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IS THERE A TEACHER IN THIS CLASS? INFORMATION PROCESSING, MULTIMEDIA AND EDUCATION

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Abstract: This paper proposes to discuss the concept of multimedia using information processing theory in ICT enabled teacher education in the context of a knowledge society. The Information and communication technology (ICT) competencies required of teachers related to content, pedagogy, technical issues, social issues, collaboration and networking remain crucial in shaping the new global economy and producing rapid changes in society. Information Processing (IP) models share an orientation toward the information processing capability of student and the ways they can improve their ability to master information. Problem solving strategies give students opportunities to think rationally, understand intellectual processes and practice intellectual skills. The problem solving method assumes that students are active participants in the construction of new knowledge rather than passive receivers. Using a computer the students can get access to audio, video and further information. This interactivity encourages problem solving. Multimedia helps the process of stratification on mind which moulds the mind for receiving various aspects of a term or process through multiple assimilations. The attempt here is not to state that teachers can be asked progressively to disappear from the scheme of things, but to emphasize that multimedia adds to their kit of resources in the days to come. Students can find a space in the class room when they solve problems all by themselves with the help of ICT.

Zusammenfassung (Auszug): Dieses Papier hat vor, die Vorstellung von Multimedia zu besprechen, die die Information verwenden Theorie in ICT ermöglichte Lehrer-Ausbildung im Zusammenhang einer Kenntnisse-Gesellschaft bearbeitet. Die Information und Nachrichtentechnologie (ICT), den Lehrer erforderliche Befähigung verband, um, Unterrichtsmethode, technische Probleme, soziale Probleme, Kollaboration und der Netzwerkanschluss zu befriedigen, bleiben entscheidend im Formen der neuen Weltwirtschaft und des Produzierens schneller Änderungen in der Gesellschaft. Das Verwenden eines Computers die Studenten kann Zugang zur und weiteren Audiovideoinformation bekommen. Diese Zwischentätigkeit ermutigt das Problem-Lösen. Multimedia helfen dem Prozess der Schichtung auf der Meinung, die die Meinung formt, um verschiedene Aspekte einer Frist oder Prozesses durch vielfache Assimilationen zu erhalten. Der Versuch ist hier nicht festzustellen, dass Lehrer progressiv gebeten werden können, vom Schema von Dingen zu verschwinden, aber zu betonen, dass Multimedia zu ihrem Bastelsatz von Mitteln in den Tagen beitragen, um zu kommen.

Key words: Information processing theory, problem solving, multimedia

1. Introduction

This paper proposes to discuss the concept of multimedia using information processing theory in ICT enabled teacher education in the context of a knowledge society. Higher education with the advent of diversified means of technology enabled systems makes it imperative for the teacher to become a mentor, facilitator, co-learner and techno-savvy. The 1998 UNESCO World Education Report, teachers and teaching in changing world, describes the radical implication information and communication technologies have for conventional teaching and learning. It predicts the change of teaching learning process and the way teachers and learners gain access to knowledge and information. For many teacher education programmes require the acquisition of new resources, expertise and careful planning. The

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Information and communication technology (ICT) competencies required of teachers related to content, pedagogy, technical issues, social issues, collaboration and networking remain crucial in shaping the new global economy and producing rapid changes in society. When implementing the pedagogical competencies for making use of multimedia, the local contexts and the individual approach of the teacher linked with that of their subject discipline must be paramount. Multimedia involves the use of several types of media such as text, graphics, audio, animation and full motion video. The power of multimedia is its capability of integrating technology with interactive components which engage the user in the process.

2. Information Processing and Problem Solving

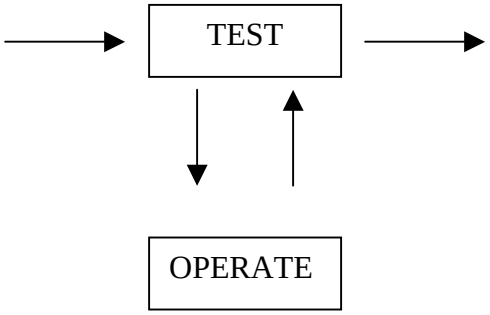
In this context it is worth while to look into the evolution of the concept of information processing which has taken ideas from various sources. Bruce Joyce and Martha Weil have developed more than twenty models which are grouped on the basis of their chief emphasis- the way they approach education goals and means. They have organized these models into the following four families;

1. Information Processing models
2. Social Interaction models
3. Personal models
4. Behaviour Modification models

Information Processing (IP) models share an orientation toward the information processing capability of student and the ways they can improve their ability to master information. Some IP models are concerned with the ability of the learner to solve problems and thus emphasize thinking; others are concerned with general intellectual ability. A large number emphasize concepts and information derived from the academic disciplines.

