

**Healthy Practices in Teaching & Learning with Information Technology, and Evaluation
Method in Classroom**

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Abstract: -

Thousands of candles can be light from a single candle, and the life of candle will not be reduced. Happiness never decreases by being sharing. One of the most satisfying aspects of teaching at the college or university level may be found in the mentoring connection that faculty members can develop with their students. A good mentoring connection can be what is sometimes called a "peak experience" for both mentor and student. A sharing of something unique that no one else may experience in quite the same way. The student experiences an acceptance of ideas and contributions that may be unequalled in previous life experience.

Although there has been a strong move forward to get educational technology into the hands of teachers and students, many barriers to implementation still exist.

The integration of technology into the curriculum will not succeed without giving teachers sufficient time to practice, explore, conceptualize, and collaborate.

Professional development activities may not provide ongoing, hands-on training for teachers or practical strategies for implementing technology into lesson plans. Initial technology funding may not be sustained and thus not capable of providing upgrades, maintenance, and ongoing professional development. Fortunately, these obstacles can be addressed and overcome. This Critical Issue provides practical information for promoting technology use in schools, college, and university.

Introduction

Relationships and the Making of Meaning

Relationships are as essential to teaching as the flour in the cake. The reason that we often fail to appreciate the importance of relationships is that we have inherited misconceptions about teaching, about learning and about the nature of the mind.

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Now we are equally certain that the mind is a kind of computer and the teacher's task is to program it. As long as the students' circuits are not fried from partying the night before, information can be fed to them at a reasonable rate and they should be able to process it.

Relationships and the Process of Learning

Second argument for good relationships is based on the contextual nature of the learning process. There is recent evidence that we do not learn isolated facts that are stored away in our heads like books on a library shelf; we learn them along with the context in which they are encountered.

Creating Good Relationships

How do you encourage relationships that lead to the most effective teaching and learning? Key features underlying the agreement are mutual respect; shared responsibility for learning and mutual commitment to goals; effective communication and feedback; cooperation and willingness to negotiate conflicts and a sense of security in the classroom.

Role of a Mentor

- Providing academic help
- Providing career help in study
- Providing technological support

It is common to hear the mentor described as:

- Guide
- Role model
- Advocate
- Friend
- Coach

Primary role of the mentor

- Establish mutual trust and respect.
- Establish a positive, personal relationship with a mentee.
- Maintain regular interaction and consistent support.
- Have fun and enjoy the experience.
- **Help a mentee to develop or begin to develop life skills.**
 - Work with your mentee to accomplish specific goals such as improved grades, time management, school attendance, self-esteem, and confidence.

- Instill the framework for developing broader life-management skills (*i.e.*, decision-making, goal setting, conflict resolution, money management, etc.).
- **Assist a mentee in obtaining additional resources.**
 - Provide awareness of community, educational, and economic resources available to youth and their families and how to access these resources.
 - Act as a guide, advocate, "coach" and role model.
 - Avoid acting as a professional case manager. View the role of mentor as a friend rather than a counselor.
- **Increase the mentee's ability to interact with people from various backgrounds (cultural, racial, socioeconomic, etc.).**
 - Respect and explore differences among people from various backgrounds.
 - Introduce the mentee to different environments (*i.e.*, workplace versus school setting). Discuss differences in behavior, attitude, and style of dress.
- Keep in mind that each mentor-mentee match is unique and will result in unique experiences.

Technology in the classroom

There are various types of technologies currently used in traditional classrooms. Among these are:

- **Computer in the classroom:** Having a computer in the classroom is an asset to any teacher. With a computer in the classroom, teachers are able to demonstrate a new lesson, present new material, illustrate how to use new programs, and show new websites.
- **Class website:** An easy way to display your student's work is to create a web page designed for your class. Once a web page is designed, teachers can post homework assignments, student work, famous quotes, trivia games, and so much more. In today's society, children know how to use the computer and navigate their way through a website, so why not give them one where they can be a published author. Just be careful as most districts maintain strong policies to manage official websites for a school or classroom. Also, most school districts provide teacher WebPages that can easily be viewed through the school district's website.
- **Class blogs and wikis:** There are a variety of Web 2.0 tools that are currently being implemented in the classroom. Blogs allow for students to maintain a running dialogue,

such as a journal, thoughts, ideas, and assignments that also provide for student comment and reflection. Wikis are more group focused to allow multiple members of the group to edit a single document and create a truly collaborative and carefully edited finished product.

