The Theme: Tashkent is the capital city of Uzbekistan.

By Tyulkina Lyubov

Content

INTRODUCTION

The term Multi-Media, which was used during the 1970's to describe a particular theatre-based film and slide-show collage experience, has now been shortened to just the word "multimedia". From the mid 80's through the late 90's, the prevalent meaning of multimedia was a category of "authoring" software that allowed designers to develop interactive computer programs without having to have advanced programming skills. This category of software still exists, and is sometimes referred to as multimedia, but the term is now used to more generally describe nearly every hardware or software technology that displays images or plays sounds. Multimedia today refers not only to what is presented through computers, but also through the composition of text and illustrations in print media[1].

Different definitions of multimedia have been proposed. Gayeski defines Multi-media as a class of computer driven interactive communications systems which create, store, transmit and receive textural, graphic and auditory networks of information [2]. Hughes considers that multimedia is the combination of time-based media, such as voice, animation, and video, along with space-based media, such as text, graphics, and images [3]. Wiburg defines two important subsets of multimedia, hypertext, which is software consisting of networks of related fields that can be accessed randomly by icons or search strategies, and hypermedia, which adds video clips, graphics or audio files to hypertext [4].

The use of multimedia in learning has been growing rapidly. The explosion of this use has been attributed to the assumption that multimedia helps people to learn[5]. Some studies have shown that multimedia can help people learn more information

1. Juan Ignacio Moreno, juani.moreno@upct.es
2. Gayeski, D.M., *Multimedia for learning,* Englewood Cliffs, New York, 1993, 4
3. Hughes, C., in Fibiger, B, "Multimedia - what is it all about", *http://imv.au.dk/semiotics/modul_1/sctn_1.htm*, (visited 15/04/2006).
4. Wiburg, K., "Becoming critical users of multimedia", *The Computing*

Teacher, 22, 1995, 59-61
5. Najjar, L.J., "Multimedia Information and Learning", *Journal of Educational Multimedia and Hypermedia*, 5, 2, 1996, 129-150

better than traditional classroom lectures [6].Several factors have been attributed to the success of multi-media in helping people to learn. First, parallelism between multimedia and the natural way in which people learn, second, information in multimedia can be presented in a non-linear format and third, multimedia can be more interactive than traditional classroom lectures.

Development of interactive virtual learning courseware has focused largely on the instructional design approach of multimedia applications and has brought about a substantial amount of success in producing engaging multimedia educational resources. The process of design of multimedia instructional material to producing effective learning needs to be guided by researched based theories about the nature of leaning. This paper studies the contribution of different learning theories to the design of teaching multimedia materials of high pedagogical value applicable to virtual engineering education.

Multimedia courseware in teaching and learning and its correction

Today, the rapid development of information technology for education and teaching means, and methods to provide the conditions for change. Use of multimedia courseware teaching, has become a modern teaching a new teaching method. However, I know by observation found in the majority of educators to actively explore the use of multimedia courseware for teaching science at the same time, there are some parts of Multimedia Courseware into the misunderstanding, if not corrected, will certainly affect the development of information technology education and teaching quality improved. I talk a superficial understanding of this and recommendations.

Multimedia courseware in teaching and learning

Misunderstanding one: courseware universal, stylish with courseware. Only use of multimedia teaching course is a good lesson, not by holding classes of multimedia teaching is not power plate, especially in the opening of public courses such as teaching classes to observe activities especially.

6. Bagui, S. "Reasons for increase learning using multimedia", *Journal of Educational Multimedia and Hypermedia*, 7,7, 1998, 3-18.

Multimedia courseware for teaching is not to the actual needs of teaching, some lessons can and should use more direct means of teaching is not intuitive, but turning it into a virtual means, the truth is in front, swing show, the multimedia courseware understanding of the nature of the role of knowledge into the errors.

Misunderstandings two: Courseware inclusive, all-encompassing. The teaching materials, information, writing on the blackboard all move into the multimedia content, teach those who just knocked on the keyboard in class, little mouse, waved his wand e-education, and some even operate the entire class does not leave the projector unit half a step, at best show only one electronic lesson plans, became a full house "electric irrigation", which is into the use of multi-media courseware diagram easily, effort and the error.

Misunderstanding number three: courseware design limitations, one-sided. Class Design and emphasis on technical aspects of information operations, neglect pedagogical level. Some people do not produce their own courseware and invited others to help create, the lack of communication and integration, the results of the courseware system and the professional, the subject is far from teaching objectives and requirements, can not reflect the religion's teaching ideas, teaching intentions, teaching literacy and style. This is the idea of formation of multimedia courseware links misunderstanding.

Misunderstandings number four: Courseware Hu in fancy. Add items caught up, easy to operate, interface display clear, custom design, background music set off so overwhelming and color scheme improperly, less than dynamic, interactive, intelligence is not strong, and so on, are not fully reflect the characteristics of multimedia teaching and advantages. Obviously, this is step into the production technology of Multimedia Courseware, methodological errors.

Second, correction of errors Multimedia Courseware

A clear understanding of the nature of multimedia courseware, role, and actively teaching appropriate use of multi-media courseware.

Multimedia Courseware large, with information on the comprehensive, dynamic and interactive, have become a new bright spot in the classroom teaching. However, the use of courseware teaching practices from the level of theory, after all the problems, not an end in itself, but rather a means of teaching, is teaching the carrier and manifestations, therefore, can not use the courseware as universal subjects Division, were prepared panacea. Whether the use of multimedia courseware teaching, should be considered the needs and possibilities of teaching decisions and should not be made under the provisions of certain lack of, or made unrealistic demands. In general, large amount of multimedia information, the information integrated and interactive, able to complex things simple, the abstract into concrete, is more suitable for liberal arts and basic theory of science and engineering research. But science and engineering, apart from some of the unsafe and difficult to operate a successful experiment, in the case to the professional teaching practice that is part of the operation of a switch virtual link, use the courseware teaching the blind pursuit of the "new" and "strange " fashionable ", it is not proper**.**

Several factors have been attributed to the success of multi-media in helping people to learn. First, parallelism between multimedia and the natural way in way in which people learn, second, information in multimedia can be presented in a non-linear format and third, multimedia can be more interactive than traditional classroom lectures.

