By Dave Cornelius

FEATURE

# STEMM: Science, Technology, Engineering, Math...and Multimedia?

"WITHOUT THE SKILLS LEARNED IN MULTIMEDIA DISCIPLINES, **EVEN THE WORLD'S GREATEST ACHIEVEMENTS GO UNPUBLISHED AND RESEARCH PROCEEDS AT A VIRTUAL SNAIL'S PACE.**"

**T**HE CURRENT BUZZ **SURROUNDING** science, technology, engineering and math (STEM) disciplines and their economic importance is certainly justified. Unfortunately, when we push to improve a specific discipline, it often has negative effects on everything else. The problem occurs when the excitement, funding and focus effectively relegate other equally important disciplines to a second-class stature. The resulting myopia is especially damaging when the relegated discipline is an integral part of, and impacts, everything. Consider multimedia technologies. They are part science, technology, engineering, math, communication, language and art. They simply don't fit a silo approach to education, yet are integral parts of everyone's list of 21st century skills.

Currently multimedia and the corresponding technology literacy programs are being downgraded as expensive fluff, and are being replaced by more in vogue disciplines with easily standardized and tested content. However, without the skills learned in multimedia disciplines, even the world's greatest achievements go unpublished and research proceeds at a virtual snail's pace.

Multimedia students must be masters of ohms, watts, sound pressure levels, heat signatures and dynamic range. They plot the area of spheres covered by electronic signals beamed from distant moving sources. They can determine the amount of lumber required to construct a cyclorama and cove curved horizontally and vertically so that light refracts rather than reflects. They regularly apply active voice, pacing, pathos or ethos and demonstrate

use of light, composition, tempo, timbre, tone, frequency and color correction? Then of course they must navigate pixel widths, compression codices, baud rates, download speeds, bandwidths, search engines and mobile devices—all while communicating and collaborating in an "always on" environment. For any one of these skills you might contact a physicist, an engineer, a mathematician, a computer technologist, a writer, an artist or a musician. However, if you prefer one-stop shopping, you might visit any number of high school multimedia classrooms across the country and ask a media student. Better still, ask them to show you.

## Multimedia Communication Is 21st Century Literacy

Whether you call it multimedia communications, communication technologies, technology literacy or digital journalism, the skills, techniques and tools acquired remain core elements for survival in a digital world. Without them, individuals are functionally illiterate. If you think that is a bold statement, search O*net online. More than 230 careers require multimedia skills. Nearly one-third of them have higher than average growth expectations. Compare that to searches for careers requiring the specialized knowledge and skills necessary for any of the other STEM disciplines.

The emphasis on media skills is so pervasive it has prompted the federal government to fund a department dedicated to digital literacy (**www.DigitalLiteracy. gov**). In addition, U.S. Senate bill S-1178, dubbed the ATTAIN Act, seeks to fund programs that emphasize "the need to

PHOTO BY ISTOCK.COM

partner core academic subjects with 21st century skills, such as critical thinking, problem solving, communication, collaboration and creativity."
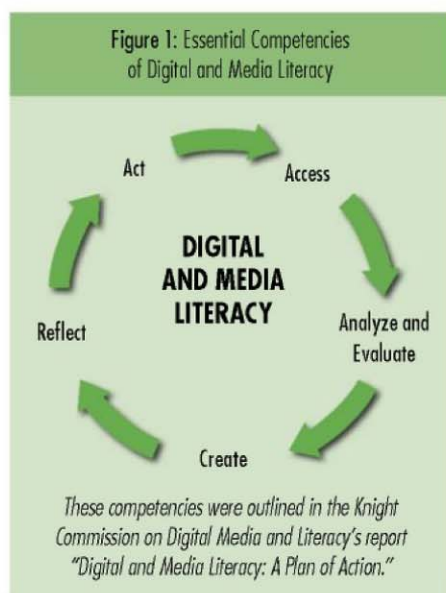
The Knight Commission on Digital Media and Literacy carries things further in its white paper, "Digital and Media Literacy: A Plan of Action." It notes that the "ubiquitous and easy access to so many information and entertainment choices requires that people acquire new knowledge and skills in order to make wise and responsible decisions. For people to achieve the personal, professional and social benefits of thriving in a digital age, these skills are not just optional or desirable—they are the essential elements of digital citizenship."

The paper added: "To address these needs of digital citizenship, the Knight Commission made three recommendations that directly address the issue of digital and media literacy education in the context of formal and informal public education sectors:

- Recommendation 6: Integrate digital and media literacy as critical elements for education at all levels through collaboration among federal, state and local education officials.

