ED449118 2000-10-00 Evaluating Technology-Based Curriculum Materials. ERIC Digest.

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ERIC Identifier: ED449118
Publication Date: 2000-10-00
Author: Reed, Diane S. - McNergney, Robert F.
Source: ERIC Clearinghouse on Teaching and Teacher Education Washington DC.

Evaluating Technology-Based Curriculum Materials. ERIC Digest.

Technology alone will not improve the quality of education, but when integrated with curriculum and instruction, it can be a powerful educational tool. Technology that is fitted to curriculum and instruction can stimulate the development of higher-order thinking and problem-solving skills, and it can support collaborative, globalized learning. This digest reviews how educators can evaluate technology-based curriculum materials for use in the classroom at all educational levels.

AUTHENTICITY

A key concept in evaluating technology-based curriculum materials is authenticity. Is the technology used to bring real-world examples into the classroom? Do such examples enhance conceptual understanding of complex, naturally occurring phenomena by integrating technology and subject matter? Are activities such as simulations, Web experiments, and Web field trips used to enable students to understand the richness and variability of real life? Particularly with young learners, technology should help students learn "by doing, interacting, and exploring, rather than watching and/or listening" (Wright & Shade, 1994).

To promote authenticity, learning assessment tools should pull students in desirable directions. Student products take the forms of portfolios, WebQuests (Dodge, 2000), and reports to classmates. Proponents of these methods argue that they mirror what is expected of employees in the work world. When evaluation attends not only to what students must know but also what they must be able to do, assessments themselves can function as instructional devices.

CONSTRUCTIVISM

Given the emphasis on authenticity, it is not surprising that the language of constructivism permeates the technology literature. Writers characterize technology as a tool that can help teachers and students become co-learners who collaboratively construct knowledge. Technology use that results in student engagement is characterized as successful. Engaged learners are: responsible for their own learning, energized by learning, strategic, and collaborative (Jones, Valdez, Nowakowski, Rasmussen, 1995).

EVALUATION FRAMEWORK

Comer and Geissler (1998) offer a framework for evaluating curriculum materials. They suggest that curriculum evaluators prepare their own assessment criteria tailored to the instructional context in which the curriculum materials will be used. Defining the instructional context requires evaluators to determine: (a) who the learners are; (b) who the instructor is and what constitutes the learning environment, of which the instructor is

a part; and (c) the nature of the technical limitations. Once evaluators establish this context, they can begin to evaluate the following aspects of the curriculum materials: content, required technology and instructional tools, learning assessment, and teacher support (Bernhard, Lernhardt, Miranda-Decker, 1999), keeping in mind the need for authenticity.

CONTENT

"One of the most important distinctions in evaluating digital content is whether a product emphasizes open-ended exploration or drill-and-practice. Many experts, particularly those who support a constructivist approach to teaching, strongly prefer the former" (Zehr, 1999). When integrated effectively into the curriculum by skilled teachers, digital content enables students to seek and manipulate digital information in collaborative, creative, and engaging ways, all of which foster learning (CEO Forum, 2000). For example, the JASON Project enables teachers and their students to participate in a year-round scientific expedition meant to encourage engagement--even excitement--about one or more of the earth's dynamic systems. Students share data and are able to chat with scientists about their own experiments. On the Monterey Bay expedition, students did experiments in their own classrooms on the feeding of abalone and sea urchins (The Jason Foundation for Education, 2000). In another example, the Virginia Center for Digital History enables students to examine newspapers, letters, diaries, and maps of the historical period the students are studying (Thomas & Ayres, 1999). The Valley of the Shadow project, a story of two cities' histories during the Civil War, allows students to explore the lives of the families of soldiers and to reconstruct true-life stories.

Effective content focuses on information literacy skills to assist students in gathering, interpreting, and presenting information. "It turns out that successful searching and efficient electronic investigations must rest upon a carefully developed, structured foundation of information literacy skills that would include solid questioning, prospecting, translating and inventive abilities" (McKenzie, 1999). Student projects such as WebQuests guide students through information gathering and make their searching more efficient (Dodge, 2000).