- **Wireless classroom microphones:** Noisy classrooms are a daily occurrence, and with the help of microphones, students are able to hear their teachers more clearly. Children learn better when they hear the teacher clearly. The benefit for teachers is that they no longer lose their voices at the end of the day.
- **Mobile devices:** Mobile devices such as clickers or Smartphone can be used to enhance the experience in the classroom by providing the possibility for professors to get feedback.
- **Smart Boards:** An interactive whiteboard that provides touch control of computer applications. These enhance the experience in the classroom by showing anything that can be on a computer screen. This not only aids in visual learning, but it is interactive so the students can draw, write, or manipulate images on the Smart Board.
- **Online media:** Streamed video websites can be utilized to enhance a classroom lesson (e.g. United Streaming, Teacher Tube, etc.)

Benefits

Educational technology is intended to improve education over what it would be without technology. Some of the claimed benefits are listed below:

- **Easy-to-access course materials.** Instructors can post the course material or important information on a course website, which means students can study at a time and location they prefer and can obtain the study material very quickly
- **Student motivation.** Computer-based instruction can give instant feedback to students and explain correct answers. Moreover, a computer is patient and non-judgmental, which can give the student motivation to continue learning. According to James Kulik, who studies the effectiveness of computers used for instruction, students usually learn more in less time when receiving computer-based instruction and they like classes more and develop more positive attitudes toward computers in computer-based classes. The American educator, Cassandra B. Whyte, researched and reported about the importance of locus of control and successful academic performance and by the late 1980s, she wrote

of how important computer usage and information technology would become in the higher education experience of the future.

- **Wide participation.** Learning material can be used for long distance learning and are accessible to a wider audience.
- **Improved student writing.** It is convenient for students to edit their written work on word processors, which can, in turn, improve the quality of their writing. According to some studies, the students are better at critiquing and editing written work that is exchanged over a computer network with students they know.
- **Subjects made easier to learn.** Many different types of educational software are designed and developed to help children or teenagers to learn specific subjects. Examples include pre-school software, computer simulators, and graphics software.
- A structure that is more amenable to measurement and improvement of outcomes. With proper structuring it can become easier to monitor and maintain student work while also quickly gauging modifications to the instruction necessary to enhance student learning.

Determining Effective Goals for Technology Use

Technology is not transformative on its own. Evidence indicates that when used effectively, "technology applications can support higher-order thinking by engaging students in authentic, complex tasks within collaborative learning contexts" (Means, Blando, Olson, Middleton, Morocco, Remz, & Zorfass, 1993). Instead of focusing on isolated, skills-based uses of technology, schools should promote the use of various technologies for sophisticated problem-solving and information-retrieving purposes (Means & Olson, 1995).

In other words, new technology can be an appropriate vehicle for promoting meaningful, engaged learning. It allows students to work on authentic, meaningful, and challenging problems, similar to tasks performed by professionals in various disciplines; to interact with data in ways that allow student-directed learning; to build knowledge collaboratively; and to interact with professionals in the field. Technologies also can be used to promote the development of higher-order thinking skills and allow opportunities for teachers to act as facilitators or guides and often as a co-learner with the students.

In the classroom, teachers can develop a countless of technology-supported engaged learning projects that enable students to solve real-world problems, retrieve information from online resources, and connect with experts. Such projects can be adapted for all grade levels. For

example, a teacher can share an author's Web site with young children to help them understand how writers make their stories interesting and fun to read. Middle-school students can use e-mail and teleconferencing to connect with experts to solve science problems. High-school students can develop a mock technology company and use the Internet, scanners, and presentation software to plan and deliver speeches to stockholders.

Accepting New Roles for Teachers in the Classroom

Technology integration brings changes to teachers' instructional roles in the classroom. The teacher's roles in a technology-infused classroom often shift to that of a facilitator or coach rather than a lecturer (Henriquez & Riconscente, 1998). Technology use also tends to foster collaboration among students (Tinzmann, 1998). Schaffer and Logan (1999) document these and other changes in the dynamics of the classroom.

