Establishing a Framework for Digital Images in the School Curriculum

acquire
analyze
create
communicate
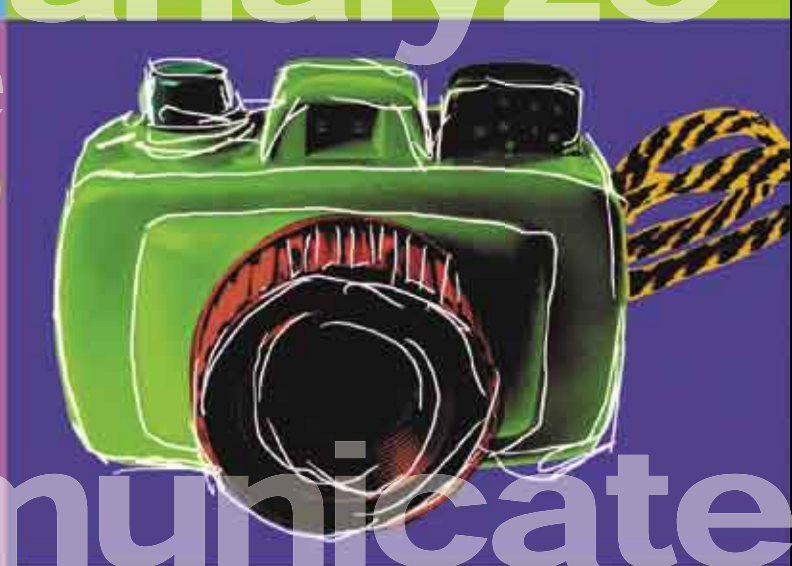
By Glen Bull and Ann Thompson

Subject: Professional development, technology integration

Audience: Technology coordinators, technology integration specialists, technology facilitators, staff developers, administrators, teachers, teacher educators

Standards: *NETS•T* II; *NETS•S* 3–6 (http://www.iste.org/standards/)

This year, we crossed a watershed—for the first time, more digital cameras than film cameras were sold in the United States. Soon the majority of American families will own a digital camera. The spread of a ubiquitous technology throughout society offers an opportunity for schools. In some instances, digital cameras facilitate instructional uses of images in the curriculum that previously could be accomplished only with great difficulty or expense. In other instances, digital cameras make it practical to address instructional objectives that were heretofore not possible.

For the past five years, editors from seven educational technology publications have met with the presidents and leaders of the national teacher educator associations representing the core content areas. This annual leadership summit also includes federal policy makers and corporate representatives. The summit offers leaders of the national teacher educator associations an opportunity to confer

and develop cross-disciplinary perspectives on selected topics of interest. This year's summit addressed the topic of digital images in the school curriculum.

Groups formed to explore digital images in English language arts, social studies, mathematics, and science. The four In the Curriculum articles that follow represent the latest thinking of these groups on how digital images can be used in the core curriculum areas. In addition to this theme issue of *L&L,* the editors of other participating educational technology journals now issue a call for articles on this topic. (See Call for a National Dialogue on p. 16.)

A Framework for Use of Images

Examination of categories of use across content areas can lend insight into uses that transcend individual subjects. As an organizing framework, each of the activities in all four content areas involve one or more of the following steps:

- Acquire images
- Analyze images
- Create instructional activities and products with images
- Communicate and disseminate products and outcomes

The four phases—acquire, analyze, create, and communicate—are not intended to suggest a linear process. Rather, activities involving images may begin at any phase and often will cycle among one or more phases in an iterative, step-wise fashion.

Acquire. The explosion of imaging technologies offers many opportunities for students to participate in acquisition and selection of images. Science students can use digital cameras to acquire images of leaves for digital leaf collections. Students in social studies classes can use digital cameras to acquire images for inclusion in community histories. Search engines on the World Wide Web can unearth a plethora of images on almost any topic.

Analyze. Use of images can involve many kinds of analysis. Development of a classification system for a digital leaf collection involves one type of analysis. Software such as the Geometer's Sketchpad can be used to analyze images of natural objects and architectural structures for the presence of ratios such as the golden rectangle. Social studies students may learn that the selection of images used to tell the story of a community is an act that involves social choices and values.

Create. Educational activities often involve products. In the past, these products have typically consisted of written words on a page. Word processing software now makes it easy to incorporate images in a manner that was not possible in previous eras. This allows science students to incorporate and label images in science class. Mathematical documents can now incorporate multiple representations—numeric, algebraic, graphical, and pictorial.