Development of interactive virtual learning courseware has focused largely on the instructional design approach of multi-media applications and has brought about a substantial amount of success in producing engaging multimedia educational resources. The process of design of multimedia instructional material to producing effective learning needs to be guided by researched based theories about the nature of leaning. This paper studies the contribution of different learning theories to the design of teaching multimedia materials of high pedagogical value applicable to virtual engineering education.

In the current teaching, there does not consider the use of multimedia courseware for teaching the practical needs of teaching is only window dressing to create the surface effect of the tendency of formalism is entirely due to a number of local educational administration, the availability of multimedia courseware as a measure of a class an important basis for the scientific success of the evaluation-oriented mechanism. Teaching in all subjects, teaching effectiveness should be based on the principles and purposes of the application of advanced technology, the reality of teaching, actively teaching appropriate use of multimedia courseware. Should have a positive use of multimedia and traditional teaching media relations, to overcome the courseware universal, multi-media monopoly class phenomenon, so a variety of teaching methods, methods of application to achieve a harmonious and efficient. Specifically the use of multimedia courseware for teaching purposes, improve teaching efficiency and quality efforts.

Multimedia user interfaces combine different media such as text, graphics, sound, and video to present information. Due to improvements in technology and decreases in costs, many human factors engineers will soon find themselves designing user interfaces that include multimedia. Since many educators, parents, and students believe that multimedia helps people to learn, one popular application of this technology will be the field of education**.**

Unfortunately, the existing educational multimedia user interface design guidelines are almost entirely based on the opinions of experts rather than on the results of empirical research. This gives us a weak foundation for making design decisions and slows progress in making educational multimedia user interfaces more effective[7].

7.Allen, W. H. (1974). Media stimulus and types of learning. In H. Hitchens (Ed.), Audiovisual instruction (pp. 7-12). Washington, DC: Association for Educational Communications and Technology.

Chapter I Learning theories and multi-media learning.

Multimedia instructional environment are recognized to represent a great potential for improving the way in which people learn. In virtual instructional environments using multimedia materials, learner are exposed to material in verbal (such as on-screen text or narration) and pictorial (including static materials such as photos or illustrations, and dynamic material such as video or animation) forms[8] .
Based on a behavioural perspective of learning, an information delivery theory of multimedia learning was developed in which learning involved adding information to learner's memory[9] . According to this theory, the role of computer in virtual learning is deliver information to learners, so the instructional designer role is to present information (as words, pictures or both) and the learner role is to receive that information. Thus when an explanation is presented in words, Thus when an explanation is presented in words,learner store this information in his memory and addition of pictures should have no effect on what is learned if the pictures contains the same information as the words. Taking in account the cognitivistic and constructivistic perspectives of learning, a cognitive theory of multimedia learning has been developed in which meaningful learning occurs when students mentally construct coherent knowledge Representations[10]. This theory is based on three assumptions suggested by cognitive research: a dual channel assumption, a limited capacity assumption, and an active processing assumption[11].

Dual channel assumption suggests that
human have separate channels for processing auditory/verbal representations and

8. Yang, Y. "Learning Theories - Synthesis and Comparison", In "Learning theories and instructional design using learning objects", *Journal of Educational Multimedia and Hypermedia*. 13, 4, 2004, 343-370
9. Mayer, R.E., "Learners as information processors", *Educational*

Psychologist, 32, 1996, 151-161.
10. Baddeley, A., *Human Memory*, Allyn and Bacon, Boston, U.S., 1998.
11. Wittrock, M.C., "Learning as a generative activity", *Educational*

visual/pictorial representations[12]. Limited capacity assumption considers that only a few pieces of information can be actively processed at any one time in each channel[13]. Active processing assumption points out meaningful learning occurs when the learner engages in cognitive processes such as selecting relevant material, organizing it into coherent representations and integrating it with existing knowledge[14].

1.1 Characteristics of the Materials for the multi-media lesson.

The characteristics of the learning materials can significantly affect learning. Learning material characteristics include the medium, physical structure, psychological structure, conceptual difficulty, and sequence[15]. The following principles suggest ways to design the learning materials to improve learning.Use the Medium that Best Communicates the Information. Although opinions differ[16], limited evidence suggests that some media are better than others at communicating certain kinds of information [17]

For example, when a learner needs to remember a small amount of verbal information for a short period of time, information that is presented via the auditory medium is generally remembered better than information that is presented via text. In one study, learners recalled and recognized 10 items from a list better when the experimenter presented the items using sound than when the experimenter used text.This result is very consistent[18].

12.Baddeley, A., *Human Memory*, Allyn and Bacon, Boston, U.S., 1998.
13. Paivio, A., *Mental representations: A Dual Coding Approach*, Oxford University Press, Oxford, U.K., 1986.
14. Sweller, J., *Instructional Design in Technical Areas*, ACER, Camberwell, Australia, 1999
15. Principles of Educational Multimedia User Interface Design - L.J. Najjar(Bransford, 1978).
16. Craik, F. I. M., & Watkins, M. J. (1973). The role of rehearsal in short-term memory. Journal of Verbal Learning and Verbal Behavior, 12, 559-607
17. Najjar, L. J. (1996b). Multimedia information and learning. Journal of Educational Multimedia and Hypermedia, 5, 129-150.

18.Penney, C. G. (1975). Modality effects in short-term verbal memory. Psychological Bulletin, 82, 68-84

Studies that found conflicting results[19] used long retention intervals or inappropriate instructions or scoring methods.

For retaining information over longer periods of time, text appears to be better than sound for communicating verbal information. Text was superior when the verbal information was a list of words[20], instructions, four-line poems[21] , and nonsense syllables[22]. However, one study[23] found no learning differences between auditory and textual words. Also, if the learner's visual channel is already occupied, then it may be more appropriate to use audio verbal information than textual information. This situation occurs, for example, when pictorial animations and auditory verbal information are presented together [24]

A picture, it is commonly said, can be worth a thousand words. Pictures seem to help people learn information more effectively than text. This picture superiority effect appears to be strong. For example, pictures of common objects were recalled and recognized better than their textual names.

