Multimedia as a Teaching Tool for Multiple Intelligences

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Abstract: Howard Gardner claims that human has at least seven multiple intelligences (MI). By identifying, flexing, and developing a learner's dominant learning intelligences, one can then draw on this knowledge to reach learners with a variety of learning preferences and thus enhance their learning motivation and efficiency. Teachers are encouraged to integrate MI theory with curriculum development and implement that into classroom practices. However, to implement MI theory in a traditional classroom faces many difficulties. Educational technologists thus suggests the use of multimedia technology to fulfill the practice of MI theory.

This paper first reviews current MI literature and multimedia technology. Followed by a description of a pedagogical framework stemming from MI theory and based on a solar learning system developed by Wilma Vialle. How this solar system pedagogy is presented by multimedia technology is proposed and explained. Suggestions on how to integrate MI theory and multimedia technology into the instructional design of a computer-assisted learning environment are also included.

Keywords: multiple intelligences, multimedia, computer-assisted instruction

1. Overview of MI theory

In 1983, Howard Gardner proposed that human has at least seven intelligences, including Linguistic, Logic-Mathematical, Spatial, Bodily-Kinesthetic, Musical, Interpersonal and Intropersonal [1]. According to Howard Gardner, Lingusitic intelligence is the capacity to use languages and to express what's on one's mind and to understand others. Logic-mathematical intelligence is the ability to understand the principles of a causal system or to manipulate numbers, quantities and operation. Spatial intelligence refers to the ability to visualize and present the spatial world. Bodily-Kinesthetic intelligence is the capacity to use one's whole body to solve problems or make something. Musical intelligence is the capacity to think in music, to be able to hear, recognize, remember and manipulate patterns. Interpersonal intelligence is the ability to understand others, to know what's on others' minds. Intropersonal intelligence refers to knowing who ourselves are and how we react to things.

MI theory has been regarded as one of the most important ideas on the educational horizon. Unlike many other educational innovations having limited impact and appeal, MI theory has a significant influence in a wide range of

educational institutions. MI theory is also widely used in training programs in business and industry [1]. As Thomas Armstrong pointed out that everyone is unique and has his/her own dominant intelligence. However, neither do the schools emphasize learners' unique personality and talent, nor encourage them to discover and develop their dominant intelligences. Teachers usually put emphasis on the whole teaching activities and neglect learners' diversity [2]. Following Howard Gardner's perspective, he thus advocated these goals of MI theory to teach for understanding, to prepare individuals for the world beyond school, to develop each person's potential fully, and to make sure that students' master core knowledge [3]. In a word, the impact of MI theory toward education is that it expands the space for students' development, challenges weaker intelligences, promotes effective teaching based on individuality [4].

MI theory has been applied by many educators to improve their pedagogy. Linda Campbell appreciates that MI can influence the implementation of various curriculums. Tom Hoerr documents such theory in the design of curriculum, the assessment of student progress, communication with partners, and growth as colleague at the New City School. Gayle Merrefield uses it to educate the children with problem in the use of language. Harvey Silver, Richard Strong, and Mathew Perini tries to integrate the concept of MI theory and learning styles [5], Carol Reid and Brenda Romanoff have developed a program that broaden the criteria for selecting gifted students. In Australia, MI theory is used by schools from preschools to universities, including special and gifted education [6]. Veronica Borruso Emig expands her teaching and assessment strategies in MI theory [7].

Even though educators have been trying to integrate MI theory into teaching activities and develop pedagogy to stimulate students' different intelligences in traditional classrooms, the teaching effectiveness and efficiency are still limited. First of all, the preparation for MI teaching activities is very time-consuming and proper equipment is not always available. However, the emergence of multimedia technology complements the insufficiency of instructional methodology [8]. The following is a discussion of the application of multimedia technologies in education.

2 Multimedia Technologies in Education

It is undoubtedly that traditional teachers adopted "chalk-and-talk" strategy and students have learned with "paper-and-pencil" tools [9], but current educational systems expose the learners to a variety of technologies using video programs and computer software. In the 20th century, the developments of science, engineering and technology have a considerable impact on education and training. Among them, multimedia technology has been put forward in an attempt to enhance the design of pedagogical framework [10].