Students become content producers. Products may take a variety of forms: video, software, CD-ROM's, web sites, e-mail, on-line learning management systems, computer simulations, streamed discussions, data files, databases, audio, and more. There are so many examples of student knowledge production that numbers and types defy description. A tour of the ThinkQuest site (http://www.thinkquest.org) provides a flavor of what kinds of work students can do. The CEO Forum (2000) offers another example from students in Queens, New York, who created "YO! It's Time For Braces." This multimedia web production intends to inform and allay fears about orthodontic braces. The site includes advice, information, and pictures from 20 orthodontists and other specialists (CEO Forum, 2000).

TECHNOLOGY AND INSTRUCTIONAL TOOLS

Evaluators must consider the hardware and software requirements of the curriculum and whether the teacher has ready access to them. In addition, how much time will the teacher need to invest in learning to use the technology? Hopefully, the technology infrastructure of the school or school district will accommodate access for students and staff both inside and outside classrooms.

Evaluators should consider whether the technology helps students "understand the role and importance of technology in the real world" (Bernhard, Lernhardt and Miranda-Decker, 1999). The technology skills required for success are taught in the context of the curriculum as just-in-time modules and not as isolated units. The technology should have the "ability to engage student interest . . . and to make use of computer capabilities" (Bernhard, Lernhardt and Miranda-Decker, 1999). Evaluators should examine software in the same reflective way that they examine other instructional materials; that is, with children's learning in mind (Hall & Martin,1999).

ASSESSMENT

The primary goal of technology assessment should be to measure student engagement as demonstrated by their observable performances. Students are most likely to perform in desirable ways when they engage in realistic and worthwhile tasks. Assessments in the JASON Project, for example, are hands-on, real-world exercises in data collection. "Performance assessments measure what is taught in the curriculum. There are two terms that are core to depicting performance assessment: (1) Performance: A student's active generation of a response that is observable either directly or indirectly via a permanent product. (2) Authentic: The nature of the task and context in which the assessment occurs is relevant and represents 'real-world' problems or issues"(Elliott, 1995).

TEACHER SUPPORT

No curriculum can be effective without high-quality, ongoing professional development. "The old approach of after-school technology training sessions does not work. Such sessions demonstrated the features of software applications but rarely showed how to use them in the classroom" (McKenzie, 1999). Professional development should take into account the diverse learning styles and stages of the development of learners. Multiple teacher development options should be available--study groups, classes that emphasize teaching and learning strategies, online classes, and formation of teacher-support teams. Sufficient time should be allotted for teachers to participate.

CONCLUSION

There is no way to escape the fact that today's classrooms must provide technology-supported learning opportunities for students. Teachers must be prepared to

use technology in ways that encourage student engagement * ultimately student learning * as measured in a variety of ways. Technology, used appropriately, can help students become active, independent learners with access to seemingly unlimited information. Only through evaluation of technology-based curricula can educators make informed decisions about the purchase and use of technology, and ultimately about the wisdom of their investments.

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This project has been funded at least in part with Federal funds from the U.S. Department of Education, Office of Educational Research and Improvement, under contract number ED-99-CO-0007. The content of this publication does not necessarily reflect the views of or policies of the U.S. Department of Education nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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Title: Evaluating Technology-Based Curriculum Materials. ERIC Digest.
Document Type: Information Analyses---ERIC Information Analysis Products (IAPs) (071); Information Analyses---ERIC Digests (Selected) in Full Text (073);
Available From: ERIC Clearinghouse on Teaching and Teacher Education, American Association of Colleges for Teacher Education, 1307 New York Avenue, N.W., Suite 300, Washington, DC 20005-4701; Tel: 202-293-2450 or 800-822-9229 (Toll Free); e-mail: query@aacte.org. For full text: http://www.ericsp.org.
Descriptors: Constructivism (Learning), Content Analysis, Curriculum Evaluation, Educational Technology, Elementary Secondary Education, Evaluation Methods, Performance Based Assessment, Student Evaluation
Identifiers: Authenticity, ERIC Digests
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