Exceptions seem to occur when the items are conceptually similar (e.g., all animals or all tools) causing the pictures to be easily confused , or when the items are presented so quickly that learners cannot create verbal labels for the pictures[25].

Pictures also seem to be better than text or auditory instructions for communicating spatial information. For example, pictures helped people to draw and label the

19. Marcer, D. (1967). The effect of presentation method on short-term recall of CCC trigrams. Psychonomic Science, 8, 335-336.
20. Severin, W. J. (1967). The effectiveness of relevant pictures in multiple-channel communications. Audio Visual Communication Review, 15, 386-401.
21. Menne, J. M, & Menne, J. W. (1972). The relative efficiency of bimodal presentation as an aid to learning. Audio Visual Communication Review, 20, 170-180.
22. Chan, A., Travers, R. M. W., & Van Mondfrans, A. P. (1965). The effects of colored embellishments of a visual array on a simultaneously presented audio array. AV Communication Review, 13, 159-164.
23. Van Mondfrans, A. P., & Travers, R. M. W. (1964). Learning of redundant material presented through two sensory modalities. Perceptual and Motor Skills, 19, 743-751

24. Baggett, P., & Ehrenfeucht, A. (1983). Encoding and retaining information in the visuals and verbals of an educational movie. Educational Communication and Technology Journal,31,
25.Paivio, A., & Csapo, K. (1969). Concrete-image and verbal memory codes. Journal of Experimental Psychology, 80, 279-285.

human heart[26], recall and recognize spatial relationships in a story, and solve bus route problems[27]. To communicate motion-based information that changes continuously over time, when it is important to show how the information changes over time, animation or video appear to be best. These studies used knot-tying tasks, assembly or disassembly tasks, and interactive, explanatory computer animations. Animation or video does not seem to be helpful when the information to be learned is difficult for learners to understand, the information does not need visual support[28], or the learners do not practice with an interactive animation.

When used in more complex ways, the benefits of pictures are less strong. One study (Baggett, 1979) found that, on an immediate test, people recalled the structure of a story (exposition, complication, resolution) equally well when the story was presented via a silent movie or when it was presented via closely matched text. Another study (Nugent, 1982) also found no differences in immediate recall of story content when matched information was presented via silent video, text, or narration. However, when one of the studies (Baggett, 1979) tested recall performance after a week, performance was better for the pictorial story than the textual story. Thus some media appear to communicate specific kinds of information better than other media. Also, pictures cannot be used to communicate abstract concepts such as "freedom" or "amount." For communicating verbal information, text is better than auditory narration. For recalling and recognizing items, pictures are better than text. Pictures are also better than text or narration for communicating spatial information.

Use Multimedia in a Supportive, Not a Decorative, Way. There is strong empirical

26. Dwyer, F. M. (1967a). Adapting visual illustrations for effective learning. Harvard Educational Review, 37, 250-263.
Dwyer, F. M. (1967b). The relative effectiveness of varied visual illustrations in complementing programmed instruction. Journal of Experimental Education, 36, 34-42.

27.Bartram, D. J. (1980). Comprehending spatial information: The relative efficiency of different methods of presenting information about bus routes. Journal of Applied Psychology, 65, 103-110.
28. Carabello, J. (1985). The effect of various visual display modes of selected educational objectives. Unpublished doctoral dissertation, The Pennsylvania State University, University Park

support for this design principle, especially for the use of supportive pictures with verbal information. Other multimedia combinations are not as well supported. The information being presented in one medium needs to support, relate to, or extend the information presented in the other medium. Several studies show that adding closely related, supportive illustrations to textual or auditory verbal information improves learning performance. For example, pictures improved recall of textual words[29], recall and comprehension of textual passages[30], recall of auditory passages[31], and comprehension of auditory passages[32].

Some multimedia application designers apparently believe that pictures improve learner interest, motivation, and, therefore, learning. This does not appear to be the case. Adding unrelated illustrations does not improve learning, and in fact it may actually decrease learning. Unrelated illustrations did not improve comprehension and recall of textual material[33] or recall of illustration captions[34]. One investigator found that adding supportive illustrations to text helped fourth-grade children retain verbal information. But unrelated illustrations made it harder for learners to comprehend the text.These results suggest that the mere presence of illustrations does not improve the learning of verbal information. The illustrations must help explain information that is presented by the verbal medium. It appears that supportive illustrations allow learners to build cognitive connections between the

29. Paivio, A., & Csapo, K. (1973). Picture superiority in free recall: Imagery or dual coding? Cognitive Psychology, 5, 176-206.
30. Levie, W. H., & Lentz, R. (1982). Effects of text illustrations: A review of research. Educational Communication and Technology Journal, 30, 195-232.
31. Levin, J. R., & Lesgold, A. M. (1978). On pictures in prose. Educational Communication and Technology Journal, 26, 233-243.

32. Bransford, J. D., & Johnson, M. K. (1972). Contextual prerequisites for understanding: Some investigations of comprehension and recall. Journal of Verbal Learning and Verbal Behavior, 11, 717-726.
33. Levie, W. H., & Lentz, R. (1982). Effects of text illustrations: A review of research. Educational Communication and Technology Journal, 30, 195-232.
34. Bahrick, H. P., & Gharrity, K. (1976). Interaction among pictorial components in the recall of picture captions. Journal of Experimental Psychology: Human Learning and Memory,2, 103-111.

verbal and pictorial information [35]. This dual-coded information leads to improved learnings[36].

It is clear that supportive illustrations help people to learn verbal information. A small number of studies suggest that animations [37] and videos[38] may also improve verbal information learning. However, additional studies must be performed before we can extend this principle to media combinations other than illustrations with textual or auditory verbal information.

Present Multimedia Synchronously. There is strong support for the idea that verbal-pictorial information should be presented together. For example, college students performed better on problem-solving transfer tests when textual annotations were integrated into explanative drawings than when the experimenters presented the text and drawings sequentially , or simultaneously in time, but physically spaced apart. Creative problem solving and recognition were also higher when an auditory, explanative narration was synchronized with an explanative animation or movie compared to a situation in which the narration preceded or followed the animation[38]. Exceptions to the advantage of simultaneous presentation of related verbal and pictorial information occurred when the learners were very knowledgeable about the domain being studied[39]; when verbal recall, rather than problem-solving ability, was measured[40] ; and when learning was measured a week later, after the learned information faded in both conditions .