As students become more self-directed, teachers who are not accustomed to acting as facilitators or coaches may not understand how technology can be used as part of activities that are not teacher-directed. This situation may be an excellent opportunity for the teacher not only to learn from the student but also to model being an information seeker, lifelong learner, and risk taker. Kozma and Schank (1998) note, "Teachers must become comfortable letting students move into domains of knowledge where they themselves lack expertise, and they must be able to model their own learning process when they encounter phenomena they do not understand or questions they cannot answer"

Coaching Teachers at Different Skill Levels

A school may be home to educators with a wide variety of skill levels in technology: computer gurus anxious to put the capabilities of the newest hardware and software to use; moderate technocrats, who implement basic computerized tasks; and the technologically limited. The problem faced by administrators and professional development staff of such a school is providing adequate training to bring all teachers to an adequate level of technical expertise so learning goals can be met.

Because teachers learn at different rates and have individual needs when mastering new skills, technology training should be flexible yet cover a comprehensive set of skills. Before professional development is designed, each teacher's current level of technology skills should be determined by using appropriate instruments, such as the Educational Technology Foundations for All Teachers developed as part of the National Educational Technology Standards. These

standards can be used to determine the skill level of individual teachers and their needs for professional development. Self-assessment directly related to the technology learning goals set by the school also is appropriate and effective.

Technology Coordinator:

- Be available for troubleshooting and just-in-time support, or for securing further technical assistance.
- Periodically check all technology for problems; complete repairs as needed.
- Determine alternative configurations for computers depending on instructional goals. (For example, pool all grade-level computers to create a lab, or develop mobile computers to meet the needs of different classes at different times.)
- Develop flexible plans for classrooms' Internet use based on access points.
- Participate in the planning and implementation stages for technology use. Be aware of classroom needs to incorporate technology into the curriculum.
- Develop strategies for training teachers for using technology that will meet the school's educational goals for the use of technology.
- Design timely, teacher-responsive support for technology, such as workshops, coaching, and mentoring.
- Identify each teacher's skill level with technology using assessment instruments such as the Professional Competency Continuum Assessment Tool.
- Develop the knowledge and skills to help teachers at all competency levels improve their ability to integrate technology to promote learning.
- Work individually with teachers in the classroom. Provide adequate time and support for each teacher's individualized learning.
- Identify additional technology professional development opportunities for teachers.
- Help teachers work in teams to identify, evaluate, and select appropriate software relating to their content areas and learning goals. Provide guidelines on how to evaluate learning software.
- Provide a professional development corner in the school library or faculty room where reviewed software is cataloged and available to teachers.
- Encourage other teachers, students, and community members to volunteer their technology skills for minor troubleshooting.

- Continue to update technology knowledge and skills through ongoing professional development.

Teachers:

- Determine the purpose of using technology in the classroom, as determined by the specified educational goals. Is it used to support inquiry, enhance communication, extend access to resources, guide students to analyze and visualize data, enable product development, or encourage expression of ideas? After the purpose is determined, select the appropriate technology and develop the curricula. Create a plan for evaluating students' work and assessing the impact of the technology.
- Coordinate technology implementation efforts with core learning goals, such as improving students' writing skills, reading comprehension, mathematical reasoning, and problem-solving skills.
- Collaborate with colleagues to design curricula that involve students in meaningful learning activities in which technology is used for research, data analysis, synthesis, and communication.
- Promote the use of learning circles, which offer opportunities for students to exchange ideas with other students, teachers, and professionals across the world.
- Encourage students to broaden their horizons with technology by means of global connections, electronic visualization, electronic field trips, and online research and publishing.
- Ensure that students have equitable access to various technologies (such as presentation software, video production, Web page production, word processing, modeling software, and desktop publishing software) to produce projects that demonstrate what they have learned in particular areas of the curriculum.
- Encourage students to collaborate on projects and to use peer assessment to critique each other's work.
- In addition to standardized tests, use alternative assessment strategies that are based on students' performance of authentic tasks. One strategy is to help students develop electronic portfolios of their work to be used for assessment purposes.

