a good method to improve the memory. Educational psychologists have classified the stages of memory process into three main categories. They are sensory memory, short-term memory and long-term memory.

Sensory memory is a simple type, which works only as long as the sensing organs experience it. For example, if we were looking at a book, we would remember it only as long as it is in front of us. Sensory memory denotes several types depending on the source of sensory information. Iconic memory reflects information from our visual system [eye]. Echoic memory stores information through our ears. Regardless of the individual differences, sensory memory is able to store information for a very short period. Short-term memory can help us recall things a little longer. Most cognitive researchers believe that information in short-term memory is lost after 15 to 25 seconds, unless it is transferred to long-term memory. Long-term memory storage part, hypothalamus, is the main place of the memory. It can hold an unlimited amount of information. It is our cognitive system for storing and retrieving information. Long-term memory allows us to retain large amounts of data for a very long period of time. In 1885, a German psychologist conducted the first experimental study in the field of memory. He found that by using the common method of memorizing, we forget 40 percent within twenty minutes and 75 percent within a week. In 1968, Atkinson and Shiffrin developed a model of memory and named it "modal model" of memory. They noted that both human and computer memory must accomplish three basic tasks: (S. Shiyam Sundar et al, 2004), encoding and converting information from the source and be stored into memory; (Lloyd P. Rieber (1991), storage-retaining the information over a period of time; and (Chen Yi, 2010) retrieval-locating and assessing required information.

We tend to forget the information because of the following reasons:

1. interference
2. retrieval failure
3. motivated forgetting—repression
4. constructive process

Memories are recalled through a process of "retrieval". The process of remembering can actually be divided into four steps:

1. attention and selection
2. encoding
3. storage
4. retrieval (C.T.Mor, R.A. King 1987)

2.4 Attention

Attention is an ability to concentrate, and it varies from one individual to other depending on various conditions. Attention is classified into selective attention, divided attention and atomicity. It plays a very important role in memory and learning. All our sensory organs absorb information from various sources. At any given learning time, our brain is exposed to hundreds of messages that need its attention. But the brain cannot process all these messages at the same time. We make choices to the learning material either consciously and unconsciously. Attention and selection play a very important role in memory. Attention is a process of readiness for response. What we select depends on what is important to us. We call this selective attention. Factors such as loud noise, bright light, size, contrast, unusual patterns, movement and novelty influence the selective attention. Attention depends upon motives, expectations and needs. Reading is a very important cognitive skill involving words, symbols and meaning. An eye movement study helps us to understand the process of visual perception.

Concentration or paying attention is an ability that can be developed to any extent. Reading story books effortless and interesting and automatically holds our attention. Constant attention in learning in curriculum and subject will bring an unexpected achievement. Interest is an important starting point for concentration and attention. Several educational researchers have conducted studies to analyse the importance of attention and concentration for effective learning. Continuous attention is a matter of mental discipline. Chesterfield said "the power of applying an attention, steady and undissipated, to a single object, is the sure mark of a superior genius,". The ease with which we remember and recall depends on how forcibly the learning content to be remembered is impressed on our mind to begin with. As knowledge can only reach through the senses, it is important to see that they are keen. Senses are capable of recording and capturing only a small fraction of the messages from the learning environment. Learning about the selective attention and selective perception is important to study about the learning materials' impact. Interest and memory are interlinked. It is not only easy to remember thing in which we are interested. It is remarkably difficult to forget them. To remember a lesson, it must be strongly registered in the mind. Interest in the lesson, learning and intense concentration are the main factors. Three-dimensional animation material develops interest to study further.

2.5 Sensation and Perception

Sensory organs are the means of human knowledge and help in receiving the information. Sense organs are eyes [visual sensation], ears [auditory sensation], nose [smelling sensation], tongue [tasting sensation] and skin [touch sensation]. Humans perceive objects, persons, events etc. through their sensory organs.

Figure 2.1: Visual and auditory stimulation

Sensation is the immediate result of a sense organ being acted upon by appropriate stimuli. Stimulus may be visual, auditory, odour, taste and tactile in nature. Receptors are capable of capturing different types of environment stimulus. The stimuli are energy waves. They are transferred by the sense organs into pulses of energy in the nervous system. This study suggests that a short presentation of auditory and visual stimuli, oscillating in the alpha range, have an analgesic effect on acute laser pain, with the largest effect following the 10-Hz visual stimulation. Pain reductions following stimulation in the alpha range are independent of sleepiness, anxiety, and negative moods(Ecsy K, 2016).

Perception

Perception is a psychological process in which the sensory inputs received from the sense organs are processed, organized and interpreted based on the experiences of the organism so that the nature of the stimuli is understood. Visual perception plays a very important role in digital media learning. Perception is an important cognitive process. It is influenced by the following:

(i) Characteristics of the object like contrast, intensity, movement, repletion, novelty and
(ii) Characteristics of the person like personality, stress, intelligence quotient, emotional quotient, motivation and learners' attitude.

2.5 Learning and Teaching

Learning is essentially a natural process—a process of growing. The purpose of teaching is to help the students to learn. Effective teaching and learning depends on understanding the nature of the learner, learning process and learning situations. Learners varies from each in terms of their personalities, intelligence level, stress level, motivational level, emotional intelligence level, social intelligence level, attitude level and psychomotor ability level. Everyone has a unique genetic makeup and environment. The process of understanding the world is through perception and through the memory. The interest of the learner and readiness level of the learner make learning process quickly and effectively. The main purpose in learning situations is to provide conditions that will enhance the learning process and promote acquisition and retention of the material learnt.

