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MULTIMEDIA TECHNOLOGIES IN EDUCATION

МУЛЬТИМЕДІЙНІ ТЕХНОЛОГІЇ В СВІТІ

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The fast-developing multimedia technology is mainly based on computer technology, combined with various advanced information technologies to form scientific and technological means. Applying multimedia technology to visual communication design can improve the visual effect of the designed product, expand the dimension of visual communication design, break through traditional text, color, graphics and other elements, innovate in the direction of video, audio, etc., and have strong practicality. Although the claim that students inhabit a much different world than in times past has been made throughout history, it is particularly true in this century. From a young age, today's children are exposed to computers, the Internet, instant messaging, social networking sites, and cell phones that provide instant communication locally and globally. Not surprisingly, research shows that today's digital students learn more when engaged in meaningful, relevant, and intellectually stimulating schoolwork and that the use of technology can increase the frequency for this type of learning. [1] Using technology, teachers can tap into the knowledge of experts; visualize and analyze data with their students; link learning to authentic contexts; and take advantage of opportunities for electronic, shared reflection [2].

All of these pedagogical opportunities need to be part of current teacher education programs. Preparation of tomorrow's teachers, however, does not depend solely on how well emerging technologies are incorporated into college coursework; instead, it rests on how well incoming teachers are taught to *leverage* the technologies to help their students develop these same skills. Twenty-first-century skills fall into six distinct categories, each of which can be readily engaged through careful use of multimedia technologies in the classroom setting: critical thinking, information and media literacy, creativity, communication skills, collaboration, and contextual learning. [3] Critical thinking involves in-depth examination of

topics from a variety of perspectives and calls for cognitive skills such as comparison, classification, sequencing, patterning, webbing, and planning. Bloom's early taxonomy of cognition included six graduated levels of thinking that move from knowledge to comprehension, application, analysis, synthesis, and finally, evaluation. The higher levels of thinking – analysis, synthesis and evaluation – are key to critical thinking and form the basis for developing all other 21st-century skills. Multimedia uses multiple forms of text, audio, graphics, animation, or video to convey information. As such, multimedia technologies offer today's classroom teachers the opportunity to move from a largely linear learning environment to an increasingly nonlinear environment. Such technologies also allow students a strong degree of choice as they pursue learning with multimedia texts. Although multimedia classroom tools offer classroom teachers multiple ways of engaging students in the learning process, they also present challenges for teachers. One of the challenges lies in the fact that certain multimedia tools promote far more active learning and student decision-making than others [4]. There are two categories of multimedia – linear and nonlinear. Linear multimedia tools generally progress from one screen to the next and are commonly used by instructors as a supplementary teaching aid. This form of multimedia tends to limit learning potential because it does not require active participation. On the other hand, nonlinear multimedia tools (those that include hyperlinks) offer viewers interactivity, control of progress, and choice in their construction of knowledge.

When used as active learning tools, nonlinear multimedia engages students in using 21st-century skills and provides a variety of creative, digital-age reflection opportunities. These honor Dewey's (1938) constructivist teaching and learning strategies and support cognitive flexibility in learning. According to cognitive flexibility theory, learners benefit from retrieving information in the nonlinear fashion that hypertext allows, as it helps them develop complex and rich schemata and enables them to use their knowledge in a flexible manner. Hypertext learning environments are particularly beneficial for learners who prefer active, problem-based, and self-directed learning. These environments also show potential to foster higher order, complex reasoning skills in students.

The concepts *reflection and reflective practice* are entrenched in teacher education literature with good reason. Reflection is a vehicle for critical analysis and problem solving and is at the heart of purposeful learning. Reflective observation focuses on the knowledge being learned (i.e., curriculum) as well as the experiential practice (i.e., pedagogy); both are important aspects of the learning process. Through metacognitive

examination of their own experiences, preservice teachers are encouraged to take a closer look at what they are learning and to explore their own growth in greater depth. Experiencing the power of reflection in their own learning, they are more likely to encourage similar reflection on the part of their students. When reflection has been included in instruction, it allows preservice teachers to address uncertainties in their own learning, develop new approaches to learning, and document their growth as reflective practitioners. Reflective activities have long included journal entries or narrative writing, but technology can facilitate and enhance the skills of reflection as electronic reflections can be readily archived, revisited, updated, and shared in exciting and creative ways.

The following examples of multimedia technologies, taken from our own classroom practice, offer productive ways in which teacher educators have invited technology application into their coursework with preservice teachers (whom we refer to as teacher “candidates” in this portion of the article) in field settings.

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