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The Clark / Kozma Debate Revisited

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"*I do not fear computers. I fear the lack of them.*" – Isaac Asimov

The day will come, as predicted by Isaac Asimov, when human beings cannot live without computers; when computers will become as ubiquitous as the cell phones. Resnick (2001) believed that technology can be used to revolutionize teaching and learning practices. The much-talked about "One Laptop per Child" Initiative by Negroponte, and many e-learning and distance education programs are but some examples of the strong presence of computers in influencing learning. It is said that more than 90 percent of students between the ages of five to 17 use computers as part of their learning activities (Becker, 2000). In fact, a recent Massachusetts Department of Education study reported that the percentage of that state's teachers using technology with students once a week or more was about 70% (Louie & Hargrave, 2006).

There are two camps to the perennial issue as to whether technology will influence learning. Affectionately referred to as the Clark-Kozma Debate, the debate sparked off in 1994, slightly more than a decade after Richard Clark, the skeptic, posited that media do not influence learning. He did not believe that the media will influence student's achievements. Using the metaphor of a delivery truck, he argued that the media does not cause changes in our "nutrition." Instead, he claimed that learning outcomes are due to the method of instruction and not the medium. He contended that we should not continue to waste resources studying media 'solutions' to learning problems we do not understand (Shrock, 1994). Robert Kozma debated otherwise and argued that the medium of instruction is as important as its content.

The debate points to the differing roles of the media, method, learner, and the instructor. The instructional media and method should be mutually modifiable in response to differences in the instructional and learner outcomes. “Instructional media” refers to any vehicle for presenting or delivering instructions. These vehicles refer to books, television, radio, computers, newspapers and people. “Multimedia” usually refers to the capacity of computers to provide real-time representations of nearly all existing media and sensory modes of instruction. We had seen varying degrees of success with the introduction of film, radio, and television into classrooms. Each new medium seems to make claims for its ability to improve learning and classroom instruction. In revisiting the Clark / Kozma debate, perhaps it would be useful to reflect on these five questions:

Does Multimedia Instruction Produce More Learning than “Live” Instruction or Older Media?

In this sophisticated age where technology remains the buzz word, the ‘wow’ factor is needed to attract users. Students are often in awe of animations, graphics and interactive games. Research done by Kulik (1985) on the learning benefits of various media (especially computers), has shown that it is the instructional method built into the computer and not the computer itself that accounts for the learning gain. According to Kulik, design technologies do somewhat influence student achievement. In fact, enhanced learning and retention can take place through the use of visual material (Dwyer & Baker, 2001). The visual medium can be an effective tool in the teaching of certain concepts and values which textbooks would not have otherwise been able to reinforce. Subjects such as Music and Geography require resources that are auditory and visual in nature. Through technology, students are able to *hear* and learn the sound of Sizhu music built on the pentatonic scale, *see* and identify the graphical formation of a sea stack and

even *recognize* bullying (through dramatic re-enactment); all these achieved in the comfort of the classroom.

In spite of this, there is no credible evidence of learning media benefits from other medium or combination of media that cannot be explained by other non-multimedia factors (Clark, 2001). Even Kozma has acknowledged no evidence exists to support that media has influenced learning in past research. Mayer (2001) in his research reported that while many learners seem to welcome the visual and aural entertainment, they are often overloaded by irrelevant and seductive distractions that decrease their learning. According to Martinson (1998), more information is not necessarily better information. Much of the information churned out by technology might not stimulate the student's intellect, but exist as "noise" that is dysfunctional to social intercourse. An extensive study by Bernard, et al. (2004) proved that the media does not provide any unique learning benefits that cannot be also provided by teachers. Clark suggested that perhaps the only multimedia benefits are to be found in the cost of instruction, including increases access to quality instruction by students in rural areas and time savings for students and teachers (when the investment in instructional design is amortized across increasing numbers of students).

Is Multimedia Instruction More Motivating than Traditional Instructional Media or Live Instructors?