- Ensure that technology-rich student products can be evaluated directly in relation to the goals for student outcomes, rather than according to students' level of skill with the technology.
- Create opportunities for students to share their work publicly--through performances, public service, open houses, science fairs, and videos. Use these occasions to inform parents and community members of the kinds of learning outcomes the school is providing for students.
- Learn how various technologies are used today in the world of work, and help students see the value of technology applications. (Pertinent online information can be found in the 1998-99 Occupational Outlook Handbook and the Bureau of Labor Statistics Career Information.)
- Participate in professional development activities to gain experience with various types of educational technology and learn how to integrate this technology into the curriculum.
- Develop strategies for using technology to improve student achievement.
- Develop strategies for using technology to enhance engaged learning for at-risk students.
- Develop an individual professional development plan that provides for acquisition of technology skills and integration of technology into classroom projects. This plan can be based on documents such as Core Technology Competencies and Skills, Curriculum, Learning, and Assessment Competencies and Skills, Classroom and Instructional Management Competencies and Skills, Recommended Foundations in Technology for All Teachers, Internet Skills Rubrics, and the Professional Competency Continuum Online Assessment Tool.
- Form study groups to explore issues, share assessments of student work, and identify strategies for improving technology use.
- Engage in collaborative planning and evaluation.
- Take on new and expanded roles as part of professional development. Such roles might include devising individual professional development plans, acting as peer advisors and mentors, collecting data, and forming study groups.
- Pursue innovative ideas for using community resources to provide and support professional development in technology use.

- Visit other schools and classrooms to see how technology has been integrated effectively into the curriculum. Or virtually visit classrooms by viewing CD-ROMs (such as the Captured Wisdom CD-ROM Library, produced by the North Central Regional Technology in Education Consortium), videotapes of technology use in schools, or Internet sites relating to technology integration in content areas (such as the Handbook of Engaged Learning Projects).
- Use telecommunications (such as e-mail lists and mail groups) to become part of a community of teachers. Form peer groups across schools, and join subject-matter networks and collaborative to communicate about technology.
- At faculty meetings, share ideas for using technology within different content areas.
- Attend and present at conferences to learn more and share ideas about teaching with technology.
- Become familiar with the Technology Foundation Standards for All Students, which were developed as part of the National Educational Technology Standards by the International Society for Technology in Education. Determine how these standards can promote students' technology use in the classroom.
- Become aware of the Educational Technology Foundations for All Teachers, also developed as part of the National Educational Technology Standards. Take steps to meet these standards.
- Actively participate in professional development activities to increase technology use.
- Develop an individual professional development plan that provides for acquisition of technology skills and integration of technology into classroom projects. This plan can be based on documents such as Core Technology Competencies and Skills, Curriculum, Learning, and Assessment Competencies and Skills, and Classroom and Instructional Management Competencies and Skills.
- Search the NETS database of lessons and units for grade-specific activities that integrate technology into content-area instruction.
- Develop strategies for using technology to improve student achievement.
- Develop strategies for using technology to enhance engaged learning for at-risk students and using technology to enhance literacy instruction.

- Design class projects in which students use technology for inquiry, research, design, data synthesis, communication, and development.
- Focus on student projects with authentic uses of technology for real-world application in the classroom.
- Promote cooperative learning in the classroom so that students work together with technology and learn from each other.
- If the classroom technology is limited, develop teaching strategies that involve small groups of students using the technology at different times.
- Use technology, Internet sites, and software in the classroom; reflect on the degree of success in using these strategies to meet learning goals.
- Collaborate with other teachers, and work in teams to design and implement technology-supported projects.
- Use the Learning with Technology Profile Tool to compare current instructional practices with a set of indicators for engaged learning and high-performance technology.
- Promote the intersection of learning and technology, so that engaged learning and high technology performance contribute to the students' technology effectiveness.
- Visit other schools and classrooms to see how technology has been integrated effectively into the curriculum.
- Form study groups to explore issues, share assessments of student work, and identify strategies for improving technology use.
- Work in teams to identify, evaluate, and select software that is appropriate to the curriculum and the school's learning goals.
- Gain practice in evaluating online educational materials for use in instruction.
- At faculty meetings, share ideas for using technology within different content areas.
- Attend and present at conferences to learn more and share ideas about teaching with technology.

Parents and Community Members:

- Support technology implementation and the professional development it requires.
- Participate on technology-planning teams; provide perspectives on real-world needs.
- Join in fundraising and lobbying efforts. Help identify potential sources of technology funding.