35. Paivio, A. (1971). Imagery and verbal processes. New York: Holt, Rinehart and Winston.
36. Mayer, R. E., & Anderson, R. B. (1991). Animations need narrations: An experimental test of a dual-coding hypothesis. Journal of Educational Psychology, 83, 484-490.
37. Mayer, R. E., Steinhoff, K., Bower, G., & Mars, R. (1995). A generative theory of textbook design: Using annotated illustrations to foster meaningful learning of science text.Educational Technology Research and Development, 43, 31-43

37. Mayer, R. E., & Gallini, J. K. (1990). When is an illustration worth ten thousand words? Journal of Educational Psychology, 82, 715-726
38. Baggett, P. (1984). Role of temporal overlap of visual and auditory material in forming dual media associations. Journal of Educational Psychology, 76, 408-417.
39. Mayer, R. E., Steinhoff, K., Bower, G., & Mars, R. (1995). A generative theory of textbook design: Using annotated illustrations to foster meaningful learning of science text.Educational Technology Research and Development, 43, 31-43.
40. Mayer, R. E. (1989a). Models for understanding. Review of Educational Research, 59, 43-64

Synchronized presentation of verbal-pictorial information appears to improve learning better than sequential presentations. The synchronized presentation may help learners to use dual (verbal + pictorial) coding [42] to increase cognitive interconnections between the two forms of studied information and to prior knowledge.Use Elaborative Media. There is limited, somewhat indirect evidence that the media themselves may encourage elaborative processing. Elaborative processing is extra cognitive processing of material that helps to integrate the material with prior knowledge. Elaborative processing often leads to improvements in learning performance[43] . Some media may encourage spontaneous elaborative processing of information more than other media[44] . For example, pictures may be more elaborative than text. This appears to be the case when learning is measured using recognition[45] or recall[46] . One study even obtained this result when the researchers used a study-test interval of 20 years. Although there are some exceptions (see the previous section titled "Use the medium that best communicates the information"), the learning advantage for pictures, compared with text, may occur because pictures have more features available for processing than do words, and pictures may help access meaning more quickly and completely than words ; Text may also be more elaborative than audio verbal media. Several studies[47] found that text-only conditions produced better learning than audio-only conditions. However, unlike audio conditions, text conditions also allow the learner to process the verbal information at the learner's pace.

42. Paivio, A., & Csapo, K. (1969). Concrete-image and verbal memory codes. Journal of Experimental Psychology, 80, 279-285.
43. Anderson, J. R. (1980). Cognitive psychology and its implications. San Francisco: Freeman.
44. Najjar, L. J. (1996a). The effects of multimedia and elaborative encoding on learning (GIT-GVU-96-05). Atlanta, GA: Georgia Institute of Technology, Graphics, Visualization and Usability Center. Also available World Wide Web: http://www.cc.gatech.edu/gvu/reports.

45. Hartman, F. R. (1961). Single and multiple channel communication: A review of research and a proposed model. Audio Visual Communication Review, 9, 235-262
46. Paivio, A. (1975). Coding distinctions and repetition effects in memory. In G. H. Bower (Ed.), The psychology of learning and motivation (Vol. 9, pp. 179-214). New York: Academic
47. Menne, J. M, & Menne, J. W. (1972). The relative efficiency of bimodal presentation as an aid to learning. Audio Visual Communication Review, 20, 170-180.
Severin, W. J. (1967). The effectiveness of relevant pictures in multiple-channel communications. Audio Visual Communication Review, 15, 386-401

Some multimedia combinations may be more elaborative than other multimedia combinations or single media due to the advantages of dual coding. Information that is processed through both verbal and pictorial channels appears to be learned better than information that is processed through just the verbal channel or just the pictorial channel[48]. For example, Severin[49] (1967) found that learning performance in a combined audio and pictures condition was better than in a combined audio and text condition. Nugent[50] (1982) obtained the highest learning levels when she presented information via combined text and pictures or combined audio and pictures compared to the same content presented via text alone, audio alone, or pictures alone.

It appears that elaborative media (e.g., pictures versus text, text versus audio narration) may improve learning performance more than media that may not be as elaborative. Multimedia that encourages the learner to use both verbal and pictorial channels to process the information also appears to be very effective.

1.2 Advantages of multi-media lesson on the theme “Tashkent – is a capital cuty of Uzbekistan”

Students respond to information differently. Thus, it is often to our advantage as teachers to use many different formats and modes to teach the subject matter of a lesson. This is why teachers normally use some combination of lecture, text and hands-on laboratory for conveying information. With the advent of the Internet and the multiple formats that can be communicated over the World Wide Web, we now have several new and exciting ways to present information. The multi-media lesson allows the incorporation of animation, moving pictures, and sound

48. Barrow, L. C., & Westley, B. H. (1959). Comparative teaching effectiveness of radio and television. Audio Visual Communication Review, 7, 14-23.
Mayer, R. E., & Anderson, R. B. (1991). Animations need narrations: An experimental test of a dual-coding hypothesis. Journal of Educational Psychology, 83, 484-490.
49. Severin, W. J. (1967). The effectiveness of relevant pictures in multiple-channel communications. Audio Visual Communication Review, 15, 386-401
50. Nugent, G. C. (1982). Pictures, audio, and print: Symbolic representation and effect on learning. Educational Communication and Technology Journal, 30, 163-174.

into lessons, which extends our abilities to present materials that encourage student interaction with the subject matter. Pictures and animations help bring to life scientific principles, and multimedia allows students to take a more active role in learning: they can watch experiments in action, see microorganisms up close, and use a mouse or keyboard to navigate images, simulations and interactive material. One of the advantages of using multimedia is to convey information quickly and effectively to all students – and keep them interested in learning[51].

So, the multi-media lesson on the theme “Tashkent – is a capital city of Uzbekistan” widen the knowlarges of the students in many aspects. First of all, this lesson will help to increase the patriotism feelings, widen the knowlarges of the historical places of our Motherland.Also this lesson has not only secondary and educational, but practically aim. Practical aim – is to improve the pupils’ writting, listening, speaking and reading skills using the exersices.