- Recommendation 7: Fund and support public libraries and other community institutions as centers of digital and media training, especially for adults.
- Recommendation 12: Engage young people in developing the digital information and communication capacities of local communities."

The commission further suggests five competencies that are invaluable for people to use in the consumption and creation of messages in all aspects of daily life (see Figure 1 below).



**Figure 1:** Essential Competencies of Digital and Media Literacy

DIGITAL AND MEDIA LITERACY

Act — Access — Analyze and Evaluate — Create — Reflect

*These competencies were outlined in the Knight Commission on Digital Media and Literacy's report "Digital and Media Literacy: A Plan of Action."*

"These five competencies work together in a spiral of empowerment, supporting people's active participation in lifelong learning through the processes of both consuming and creating messages. This approach is consistent with constructivist education described by Brazilian education scholar Paolo Freire," the Knight Commission's Plan of Action noted.

As the Common Core State Standards Initiative (2010) points out, "To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, report on, and create a high volume and extensive range of print and non-print texts in media forms old and new. The need to research and to consume and produce media is embedded into every element of today's curriculum." Consider the challenge of simply researching career options, finding a job posting, filling out a job application or creating and submitting a resume without e-tools. Add to that the preparation of a video resume, branding using QR coding, connecting via social media and you begin to grasp the significance of being unable to communicate using 21st century tools.

Nicole Pinkard, founder of Chicago's Digital Youth Network, agrees, suggesting that those unable to create, critique, filter, search, research and navigate in a digital world may soon be considered illiterate. (See her in a PBS video at **http://video.pbs.org/video/1767540185/**.) Multimedia tools and literacy build on and improve basic literacy by fostering engagement, application and creativity. Contrary to popular belief, digital tools do not destroy reading and writing. They do change the ecology of reading and writing. According to Joseph McCaleb, director of the University of Maryland Writing Project, digital writing assumes an authentic audience.

"It's so much easier teaching writing when you've got kids feeling purposeful,"

**"ESSENTIALLY, STUDENTS BECOME PART SCIENTIST, TECHNOLOGIST, ENGINEER, MATHEMATICIAN, RESEARCHER, COMMUNICATOR, CREATOR AND ARTIST UTILIZING TOOLS THAT ARE PART OF THEIR SOCIOLOGICAL AND TECHNOLOGICAL DNA."**

he says. "Digital media is so ripe for that."

Through photos, audio and film, students create public presentations about issues that have strong meaning for them. It doesn't matter if they are filming a public service announcement about recycling, or creating a slideshow about the challenges of finding clean water in Haiti. When their compositions are read or watched by more than just the students in their class, students feel they are making a difference, says McCaleb.

Joel Malley, technical liaison for the Western New York Writing Project, considers solid conventional writing skills the basis for making short films as well. "If you listen to a voice-over, the more compellingly written it is the more effective it's going to be," he says. Before applying more advanced technical skills—such as deciding where to put a title screen or j-cut—students who are editing films need to know the basics of how to shape a story or build an argument, he says.

Elyse Eidman-Aadahl, at the University of California, Berkeley, concurs by pointing out that digital writing skills are critical to "college- and career-readiness." Digital writing assignments "match the real world" and give students experience composing "in a form people will actually read," she says. The nature of writing has shifted in recent years. There are very few—if any—jobs these days for which employees produce lengthy handwritten reports. However nearly all communications integrate words, images, audio and Web site links. College applications are online. Schools are beginning to accept videos and Web sites in place of essays. A friendly letter is more likely composed on a smartphone than on stationery.

Young people today read and write more than ever. They just aren't doing it sitting in their bedrooms with a novel. They constantly collaborate, communicate, listen, watch, create and generally consume things they believe valuable and relevant. Refusing to accept the fact that today's students do not function as we did

is at best tragic. Students today are wired differently. Their world has changed dramatically. Educational systems and pedagogy have not. Institutional fear of embracing and managing change has alienated an entire generation of learners. They no longer believe what is being pushed to them in school has relevance to their future. And they may be right.

The resulting disconnection caused by our reliance on yesterday's inflexible failing systems and pedagogy is effectively robbing our students of their future by continuing to prepare them for a world and careers that no longer exist. Our "always on" technology-driven society has evolved from a linear industrial manufacturing model with everything in its prescribed place. Now everything everywhere connects, impacts and intertwines with everything else, and each added nuance influences everything once again.