MODEL	MAJOR THEORISTS	GOALS
Inductive thinking	Hilda Taba, Richard Suchman	Development of Inductive mental processes
Scientific Inquiry	Joseph J Schwab	Teaching research system of a discipline
Concept attainment	Jerome Bruner	To develop inductive reasoning
Cognitive growth	Piaget, Sigel, Sullivan	To develop logical reasoning
Memory	Jerry Lucas	Capacity to memorize
Advance Organizer Model	David Ausubel	Information processing capacities

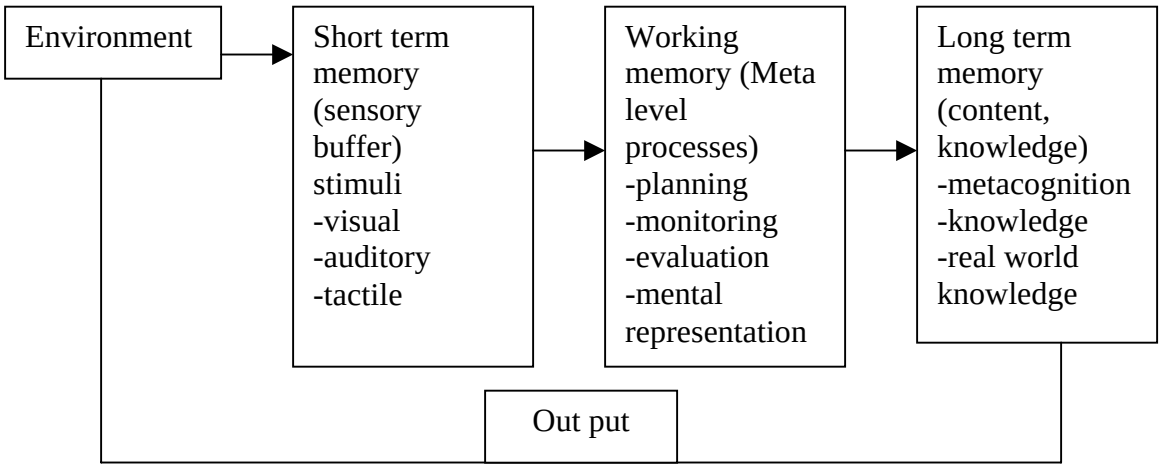
George A Miller has provided two theoretical ideas that are fundamental to cognitive psychology and the information processing framework



The first concept is chunking and the capacity of short term memory. Miller (1956) presented the idea that short term memory could only hold 5-9 chunks of information (seven plus or minus) where a chunk is any meaningful unit. The concept of chunking and the limited capacity of short term memory became a basic element of all subsequent theories of memory.

The second concept is TOTE (Test-Operate-Test-Exit) proposed by Miller, Galanter and Pribram (1960). Miller et al suggested that TOTE should replace the stimulus-response as the basic unit of behaviour. In a TOTE unit, a goal is tested to see if it has been achieved and if not an operation is performed to achieve the goal. The TOTE concept provided the basis of many subsequent theories of problem solving and production systems.

In 1958, Newell, Simon and Shaw introduced a new theory of problem solving based on concepts of Information processing and computer programming. They argued that humans process information in exactly the same way as computers do and considered this processing of information as the influencing step between inputs and outputs. The IP theory states that similar to a computer program where the postulated details of a precise set of mechanisms are described in a formal programming language to account for the observed behaviour, the problem solving process consists of what human subjects do under experimental conditions while solving problems and these activities are hierarchically and sequentially organized as in a computer program. Problem solving strategies give students opportunities to think rationally, understand intellectual processes and practice intellectual skills. The problem solving method assumes that students are active participants in the construction of new knowledge rather than passive receivers. The process of problem solving requires students to identify and define a problem, select or design possible solutions, test trial solutions, evaluate the solutions and reuse or redesign the steps if required. A recent model of IP emphasizes the role of memory in information processing and states that humans construct symbolic representations of the world through IP. Memory consists of three parts: the short term memory, the working memory and the long term memory.