1.3 Multi-media learning .The modality principle

This term has been used to refer to different phenomena. In Richard E. Mayer's cognitive theory of multimedia learning it is one of several design principles for multimedia instruction. More principles are listed below. The modality principle states that materials which present both verbal and graphical information should present the verbal information in an auditory format (and not as written text). There is an on-going debate on both the mechanisms underlying this effect, and on boundary conditions of the effect.

Theoretically, the modality principle is based on a model of working memory by Alan Baddeley and Graham Hitch who proposed that working memory has two largely independent subcomponents that tend to work in parallel - one visual and one verbal/acoustic. This gave rise to dual-coding theory, first proposed

51.Spangenberg, R. W. (1973). The motion variable in procedural learning. AV Communication Review, 21, 419-436.

by Allan Paivio[53] and later applied to multimedia by Richard Mayer. According to Mayer[52], separate channels of working memory process auditory and visual information. Consequently, a learner can use more cognitive processing capacities to study materials that combine auditory verbal information with visual graphical information than to process materials that combine printed (visual) text with visual graphical information. In other words, the multi modal materials reduce the cognitive load imposed on working memory.

In a series of studies Mayer and his colleagues tested Paivio's dual-coding theory, with multimedia. They repeatedly found that students learning given multimedia with animation and narration consistently did better on transfer questions than those who learn from animation and text-based materials. That is, they were significantly better when it came to applying what they had learned after receiving multimedia rather than mono-media (visual only) instruction. These results were then later confirmed by other groups of researchers.

Initially the instructional content of these multimedia learning studies was limited to logical scientific processes that centered on cause-and-effect systems like automobile braking systems, how a bicycle pump works, or cloud formation. But eventually it was found that the modality effect could be extended to other domains, which were not necessarily cause-and-effect based systems.

In Education, multimedia is used to produce computer-based training courses (popularly called CBTs) and reference books like encyclopedia and almanacs A CBT lets the user go through a series of presentations, text about a particular topic, and associated illustrations in various information formats. Edutainment is an

informal term used to describe combining education with entertainment, especially multimedia entertainment.

Learning theory in the past decade has expanded dramatically because of the introduction of multimedia. Several lines of research have evolved (e.g. Cognitive load,Multimedia learning, and the list goes on).

52.Mayer, R. E. (1997). Multimedia learning: Are we asking the right questions? Educational Psychologist, 32(1), 1-19.

53. Paivio, A. (1971). Imagery and verbal processes. New York: Holt, Rinehart and Winston.

The possibilities for learning and instruction are nearly endless.

The idea of media convergence is also becoming a major factor in education, particularly higher education. Defined as separate technologies such as voice (and telephony features), data (and productivity applications) and video that now share resources and interact with each other, synergistically creating new efficiencies, media convergence is rapidly changing the curriculum in universities all over the world. Likewise, it is changing the availability, or lack thereof, of jobs requiring this savvy technological skill.

The English education in middle school in China is well invested and assisted with various equipments. In contrast, the original objective has not been achieved at the desired effect. The government, schools, families, and students spend a lot of time working on improving scores, but hardly gain practical skills. English education today has gone into the vicious circle. Educators need to consider how to perfect the education system to improve students' practical ability of English. Therefore an efficient way should be used to make the class vivid. Multimedia teaching will bring students into a class where they can interact with the teacher and the subject. Multimedia teaching is more intuitive than old ways; teachers can simulate situations in real life. In many circumstances teachers don't have to be there, students will learn by themselves in the class. More importantly, teachers will have more approaches to stimulating students' passion of learning

Make the User Interface Interactive. This design principle is strongly supported by a variety of studies. Interaction is mutual action between the learner, the learning

system, and the learning material[54]. An interactive user interface may allow learners to control, manipulate, and explore the material or periodically asks learners to answer questions that integrate the material. An interactive user interface appears to have a significant positive effect on learning from

54. Fowler, B. T. (1980). The effectiveness of computer-controlled videodisc-based training. Unpublished doctoral dissertation, University of Iowa, Iowa City.

multimedia[55].

For example, one researcher [56] statistically analyzed 96 learning studies and concluded that interaction was associated with learning achievement and retention of knowledge over time. Other researchers[57] examined 75 learning studies and found that participants learned the material faster and had better attitudes toward learning the material when they learned in an interactive instructional environment.

Interaction may improve learning because it encourages learners to elaboratively process the learning material [58]. The interaction must be cognitively engaging. Learners who read screen after screen of text or who get only simple "Right" and "Wrong" feedback to their responses are unlikely to learn[59] . Also, interactivity may have a stronger effect on immediate learning than long-term retention of the information[60].

1.4 Characteristics of the Learner

Characteristics of the learner can have an impact on learning. Characteristics of the learner include the learner's current skills, knowledge, and attitudes [61]

The following principles describe learner characteristics that are associated with learning from educational multimedia.

Use Educational Multimedia with Naive and Lower-Aptitude Learners. Because few studies on this topic exist, the evidence supporting this design principle is

55. Bosco, J. (1986). An analysis of evaluations of interactive video. Educational Technology, 25, 7-16.
56. Stafford, J. Y. (1990). Effects of active learning with computer-assisted or interactive video instruction. Unpublished doctoral dissertation, Wayne State University, Detroit.
57. Fletcher, D. (1990). The effectiveness and cost of interactive videodisc instruction in defense training and education (IDA Paper P-2372). Alexandria, VA: Institute for Defense Analyses.
58. Bower, G. H., & Winzenz, D. (1970). Comparison of associative learning strategies. Psychonomic Science, 20, 119-120.
59. Verano, M. (1987). Achievement and retention of Spanish presented via videodisc in linear, segmented and interactive modes. Unpublished doctoral dissertation, University of Texas, Austin
60. Fletcher, D. (1989). The effectiveness and cost of interactive videodisc instruction. Machine-Mediated Learning, 3, 361-385.
61. Bransford, J. D. (1978). Human cognition. Belmont, CA: Wadsworth.

somewhat limited. Multimedia information appears to be more effective for learners with low prior knowledge or aptitude in the domain being learned. Regarding naive learners, Mayer and Gallini[62] (1990) found that illustrations helped college students with low prior knowledge of automobile mechanics to recall textual explanatory information and to solve creative problems. Adding illustrations to the text did not generally affect the learning performance of students who had high prior knowledge of these devices. Other studies found similar effects for teaching natural science to fifth-graders (Kraft, 1961), geology and meteorology to college students[63] , and basic training information to army recruits[64] . However, although this effect occurred in several studies, it was not always consistent[65] (e.g., Mayer & Gallini, 1990, experiments 2 and 3).