Bloom, in his article "Learning for Mastery," commented on how the education system destroys students' egos and reduces their motivation for learning. Education should be a purposeful activity and as such, we need to motivate students by using alternative instructional

methods. Most educators know that students will be more motivated to learn when they are creating their own learning opportunity. The “tell me and I’ll forget; show me and I may remember; involve me and I’ll understand” concept is now being acknowledged and implemented in classes worldwide. More and more students are immersed in hands-on, technology-integrated projects that emphasize educational opportunities that are student-centered, collaborative, and inter-disciplinary (Bradford, 2005). I am a firm advocate of the indirect infusion of knowledge through technology. The Schools Video Awards (SVA), a nation-wide video competition that I had the opportunity of chairing 2 years ago, is an excellent platform for students to use technology in producing short documentary, drama, or advertisement. Students benefit from working in teams and developing soft skills. True to Kozma’s argument that media can indeed influence learning, many of the abilities that students acquire through such technology-integrated project-based learning are also 21st century interpersonal skills (teamwork, problem solving skills, and effective oral and written communications); all of which are high desired by business communities.

However, there has been compelling evidence to suggest that multimedia courses may be more attractive to students and that they tend to choose them when offered the option. Yet, the students’ interest and motivation does not result in more learning and, overall, the addition of multimedia appears to result in significantly less learning than would have occurred in “instructor-led” courses (need a couple of references to support this claim). Salomon (1984) hypothesized that students’ interest in newer media is based on the expectation that it will be less demanding to learn. They chose multimedia courses based on the expected flexibility and ease of learning. These expectations result in the investment of lower levels of mental effort and

consequently lower achievement levels when compared to the instructional conditions that are perceived as more demanding.

Does Multimedia Shape Instruction for Different Learning Styles?

For many years, educators have noticed that some students prefer certain methods of learning more than others. These dispositions or learning styles form a student's unique learning preference and aid teachers in the planning of small-group and individualized instruction (Kemp, Morrison, & Ross, 1998). While many instructors are aware that different learning styles exist, the application of this knowledge is often inconsequential. Some educators choose to utilize a wide variety of teaching activities, hoping that they will cover most students' learning preferences along the way. Cognitive style and learning preferences have been advocated by some researchers as traits that contribute to differential success in learning tasks on the basis of learners' innate approaches to learning or problem solving. The use of the visual medium in teaching and learning is supported by research demonstrating that most learners prefer this style of presentation (Gardner, 1993). For example, the use of 3-dimensional computer simulations are able to bring to life otherwise "boring" physics concepts. Students, especially the visual and kinesthetic learners will benefit from being able to *see* and *manipulate* movements on simulations that will better enhance their understanding of a particular concept of mechanics.

On the other hand, Clark (1982) found in his studies that learner enjoyment was typically uncorrelated or negatively correlated to performance outcomes. That is, subjects who reported a particular instructional technique typically did not derive any instructional benefit from experiencing it. Salomon (1984) also found similar results in his experimental study of sixth

grade learner preferences for learning from television or print: The subjects who learned more of the material presented in instruction were not those who received instruction via their preferred medium. Kalyuga, Ayres, Chandler, and Sweller (2003) argued that learners' acquired knowledge prior to using multimedia can also account for significant individual differences in academic outcomes. Learners with low levels of prior knowledge require more extensive instructional support to minimize the level of unnecessary cognitive load imposed by the material presented. Instead of aiding learning, multimedia overloads the especially slow learners who are still struggling with basic knowledge of the subject matter, causing their performance to suffer.

Can Media-based Instruction Provide Active Pedagogical Agents that Increase Motivation and Aid Learning?

Animated pedagogical agents (agents) defined by Craig, Gholson, and Driscoll (2002) are "computerized characters (either humanlike or otherwise) designed to facilitate learning" (p. 428). Many multimedia programs seem to provide instructional support in terms of animated agents. Advocates suggest that they have a great potential for aiding learning. Instructional technologists are also encouraging educators to use Mindtools or computer applications to engage learners to think critically about the content they are studying (Jonassen, 1996). In line with Kozma's position on media influencing learning, Mindtools are developed to help students think deeply about what they are studying. It is believed that the quickest way to learn about something is to teach it. Mindtools requires the learner to actually teach the computer. When learners develop their mind maps or databases, they are constructing their own "conceptualization of the organization of a content domain" (Jonassen, Carr, & Yueh, 1998).