Products need not be limited to printed documents. For example, students in language arts classes can use images to develop digital stories that have their greatest impact when viewed on screen with student narration. Similarly students in social studies class can employ the same method(s) that the director Ken Burns uses to describe historical events, creating movies with still images and voiceovers.

Communicate. The ultimate objective in nearly all endeavors outside of school is to communicate. The use of electronic portfolios, Weblogs, and Web sites facilitates communication in educational activities as well. A paper or product that was formerly read only by a teacher can now be communicated to a larger audience.

In some instances, these activities and products might be shared only with other students within a class. Electronic collaboration tools now facilitate peer review in English class. In other cases, products can be shared with other classes at geographically distant sites. The Internet also makes it possible to share these products with parents. Fortunately digital documents, e-mail, and Web sites make it as easy to share images as words.

Although digital images in all disciplines involve the cycle described above in various ways, there are categories of use specific to each discipline.

Benefits of Use

Some uses of digital images in the curriculum could also be implemented with traditional film cameras. However, digital images amplify and extend these uses. For example, a digital image can be incorporated into a word-processed report, saved in an electronic portfolio, or posted on the Web. There are also added benefits related to convenience and cost. Students can potentially use the digital images immediately, with only the transfer delay from the digital camera to the computer. They don't have the delay for processing and return of film, and the entire process can be handled in the classroom, rather than in a photo lab. Students can also preview images and retake pictures immediately if necessary.

The cost savings are instructionally significant. In the 1970s, the Polaroid Corporation distributed free cameras to selected teachers for educational use. In many instances, once the trial pack of film provided with the educational kit was used, the cameras were placed on the shelf to gather dust. Teachers often lacked funds to purchase additional film. Costs for printing digital images can also add up, but with appropriate access, students may use their digital images in a total

Call for a National Dialogue

By Ann Thompson, Glen Bull, Lynne Schrum, and LaMont Johnson

This report from the summit represents the start of a coordinated effort to establish a national dialogue on digital images in the curriculum. Arguably, images combined with text offer more than text alone. This is an important factor in the extensive use of images for scientific visualization, in popular media and culture, in museum exhibits, and all aspects of life outside schools.

Editors from the publications listed in Table 1 participated in the recent leadership summit. They are collectively issuing a call for additional articles and discussion that extend our understanding of this important topic.

Technical factors have limited use of images in the curriculum until recently. As technical limitations dissipate, educators have a responsibility to determine how images in the curriculum can enhance student learning. As best practices are identified, teachers and educational leaders must be prepared to capitalize on the educational opportunity represented.

This theme issue will be followed by topical issues in *Computers in the Schools,* the *Journal of Computing in Teacher Education (JCTE),* and the *Journal of Research on Technology in Education (JRTE).* This represents the first attempt at coordinated effort among the respective dissemination channels to encourage exploration and dialogue on a seminal topic. The goal is to encourage exploration and research into use of digital images in the K–12 curriculum.

Computers in the Schools will publish a theme issue (Volume 22, 3–4) devoted to digital images in the K–12 curriculum. *Computers in the Schools* is intended for educational leaders, teachers, and technology coordina-tors. This theme issue was announced at the 15th International Conference of the Society for Information Technology & Teacher Education (SITE). To receive an electronic copy of this announcement, contact LaMont Johnson at ljohnson@unr.edu.

The Summer 2005 issue of *JRTE* will be devoted to research in the use of technology for teaching and learning in K–12 schools, but specifically invites articles investigating "Digital Images in K–12 Classrooms." It is important to document the value of using images in our classrooms. The *JRTE* editorial staff challenges contributors to explore ways in which images can contribute to learning and to document the outcomes that result from this use.

Contributions to the theme issue will be accepted until October 1, 2004. Manuscripts should report research on curricular and pedagogical uses of digital images. Submissions should be sent to Davis Smith at dsmith@iste.org. Potential contribu-tors are encouraged to review author guidelines at http://www.iste.org/jrte/ prior to submission. The subject line should read: Theme Issue—K–12 Digital Research.

JCTE focuses on research and practice in the use of technology in both preservice and inservice teacher education. *JCTE* is interested in submissions describing effects of innovative uses of digital images in teacher education programs and in preservice teachers' K–12 field experiences. The *JCTE* editorial staff hopes to include a strand on this topic throughout the 2004–05 academic year. Information on *JCTE* article summaries and author's guidelines are available at http://www.iste.org/jcte/. Send inquiries and submissions to Ann Thompson at jcte@iastate.edu.

In addition to the strong editorial group proposing coverage, leaders of the participating organizations (Table 2) are encouraging dialogue and exploration of these topics within their respective organizations.