Multimedia also appears to be more helpful for learners with low aptitude than learners with high aptitude. For example, in one study[66] (Blake, 1977), college students with low or high aptitude in spatial and mental abilities learned the pattern of movement of five chess pieces via moving pictures (film), static pictures with animated arrows, or static pictures alone. The students with low aptitude performed better in the conditions with motion than the condition with static pictures alone. However, the students with high aptitude performed similarly on all three kinds of pictures.Wardle [67]gave 800-word textual passages on various science topics to seventh-grade students. Some of the passages included supportive illustrations.

Poor readers performed better on a comprehension test when the passages included illustrations. For good readers, the illustrations had no effect.

62. Mayer, R. E., & Gallini, J. K. (1990). When is an illustration worth ten thousand words? Journal of Educational Psychology, 82, 715-726.
63. Dean, R. S., & Enemoh, P. A. C. (1983). Pictorial organization in prose learning. Contemporary Educational Psychology, 8, 20-27.
64. Kanner, J. M., & Rosenstein, A. J. (1960). Television in army training: Color vs. black and white. AV Communication Review, 8, 243-252.
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66. Blake, T. (1977). Motion in instructional media: Some subject-display mode interactions. Perceptual and Motor Skills, 44, 975-985.
67. Walker, N., Jones, J. P., & Mar, H. H. (1983). Encoding processes and the recall of text. Memory and Cognition, 11, 275-282

Although only a handful of studies examined this principle, the results of these studies suggest that multimedia is most effective for people with low prior knowledge or aptitude in the domain being learned. This may be because experts have prior knowledge that can be used to understand and integrate the new information, but novices lack this advantage. Also, novices may not know which information is important and on which information they should focus their attention. Learners with high aptitude appear to be able to learn from relatively non-elaborative media such as text, but low-aptitude learners benefit most from the elaborative and explanatory advantages offered by multimedia. High-aptitude learners may be good learners, regardless of the media used to present the information[68].

Present Educational Multimedia to Motivated Learners. A variety of studies provide moderately strong support for this design principle. Using external rewards, such as points or grades, to improve motivation does not appear to improve learning [69]. For example, Loftus[70] (1972) found that when he increased the number of points for recognizing certain pictures from a large set of pictures, people spent more time looking at the more rewarding pictures, and recognized those pictures better in the recognition test.

However, when he controlled for the amount of time spent looking at each picture, the reward had no effect. The reward affected what people learned, but not how well people learned. Other researchers [71] found that adding external rewards to a task may actually decrease the learner's intrinsic motivation and cause the learner to spend less time on the task than learners who are not externally motivated.

68. Kanner, J. H., Runyon, R. P., & Desiderato, O. (1954). Television in army training: Evaluation of television in army training (Tech. Rep. No. 14). Washington, DC: George Washington University, Human Resources Research
69. Anderson, J. R. (1994). Learning and memory: An integrated approach. New York: Wiley
70. Loftus, G. R. (1972). Eye fixations and recognition memory for pictures. Cognitive Psychology, 3, 525-551.
71. Condry, J. (1977). Enemies of exploration: Self-initiated versus other-initiated learning. Journal of Personality and Social Psychology, 35, 459-477.

Intrinsic motivation, however, appears to improve learning. An intrinsically-motivated learner tends to learn more than an unmotivated learner. For example, Bickford[72] (1989) found that high school students learned more from paper-based materials that were designed to improve intrinsic motivation than materials that were not designed this way. Entin[73] (1974) found that students who scored higher on an achievement motivation questionnaire tried more math problems and scored higher on an achievement test than students who scored lower on the motivation questionnaire.

There are several ways to improve the learner's intrinsic motivation. The user interface designer can relate the content and objectives of the instructions to the needs and interests of the learner [74](Keller, 1983). This can be done by using familiar metaphors and analogies[75] (Curtis & Reigeluth, 1984). For example, Ross[76](1983) found that learning performance in a statistics course was improved when the exercises used contexts that were related to the majors of the students rather than exercises that used generic contexts. Other studies[77] suggest that instructional designs that use a personal style (e.g., personal pronouns, names ofspecific people, direct quotations, vignettes of famous people) rather than a formal style may stimulate learner interest. It appears that providing immediate,

positive, verbal praise and informative feedback in a context that does not control the consequences of the performance (e.g., does not have a direct impact on the

72. Bickford, N. L. (1989). The systematic application of principles of motivation to the design of printed instruction. Unpublished doctoral dissertation, Florida State University, Tallahassee.

73. Entin, E. E. (1974). Effects of achievement-oriented and affiliative motives on private and public performance. In J. W. Atkinson & J. O. Raynor (Eds.), Motivation and achievement (pp. 219-236). Washington, DC: V. H. Winston.
74. Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), Instructional-design theories and models: An overview of their current status (pp. 383-434). Mahwah, NJ: Erlbaum.
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77. Flesch, R. (1948). A new readability yardstick. Journal of Applied Psychology, 32, 221-233.

student's grade) may improve intrinsic motivation[78] (Bates, 1979). Also, general suggestions on how to improve learning performance should be given right before the next performance attempt[79] (Keller, 1983).

Multimedia material itself appears to offer motivational advantages because of its novelty, but these advantages (and the novelty) fade over time[80] (Clark, 1983). Finally, humor does not improve motivation because it can distract the learner from the instructional goals and interfere with comprehension[81].