Hence, Mindtools represent a constructivist use of technology. Here, learners participate actively in the environment in ways that are intended to help them construct their own knowledge; rather than have the teacher interpret information and ensure that learners understand that information as it has been told to them. The incorporation of cognitive and affective thinking skills into the daily curriculum and instruction is highly recommended by Richard Paul and his colleagues at the Foundation for Critical Thinking (Black, 2005). They believe that through Mindtools, students will be able to transfer insights to new contexts, analyze arguments and interpretations, and develop intellectual integrity while suspending judgment.

Nevertheless, studies done by Craig, et al. (2000) highlighted how measured differences in student learning may not be due to the agent or any increased motivation or attention caused by the agent, but rather due to the pedagogical method provided by the agent. Clark (2005) in support of Craig argued that if less costly alternative ways can deliver the same instructions with the same motivation and learning, then we should choose the least expensive option. According to him, studies that track student persistence and enthusiasm over time indicate the longer students study with a newer technology such as virtual reality, the more their motivation tends to decrease to a level equivalent to what they experience with more familiar media such as books and / or teachers.

Does Multimedia Instruction Enhance Learning Through Learner Control and Discovery?

We have read about how Papert's rote learning activities met with disappointing results, causing his paroxysm of flower learning to die. However, he later discovered that his understanding and recollection of flowers improved when he made personal associations and

connections to those flowers. It did not matter that those associations seem absurd; the bottom line is that he was able to facilitate and control his own learning through those connections. Students should be encouraged to make personal connections to their learning through whichever method is best suited their learning styles. In this way, multimedia instruction is believed to provide learner control that will enhance learning. An excellent example is Notschool.net. Notschool.net is an online research project in the United Kingdom that re-engages young people of school age back into learning. Notschool.net's virtual community of over 1700 young people were given the opportunity to develop their self-esteem and be reintroduced to learning through the support of mentors, buddies, experts and the use of media and technology. Each 'researcher' (student) is given a Macintosh, broadband connection, an inkjet printer and a digital camera. The researchers are also able to borrow scanners, video cameras, and drawing tablets. They are encouraged to learn the subjects they are interested in and start their own projects using technology. They will be awarded nationally recognized accreditations when they have completed their learning journeys. Notschool.net's alternative schooling provides learner control that enhances their learning, albeit in a non-conventional environment.

Some segments of the education communities believe that the most effective learning experiences are those in which learners navigate unstructured multimedia learning environments or solve novel problems presented to them without instructional support (Land & Hannafin, 1996). However, Mayer (2004) noted that the assumption about pure discovery learning has been tested many times over 40 years of research and it is found that it lacked empirical validation when its efficacy, efficiency and impact on successful transfer of skills have been compared to well-structured, guided instruction.

Conclusion

It is said that today's adolescents have grown up with technology (1 to 1 Learning, 2006). Technology is indeed a driving force behind globalization and is vital in teaching and learning. Billions of dollars have been spent in equipping our schools with computers and new electronic media. As educators, we take pride in ensuring our students are literate and ready for the outside world and we constantly look for ways to enhance their learning through the latest technological advancement. Multimedia instruction offers many extraordinary benefits to education such as a wide range of instructional options, adequate instructional design, considerable reductions in the time required to learn, the time required of expert teachers, and the cost of learning. Nevertheless, like all new and exciting educational innovations, multimedia also suffers from mistaken beliefs about its potential and achievements.

In a nutshell, technology should be in the service of the vision of the active, exploring student, rather than the student being at the mercy of technology. Technology should blend with human interaction and child-created spatial environments to educate all the senses and enrich the experience. Television must be a tool of exploration, allowing students to see the structure of an atom and images from outer space, or their own brain waves. As McLuhan and Leonard (1967) suggested, computers must allow students to draw rapidly on what other knowledge has already developed but also play games that will teach "what we might call math or logic" but in terms of "music and the sense of touch" (p. 24).

The Clark / Kozma camps will continuously try to strengthen their stand on the media debate. It is indeed difficult to conclude who will surface as the ultimate winner. But their

various arguments and research findings are worth reflecting upon in our quest of incorporating technology in teaching and learning. We do not, after all, want our young to acquire the right technology for all the wrong reasons.

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