(Source: Muijs Daniel and Reynolds David, 2001)

An individual experiences the environment through senses which are registered as visual, tactile and auditory stimuli in the sensory buffer. These are then converted into a form in which they can be used in the working and long-term memories. The sensory buffer can register a lot of information but can hold this information only for a short time. Some part of the information in short time memory is lost and some part is transmitted to working memory. Thinking takes place in the working memory phase. Working memory receives its content from the short term memory and long term memory but has a limited capacity for storing information. Working memory contains the information that is actively being used at any point of time. Long term memory consists of nodes which represent chunks in memory and the neural network which represent connections between these chunks or nodes. These nodes can be equated with concepts and links with meaningful associations between concepts. Together they form the schemata or cognitive maps. Activating one item of the cluster is likely to activate all of them. This theory describes the processing of information at the symbolic level. It does not however consider analysis at neurological level.

Computer Aided Learning (CAL) improves learning only when it

- identifies a real pedagogic problem
- is accompanied by a pedagogic theory of how an educational intervention is solution to pedagogic problem
- is a good example of CAL design
- involves skilled administration of teaching and learning using technology
- is accompanied by evaluation and demonstration of the resulting learning gains (Mohanty & Vohra, 2006)

3. Multimedia and Learning

CAL is not to be seen as replacement of traditional methods of teaching and learning but as a reinforcement of concepts taught in lectures. Using a computer the students can get access to audio, video and further information. This interactivity encourages problem solving. While it may take many dedicated human hours to master a foreign language, CAL can provide the context to students, record their

conversation, and play it back to them later. This way a student can understand where he/she went wrong and how to rectify mistakes.

Multimedia helps the process of stratification on mind which moulds the mind for receiving various aspects of a term or process through multiple assimilations. Stratification of mind vividly creates a platform for receiving information through multiple assimilations. We can categorize the steps in multiple assimilation process as follows;

Introduction of a concept (threshold stage)

Stratification of mind

Encoding of quantum of information

Stabilization of information

Multimedia is a highly effective tool in the first stage of multiple assimilation process i.e. introduction of a concept. In this threshold stage of learning we can interpret as initiation of learning any tangible or intangible concepts or process. The process of stratification begins from the virtual class. If the concept is simple, the process of stratification also is very short. After the completion of stratification process, each stratum is ready for receiving the fragments of information which we precisely call the encoding of quantity of information. The concept of accommodation by Piaget is highly significant here. Eventually the strategies of stabilization of information are materialized.

4. Conclusion

Summing up certain benefits need to be underscored. They include

- Sustained motivation if the multimedia component is less complicated.
- Interesting packages can change students into players rather than spectators.
- The medium will respond fast to the learners
- It can integrate various disciplines.
- It can be customized as per the needs of the students
- It can be more inclusive than being exclusive
- Updating of information possible

The attempt here is not to state that teachers can be asked progressively to disappear from the scheme of things, but to emphasize that multimedia adds to their kit of resources in the days to come. Students can find a space in the class room when they solve problems all by themselves with the help of ICT. The discussion on IP has proved the point that the thinking pattern of students can go in tandem with the new emerging situation in the field of education.

Literature

[1] Daniel Muijs and Raynold David 2001, *Effective Teaching: Evidence and Practice*, Paul Chapman Publishing, London.

[2] Miller, George. A. The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological Review*, 63, 81-97.

[3] Miller, George. A, Galanter, E, and Pribram, K.H. 1960, *Plans and the Structure of Behaviour*. New York. Holt, Rinehart and Winston.

[4] Mohanty, Laxman and Neharika Vohra 2006, *ICT Strategies for Schools*, Sage Publications India, New Delhi.

[5] NCERT 2006, *Constructivist Approaches to Teaching and Learning*, NCERT, New Delhi.

[6] Newell, A, Shaw, J.C, Simon, H.A.1958, *Empirical Explorations of the Logic Theory Machine*: *A Case study in Heuristics*.

[7] Weil, Martha and Joyce, Bruce 1978, *Information Processing Models of Teaching*, Prentice Hall, Inc, Engle woods Cliffs, New Jersey.

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