To Avoid Developmental Effects, Use Educational Multimedia with Adults and Older Children. Although it is difficult to establish specific age ranges, empirical studies provide moderate support for this design guideline. Multimedia appears to more effectively improve learning as children get older. On recognition and recall of information in films, older children did better than younger children and adults did better than older children[82] (Stevenson & Siegel, 1969); the same result was obtained on recognition and recall of pictures[83]. television commercials , television programs , and and toy scenes Stoneman and Brody (1983) presented auditory-only, visual-only, or combined auditory-visual stories in which product advertisements were interspersed. Kindergarten children recognized more advertised products than preschool children. Second-grade children recognized

more advertised products than kindergarten or preschool children. Hoffman and Dick (1976) showed several

78. Bates, J. A. (1979). Extrinsic reward and intrinsic motivation: A review with implications for the classroom. Review of Educational Research, 49, 557-576.
79. Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), Instructional-design theories and models: An overview of their current status (pp. 383-434). Mahwah, NJ: Erlbaum.
80. Clark, R. E. (1983). Reconsidering research on learning from media. Review of Educational Research, 53, 445-459.
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83. Dirks, J., & Neisser, U. (1977). Memory for objects in real scenes: The development of recognition and recall. Journal of Experimental Child Psychology, 23, 315-328.

hundred pictures to three-year-old children, seven-year-old children, and adult college students. The seven-year-old children accurately recognized more pictures than the three-year-old children. The adults recognized more pictures than the seven-year-old children.

It appears that the younger children's processing occurs more at the perceptual level than the semantic level. Also, the ability to process auditory information seems to develop earlier than the ability to process visual information[84]. With increasing experience and maturity, children appear to learn to process information at a deeper, more semantic level and therefore improve their retention of information. This idea is supported by several studies[86] (e.g., Ackerman, 1981; Hoffner, Cantor, & Thorson, 1989; Owings & Baumeister, 1979) which found that, when presented information using multimedia, younger children encoded more perceptual aspects of stimuli than older children. Older children encoded more semantic information than younger children. Rankin and Culhane (1970) obtained a similar effect when they compared the comprehension performance of sixth-graders and college students.

Older children and adults are more likely to be able to process the meaning of multimedia information rather than its appearance. Older children and adult learners should benefit from educational multimedia more than younger learners.

1.5 Characteristics of the Learning Task

The tasks that the learner performs with the learning materials can affect performance. Characteristics of the learning task include attending to the information, rehearsing it, and actively elaborating it. Educational multimedia user interface design principles for the learning task follow.Use Multimedia to Focus

84. Carterette, E. C., & Jones, M. H. (1967). Visual and auditory information processing in children and adults. Science, 156, 986-988
85. Ackerman, B. P. (1981). Encoding specificity in the recall of pictures and words in children and adults. Journal of Experimental Child Psychology,

the Learner's Attention. A small number of studies provide limited support for this design principle. Multimedia can help direct the learner's attention to relevant information and improve learning. For example, one study[86] asked adults in a shopping mall to "look over" a newspaper page that included a story with or without a large photograph. When asked questions about their recall of the newspaper story, the participants remembered more information when they saw the story with the photograph than when they saw the story without the photograph. It appears that the photograph got the participants' attention and caused them to read the accompanying story. Other researchers successfully used drawings[87], motion[88], small "chunks" of textual and graphical information, and adjunct questions[89] to focus the learner's attention.However, getting a learner to pay attention to information does not necessarily mean that the learner will learn the information. For example, learners who are new to a field of knowledge may simply view a supplementary animation without trying to understand the information it shows[90] (e.g., Reed, 1985). Also, irrelevant media, such as unrelated pictures[91] (e.g., Levie & Lentz, 1982) or motion[92] (Park & Hopkins, 1993) may distract learners and actually decrease learning performance. Encourage Learners to Actively Process

the Information. A variety of multimedia studies were performed in this area, so there is strong empirical support for this design principle. Learning appears to improve when the learning task encourages the learner to actively process the information (e.g., Bobrow & Bower, 1969; Bower & Winzenz, 1970; Jacoby,1978;

86. Baxter, W. S., Quarles, R., & Kosak, H. (1978, August). The effects of photographs and their size on reading and recall of news stories. Presented at the annual meeting of the Association for Education in Journalism, Seattle, WA. (ERIC Document Reproduction Service No. ED 159 722)
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89. McConkie, G. W., Rayner, K., & Wilson, S. J. (1973). Experimental manipulation of reading strategies. Journal of Educational Psychology, 65, 1-8.
90. Reed, S. (1985). Effect of computer graphics on improving estimates to algebra word problems. Journal of Educational Psychology, 77, 285-298.
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92. Park, O., & Hopkins, R. (1993). Instructional conditions for using dynamic visual displays: A review. Instructional Science, 21, 427-449.

Slamecka & Graf, 1978). For example, one study (Dean & Kulhavy, 1981) asked students to learn the features of a fictitious country. One group of students studied a map on which the features were labeled. Another group copied the features and labels onto a blank map. The students who were forced to actively process the spatial information by copying the map performed better on a free recall test of the map information.

Reading text may also cause the learner to more actively process the information than simply hearing verbal narration or watching a silent movie . Similarly, materials that force learners to figure out confusing information may cause them to more actively process the information, which thereby improves learning performance.

Simple repetition of the information does not encourage learners to actively process the information and does not necessarily improve learning. For example, before changing the frequency of its radio broadcast, the BBC advertised the new frequency via radio, television, newspaper, and direct mailings. Listeners received around 1000 exposures to the information about the new frequency. However, only

17% of the listeners learned the new frequency (Bekerian & Baddeley, 1980). To encourage listeners to actively process information, a different study (Thomson & Barnett, 1981) arranged for participants to hear 16 fake radio commercials. In one condition the listeners heard the product name at the beginning (e.g., "Buy Brighto!") and end of the commercial (e.g., "Buy Brighto!"). In another condition, listeners heard the product name at the beginning of the commercial (e.g., "Buy Brighto!"), but the product name was left unpronounced at the end of the commercial (e.g., "Buy!"). The final condition was the same as the previous condition, except listeners wrote down the name of the product that was left unpronounced at the end of the commercial. Fifteen minutes later, an unexpected test showed that recall accuracy improved across the groups from 16% to 29% to 46%. Extra processing appeared to improve learning.