The learning conditions include the following:

[1] Organization and presentation of materials
[2] Learning activity
[3] Guidance and testing
[4] Emotional and social state for learning

The learning process between two learners is different. The one who wishes to be an effective educator needs to understand the great similarities in human beings as well as to recognize the specific differences that exist between individual learners. Individualization of instruction provides learning instruction to each individual learner according to their interest, intelligence, attitude and need. Mayers et al. have proposed the active learning methodology in 1993. According to their research, the following results are obtained:

1. Students retain 70% of the learning information in the first 10 minutes of a lecture. But they retain only 2% of the content in the last 10 minutes.
2. Students are not active and attentive [selective attention and perception] to what is being taught in a lecture 49 % of the time.
3. Four months after taking the introductory lesson students know only 8% more than the students who had never studied the lesson (Wang, 2005).

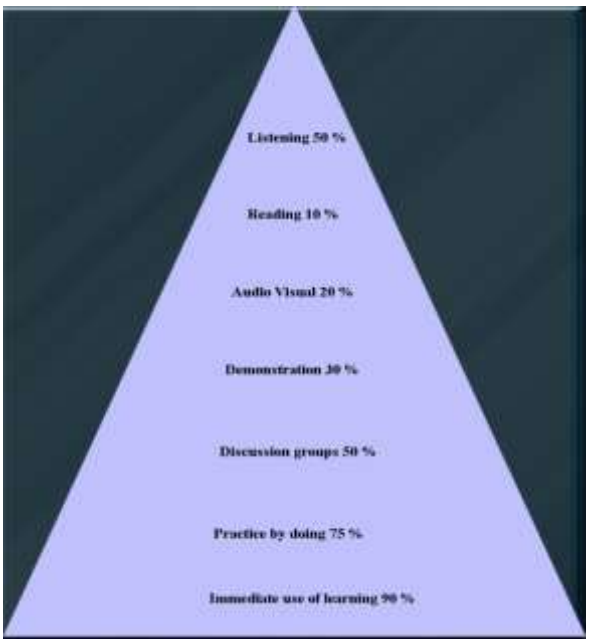

Figure 2.3: Active learning methodology pyramid

3 Multimedia and Learning

Multimedia is a technology used to send and receive information better. It includes graphics, audio, 3-D Animation, digital video, interactive programs, 2-D illustration and any other computer-delivered media. Multimedia has different media [e.g. text, audio, graphics, Animation, video and interactivity] to deliver and convey information. It refers to the use of computer to create, store and experience multimedia content. As the information is presented in various formats, multimedia enhances user's interest and makes it easier and quicker to grasp information. It finds its application in various fields, including art, education, entertainment, engineering, medicine, mathematics, business and scientific research. It is the combination of any of the digitally manipulated text, photographs, graphic art, Animation and video elements.

Educators in the 21st century must apply new digital communication devices in order to teach effectively. Blackboard teaching and text books methods, which were practised in the past, are not sufficient for new digital age learners. Wireless communication devices, multimedia devices, virtual reality, language tools, email, CD, DVD, interactive video, teleconferencing and satellites play a vital role in the development of communication. According to Divjak et al. (2004), multimedia and virtual reality offer great and new possibilities of learning that cannot be experienced in class room. Information technology includes computers and its related technologies, Internet, video conferencing and Web conferencing. ICT has a set of tools that can provide the right information at the required time. Digital technology helps us to prepare learning material for interesting learning strategy.

4 Conclusion

The uses of ICT tools in education have a positive effect on teaching and learning. ICT can affect the delivery of education and enable wider access to the same. In addition, it will improve the subject knowledge for slow learners. Learners can access the education regardless of time and geographical barriers. It would provide the flexible environment for teaching learning process which seems to have a profound impact on the process of learning in education by offering ICT and new technologies for learners and teachers. These possibilities can have an impact on student good performance and achievement. Similarly wider availability of best practices and best course e- material in education, which can be shared by means of ICT, can foster better teaching and improved subject knowledge of students. The overall literature suggests that successful Information Communication and Technology and new technologies integration in teaching and learning.

References

1. K. Nagarajan et al, (2011), "Psychology of learning and human development", Ram Publishers
2. Meenu Singla, "Study of Ward h a Scheme of Education by Gandhi Ji" , JRPS International Journal for Research Publication & Seminar Vol 02 Issue 04 March 2013
3. Arne Duncan et al., "Future Ready Learning –Reimagining the Role of Technology in Education" U.S. Department of Education, January 2016.
4. S. Shiyam Sundar et al, (2004), "Arousal, Memory and Impression-formation effects

of Animation speed in web advertising" Journal of Advertising- Springer

5. Lloyd P. Rieber (1991), "Animation, Incidental learning and continuing motivation" American Psychological association
6. Chen Yi (2010), "Research and Implementation of multiserving-oriented mobile learning application based on eLML" ICCASM
7. Ecsy K[1], Jones AK[2], Brown CA[3],´ Alpha-range visual and auditory stimulation reduces the perception of pain", Pub Med, US National Library of Medicine National Institutes of Health
8. Wang, A.J.A et al, (2005), "Encouraging Active Learning through Multimedia & Interactive Courseware" IEEE transactions, October
9. Gail A. Dawson, "Integrating Emotional Intelligence Training Into Teaching Diversity", College of Business, University of Tennessee Chattanooga, 2015.
10. John D. Mayer , Peter Salovey and David R. Caruso, "Emotional Intelligent", American Psychologist, 2004.