Table 1. Editorial Participants in Leadership Summit V

Editor	Periodical
Glen Bull	*Contemporary Issues in Technology and Teacher Education*
Ann Thompson	*Journal of Computing in Teacher Education*
Lynne Schrum	*Journal of Research on Technology in Education*
Debra Sprague	*Journal of Technology and Teacher Education*
Niki Davis	*Journal of Pedagogy, Technology, and Education*
LaMont Johnson	*Computers in the Schools*
Anita McAnear	*Learning & Leading with Technology*

Table 2. Participating Leaders in Leadership Summit V

Leader	Content Area/Discipline
Karen Karp	President, Association of Mathematics Teacher Educators (AMTE)
Michael Berson	Chair, NCSS College and University Faculty Assembly (CUFA)
Janet Swenson	Past President, NCTE Conference on English Education (CEE)
John Park	Representative, Association for Education of Teachers in Science (AETS)
Niki Davis	President, Society for Information Technology & Teacher Education (SITE)
Don Knezek	Chief Executive Officer, International Society for Technology in Education (ISTE)

electronic environment and never need to print them. Even when print is the goal, unlike a Polaroid, unsatisfactory shots with a digital camera cost nothing.

Scientists have used time-lapse photography to study natural phenomena almost since the advent of photography. (See "Moving Images" *L&L,* February, 2002, pp. 42–45.) However, cost and technical difficulty have been obstacles to incorporation of these methods in science classes prior to the advent of digital cameras. Digital cameras, moreover, can facilitate capture of the movement of plants and other natural phenomena through time lapse photography in science class. (See Digital Images in the Science Classroom on p. 26.)

Categories of Use

Digital cameras and images can be used as data collection tools, scientific visualization tools, and communication tools in science. They can facilitate reading, writing, and visual communication in language arts. They can be employed for mathematical analyses, mathematical transformations, and to provide a context for problem solving in mathematics. They can serve as a source of primary digital sources, for community connections, and as a tool for inquiry in social studies. Categories of use that have emerged through dialogue and discussion are described more fully in the articles that follow.

Future Directions: Collaboration across Disciplines

The most recent National Technology Leadership Summit (NTLS V) took place at the National Gallery of Art in Washington, D.C. The setting was appropriate for a meeting devoted to discussion of digital images in the curriculum.

The summit was jointly sponsored by the four national teacher educa-

tor associations representing science (AETS), mathematics (AMTE), English (CEE), and social studies (CUFA) working in concert with their counterparts in educational technology, the Society for Information Technology and Teacher Education (SITE), and ISTE. For more on the leaders and their associations, see Call for a National Dialogue, left. This collaboration among these associations was unprecedented prior to the series of leadership summits established in this manner, demonstrating that technology can serve as a useful catalyst for discussions across organizations and disciplines.

Corporate participants were represented by the Software Information Industry Association (SIIA), Canon USA, Olympus USA, Texas Instruments, and Key Curriculum Press. Inclusion of corporate representation facilitates insight into potential technological advances just over the horizon and also serves as a conduit for consideration of useful educational directions in future discussions. Federal policy makers included representatives from the U.S. Department of Education and the Fund for the Improvement of Post Secondary Education (FIPSE). Julie Springer, coordinator of Teacher Programs at the National Gallery of Art, served as host.

The theme of digital images in the curriculum emerged from discussions at NTLS IV, held in Bermuda the previous year. (See the NTLS Report in the May 2003 *L&L*, pp. 18–27). Glen Bull served as program chair for NTLS V. In preparation for the summit, we held a series of planning meetings. These meetings were used to plan position papers outlining uses of digital images in each of the core content areas, which were developed over the spring and summer and distributed to participants in advance of the summit in August 2003.

The draft papers in each area (science, mathematics, English, and social studies) were used as a springboard for discussion by task forces in each of those areas at the summit. The cross-disciplinary collaboration made it possible to compare similarities and differences in use of this emerging technology across subjects and content areas.

The panel of educational technology leaders at NTLS V was asked to identify ways that digital cameras could be used to address curricular objectives more effectively in some instances, and reconceptualize the curriculum in others. The initial results described in the articles that follow are not intended to be an exhaustive taxonomy but rather a preliminary survey of categories of use.

Conclusions

Since the invention of the printing press a half millennium ago, words have held a privileged position in academic settings. Now that digital technologies support integration of words and images with equal facility, academic strategies must be identified to employ them both in the service of instructional objectives.

The articles that follow provide an expanded discussion of some of the categories of use for digital images in the core content areas. Happily they include both descriptions of such use and accompanying illustrative images.

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