In addition, the type of active processing is important. For example, Craik and Tulving[93] (1975) found that processing the structural characteristics of each word in a list (e.g., "Is the word in capital letters?") was not as effective as processing the meaning of the word (e.g., "Would the word fit the sentence: ‘He met a _____ in the street").

Processing tasks that encourage learners to integrate the information they are studying seem to improve learning. Several studies (e.g., Anderson & Biddle, 1975; Frase, 1975; Reder, 1979; Rothkopf, 1966) found that periodically asking learners to answer questions about the information they had just reviewed led to improvements in learning performance. Tasks that do not encourage learners to integrate the information may actually worsen learning performance[94].

It is possible that tasks that encourage the learner to actively process and integrate the information may focus their attention on the information and cause them to process the information more elaboratively. This appears to be especially true when the processing focuses on the meaning of the information rather than its appearance, and when the processing integrates the information being studied.

Information that is processed in this way is easier to connect with long-term memories, may improve retrieval, and may therefore result in improved learning [95]

93. Tulving, E., & Thomson, D. M. (1973). Encoding specificity and retrieval processes in episodic memory. Psychological Review, 80, 352-373.
94.Stein, B. S., & Bransford, J. D. (1979). Constraints on effective elaboration: Effects of precision and subject generation. Journal of Verbal Learning and Verbal Behavior, 18, 769-777.
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CONCLUSION

These empirically-validated principles will help educational multimedia user interface designers to build applications that improve learning. The most strongly-supported principles suggest that designers should (a) use closely related verbal and pictorial information together and (b) build in tasks that encourage learners to elaboratively process the information. To make their educational multimedia applications even more effective, designers should also apply more general user interface principles and guidelines (e.g., Mayhew, 1992; Smith & Mosier, 1986).

The design principles described in this paper are new, and user interface designers should use them with some caution. The number of studies supporting some of the principles (such as "Use educational multimedia with naive learners and learners with lower aptitude") is limited and some studies used narrow, somewhat artificial learning situations. Extending the results of these studies to other situations involves some risk. To more accurately evaluate the benefit of these design principles, we need to perform studies that use actual computer-based multimedia

tutorials in realistic learning situations. Good candidates for these evaluations include the currently-popular, compact disk-based "edutainment" applications.

We also need to understand not just when multimedia is effective, but why it is effective[96] (e.g., Najjar, 1997). As more is learned about human perception, cognition, and learning, the existing educational multimedia design principles can be refined and new, more effective principles can be developed.

Courseware for teaching purpose is to make students more relaxed, happy, motivated to learn, access to integrated information services, accelerate the learning process, stimulate creativity, enhance learning efficiency. As informative multi-media teaching, teaching rhythm to speed up,

96. Najjar, L. J. (1995b). A review of the fundamental effects of multimedia information presentation on learning (GIT-GVU-95-20). Atlanta, GA: Georgia Institute of Technology, Graphics, Visualization and Usability Center. Also available World Wide Web: http://www.cc.gatech.edu/gvu/reports.

thinking of the students small space, and how to solve the transmission of information to receive additional information and the conflict between ease the burden on students, teaching more work pressure faced by the task more difficult.

To grasp the multi-media courseware is the presentation of some teaching content, and text, graphics, images, animation, voice combine the characteristics of a variety of media, in line with teaching the idea of reform, in order for teaching to do, "focused, decentralized and difficult , stimulated interest in teaching activities, improve efficiency, "and targeted use of a variety of media, to enhance the performance of multimedia courseware and affection. Multimedia courseware in teaching, we should pay attention to interactive control by computer to receive information on the initiative, dynamic characteristics, creating an interactive learning system, the introduction of research in teaching learning, hierarchical learning, and other modern teaching ideas and methods so that students can take the initiative active learning, change "learn" to "learn" to develop their innovative spirit and ability. After the introduction of the multi-media, with the update teaching methods, teaching media, the increase in teachers mechanism should be

more flexible. Education should not be bound courseware, constraints, and should help courseware form, the effort to explain, analyze, temper art of teaching, improve teaching quality, and guide the students thinking to teaching teachers and students greater freedom. To prepare lessons carefully and fully understand the students, the problems of the class to grasp, control, firmly reject the kind of full house "electric irrigation," the negative tendency graph easy effort to ensure that students learning.operating at the technical level to strengthen information and communication links between the disciplines of teaching, on the courseware designed.

Multimedia courseware is the teaching of modern information technology, combined with the subject product. Courseware for the formation of the current emphasis appears in information technology operations, ignoring bias pedagogical content, and want to grasp the overall courseware, teaching staff and information for professional technicians with good communication, through joint research, carefully planning, so that the system software in the academic performance of teaching content and form of vector integration, unity, to overcome the gap between the two, to conform to the characteristics and requirements of teaching subjects. If conditions, the parties should strive to overcome the courseware, insisting on their own multimedia courseware designed to make their own teaching ideas, teaching quality and style perfectly accurately reflected in the courseware., to carry out courseware production technology, methods and research, so the correct information expressions, manifestations and reasonable standard.

The complexity of the requirements of multimedia technology to enhance the multimedia courseware production technology, methods of research. Courseware General to go through topics, write scripts, to collect material, select the software production, adjustment, packaging and a series of procedures, steps. Courseware should pay attention to the process of overcoming the scattered and isolated phenomenon, and the use of courseware to strengthen the centralized and unified

leadership and management to give full play to the overall synthesis of all the professional functions of all departments to improve courseware utilization. To implement the principle of effectiveness of courseware, adhere to each production step, link quality, technical standards, to ensure correct information expressions, manifestations and reasonable standard.

A good courseware should have the following characteristics: to help classroom teaching or student learning; knowledge accurate; a map, sound, text interaction effect; picture vivid and interesting; operating flexibility; courseware package can run on different post-operation platform. Deviate from the students to change the dominant position of courseware, deviate from the key and difficult to solve each class, the content of exhaustive, interface bells and whistles, the students perceived a strong stimulus, confuse the overwhelming and affect the student attention, reduce the multimedia effects of the status quo multimedia courseware to embody the teaching of its ancillary features and advantages.

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