The swirling vortex of readily accessible information has spawned a lack of certainty and conformity that is impossible to manage with linear systems. Rote memorization has become irrelevant in a world where information is universally available in seconds. Learning is no longer time- and place-dependent. The teacher and textbook aren't always right. There is no longer just one right answer. The answer is no longer at the end of the book, and collaboration is now the normal means of arriving at a solution.

The overriding question becomes what will help students succeed at all levels and in all pursuits. According to John Seely Brown, senior fellow of the Design Futures Council: "The most important thing for kids growing up today is the love of embracing change." He further suggests, "The ability to navigate in a buzz of confusion and to figure out how to trust the information that you find and feel confident about, makes the world yours. Embracing change and using ubiquitous information navigation and creation tools radically alter the learning landscape."

## How Do Multimedia Tools, Experience Impact Achievement?

Quite simply, they add relevance. Relevance leads to engagement that fosters practice. Practice encourages mastery, innovation and collaboration. Implementation and publication create a sense of purpose, require reflection and invite comment. Essentially, students become part scientist, technologist, engineer, mathematician, researcher, communicator, creator and artist utilizing tools that are part of their sociological and technological DNA. Today's multimedia students:

- Create advanced scenarios and solve complex problems.
- Use advanced computational skills.
- Communicate across a wide variety of platforms.
- Create a variety of content deliverable on a rapidly changing medium that reaches incredibly diverse consumers.
- Creatively and efficiently use a multitude of technological tools.
- Tell stories and create messages that are clear, concise and compelling.
- Manage a variety of collaborative resources and interpersonal networks.
- Access, aggregate, assimilate, filter, distribute and respond to more information than has ever been accessible. They must also do it faster, more efficiently and more accurately than their predecessors.

In fact, the 21st century survival skills as defined by Tony Wagner, co-director of the Change Leadership Group at Harvard Graduate School of Education, appear remarkably similar to those developed in a multimedia classroom.

- critical thinking and problem solving;
- the ability to create, collaborate and communicate across media-rich networks and systems;
- agility and adaptability;
- initiative and entrepreneurship;
- effective oral and written communication;
- accessing and analyzing information; and
- curiosity and imagination.

## Impact "by the Numbers"

While study and application of multimedia technologies is no silver bullet, they have significant impact. Student grammar scores in the Walter Cronkite School of Journalism and Mass Communication's 10 Stardust multimedia journalism programs (**http://stardust.jmc.asu.edu/Stardust/Stardust_Program.html**) annually increase by seven to 15 percent across the board. Historically, 100 percent of the students in the programs graduate from high school and more than 95 percent of them go on to postsecondary studies. These numbers are much higher than either the state or individual school averages. It is important to note that there are no individual student prerequisites for inclusion in any of the programs. In addition, the schools are all rural or urban and represent significantly diverse underserved populations.

In 2009, Cartwright Elementary School District, in Phoenix, Arizona, began a multimedia journalism program for its middle schools. The very first semester, language usage scores in all areas improved by 30 percent for students in the program. During the last year of my tenure at Arcadia High School, in Scottsdale, my students won more than 50 state or regional awards and 16 national awards. In addition, the seniors in the media communication program earned more than $1.25 million in merit scholarships. Perhaps more to the point, during an average year they mentored, guided and helped students and teachers from every academic discipline create multimedia content or develop communication strategies and skills. Today those students are flourishing at their schools of choice

studying medicine, engineering, law, business, media and journalism. Many of the selection committees at prestigious universities indicated their media technology skill sets influenced the selection decisions.

It is interesting to note that my six-year tenure at Arcadia has already produced 77 multimedia industry professionals. In addition, more than 100 students are preparing for multimedia-related careers at postsecondary institutions across the country. While many students in multimedia programs pursue media-related professions, it is important to note that an even larger number are thriving in careers that traditionally were not media-oriented. Those careers and businesses have changed to incorporate and encourage, if not require, the ability to write, manage information electronically, create, collaborate and produce in imaginative ways using a variety of multimedia tools. Unfortunately, education has not. ∎

**Dave Cornelius**

is director of Digital Media Outreach Programs for High School Journalism, Walter Cronkite School of Journalism and Mass Communication, Arizona State University. He can be contacted at David.Cornelius@asu.edu.

ACTE Interested in exploring this topic further? Discuss it with your colleagues on the ACTE forums at **www.acteonline.org/forum.aspx**.