Multimedia, with the integration of multiple media, such as text, graphics, color photography and pictures, stereo sound, animation, and full motion video, is a new development of computer technology [11]. Combined with Hypermedia, Multimedia products also have cross-referencing capabilities to numerous related topic. Hooper noted, "There is a nonlinear, exploratory presentation style, different from the traditional method of presenting knowledge in a linear, narrative unfolding of sequential information. Multimedia will provide instructors with a dramatic new environment for class presentation. [12] "

Richard found that multimedia with the ability of improving presentation can reach the goal of promoting learning effectiveness. Linda said learning with multimedia is collaborative activity, in which learner would help one another [13,14]. Many researchers also indicates that programs using multimedia to enhance students' problem-solving and reasoning skills also promote their learning interest and motivation [15].

3 Integration of MI theory and multimedia technology

Howard Gardner agrees that versatile technologies fit multiple intelligences approach to education, especially personalized education [16]. According to Trotter and Andrew, multimedia software products can nurture the multiple intelligences if properly implemented. We agree with Silver, Strong and Perini that no individual is universally intelligent. Many of them have excellent linguistic, logic and interpersonal intelligences; while some are gifted with spatial or musical ones. Certain fields of knowledge engage or elude everyone [17]. We do not expect to teach every child in all the seven different ways, but to provide students with different learning environments to stimulate their preference intelligences.

Wilma Vialle integrated MI theory into the teaching pedagogy and created a learning unit on the solar system for elementary school learners. The learning activities are administrated in a traditional classroom. Major activities are listed as follows [18]:

- □ *Linguistic*: Read books about the solar system. Present a talk about the life of an astronaut. Does.
- □ *Logic-mathematical*: Count the number of planets and moons per planets. Arrange the planets in order of size.
- □ *Spatial*: Make scale models of the planets from different materials..
- □ *Musical*: Listen to "spacey" music (for example, "2001: A Space Odyssey").
- □ *Bodily kinesthetic*: Simulate the planets orbiting the sun.
- □ *Interpersonal*: Create and perform a play set in space.
- □ *Intropersonal*: Reflect on what students have learned about the solar system.

Taking this solar system learning unit as an example, we propose some ideas to transforms a MI learning activities in a traditional classroom learning environment into a computer-controlled multimedia learning systems. We propose that a multimedia software product should:

- □ *Linguistic*: Provide a hypertext related to solar system and guide the students to discover different related topics. A link to the World Wide Web and the function of electronic mail should be available. Encourage students to send mail to each other and discuss issues, which interest them.
- □ *Logic-mathematical*: Design a game which allows the students to develop their counting or math skills through "clicking" or "hitting" a number of planets or moons. Students should be challenged with more difficult levels after they have mastered a specific learning unit.

- *Spatial*: By using the "Click and Drag" function, students can orbit these planets around the sun on the screen. They may even create and draw a solar system, with different size, color and characters of their own.

- *Musical*: A set of spacey music should be available for students to choose from the screen. Better yet, the multimedia software product is equipped with an electronic keyboard, which allows the students to create their own music of the theme.

- *Bodily kinesthetic*: A reality-simulation game is developed to allow students to simulate travelling in the solar system. They can choose to control a spaceship, handle an emergency like attack from another spaceship or technical problems. They can even mimic and feel the astronaut walk on the surface of the moon.

- *Interpersonal*: the learning software should be designed as cooperative learning system and students are encouraged to play in a team. The computer is equipped with a video camera to record students' interaction when they are learning together. Students can playback and view the video, in which they are actors and actress, to see how they interact with others.

- *Intro-personal:* Students can reflect and express how they feel during or after the learning by typing, speaking out his/her own thought to a recorder or a video camera, or just use traditional tool--paper and pencil. With the help of drawing tools of computers, they may even draw their feeling on the screen and thus visualize their own feelings about the learning. For example, how do they feel about themselves during the learning process, the interaction with others, or how does the topic interest them.

4. Suggestions and Conclusions

Barker noted that text would continue to be one of the primary media for both the preservation and the presentation of instructional material [19].   Meanwhile, Nanny addressed the importance of images and said, "they are like the head of a hammer, and they drive the point home" [20]. However, we suggest that all pieces of media, such as sound, video, images, animation, text, and music, should properly applied in the implementation of a multimedia-based CAI software.

Technological advancement can create lifelong learning chances for every one in the world. Current educators might enhance the cognition theory and technology toward computer-assisted instruction to promote the learners' motivation and dominant intelligences. However, teachers and the instructional designers are always the most important roles in the classroom, nobody can replace them. Segal once mentioned "the best approach to select media for instructional is to allow the instructional goals, objectives, and strategies to decide the most appropriate media [21]. " We do hope the integration of MI theory and multimedia technology can cultivate the free vector for teachers' curriculum design, also provide students with a different learning approach.

5.References

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