- Suggest possible collaborations, such as with a local university or business, and provide contacts to help the school develop them.
- Volunteer time to allow teachers to engage in professional development activities.
- Join in planning for technology implementation and the professional development it requires; provide perspectives on real-world needs.
- Join in fund-raising efforts, lobbying, and identifying potential sources of funding.
- Suggest possible collaborations, such as with a local university, and use contacts to help the school develop them.
- Volunteer time to allow teachers to engage in professional development activities.
- Parents should understand the importance, benefits, and issues associated with informational uses of technology in schools.
- Parents share with their children the importance and concerns they have about the uses of technology.
- Parents are involved in school activities, including helping students become more successful users of technology.
- Parents advocate for better educational opportunities for their children, including better access and use of technology.
- Parents model and provide guidance to quality uses of technology outside of school, including adhering to copyright laws and understanding the benefits and challenges of the vast and diverse materials available on the Internet.

National Educational Technology Standards for Teachers: -

They are especially relevant for teachers considering the following technology action options:

- Teachers understand and support the importance of students learning to use educational technology as an important component of their preparation for further education, work, and life in general.
- Teachers demonstrate their support of technology use by developing their own skills, knowledge, and strategies necessary to model effective uses of technology.
- Teachers learn and use effective ways to integrate technology into their curriculum and use technology in ways that enhance instructional opportunities and successes for all students.

- Teachers learn uses of technology that provide assessment feedback to parents, students, and the teacher about how well the student is learning, and then use that data to improve learning productivity.
- Teachers understand and instill into their students the social ethical, legal and human issues surrounding the uses of technology

Students

Student standards have been developed by the International Society for Technology (ISTE), which recommends students' use of technology should reflect the following skills and operations:

- **Basic operations and concepts**
 - Students demonstrate a sound understanding of the nature and operation of technology systems.
 - Students are proficient in the use of technology.
- **Social, ethical, and human issues**
 - Students understand the ethical, cultural, and societal issues related to technology.
 - Students practice responsible use of technology systems, information, and software.
 - Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.
- **Technology productivity tools**
 - Students use technology tools to enhance learning, increase productivity, and promote creativity.
 - Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.
- **Technology communications tools**
 - Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
 - Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.
- **Technology research tools**
 - Students use technology to locate, evaluate, and collect information from a variety of sources.

- Students use technology tools to process data and report results.
- Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.
- **Technology problem-solving and decision-making tools**
 - Students use technology resources for solving problems and making informed decisions.
 - Students employ technology in the development of strategies for solving problems in the real world.

Goals:

- The school's technology plan clearly identifies learning goals to be achieved through technology.
- Technology supports the instructional learning goals. It is integrated into instruction in meaningful ways so that it contributes to the attainment of high standards by all students.
- Technology is used for challenging, long-term projects that promote students' higher-order thinking skills instead of merely for drill-and-practice programs to improve basic skills.
- All students have opportunities to use a variety of technologies to support their work on authentic tasks.
- All technology is in operable condition and is being used effectively and to the maximum extent possible.
- Just-in-time technology support is available for teachers and students.
- There is flexibility in managing the technology to ensure that all students and teachers have equity of access.
- Professional development is considered an important part of the technology plan and the technology budget.
- The professional development component of the technology plan ensures that every teacher has allotted time throughout the school year for professional development relating to technology and its integration into the classroom.
- Professional development in technology is directly applicable to the classroom situation.
- A diverse portfolio is in place to ensure that funding is available to support technology and ongoing professional development.

Evaluation

Ongoing evaluation of technology applications and student achievement, based on the overall educational goals that were decided on, helps to ensure that the technology is appropriate, adaptable, and useful. Such evaluation also facilitates change if learning goals are not being met. Administrators can acknowledge and recognize incremental improvements in student outcomes as well as changes in teachers' curricula and practices. Gradual progress, rather than sudden transformation, is more likely to result in long-term change.

Baker (1999) emphasizes that besides being a means to collect, interpret, and document findings, evaluation is a planning tool that should be considered at the beginning of any technology innovation. She adds that the overall focus of evaluation is student learning. Heinecke, Blasi, Milman, and Washington (1999) note that multiple quantitative and qualitative evaluation measures may be necessary to document student learning outcomes. To ensure that evaluation procedures are adequately designed and carried out, administrators and teachers may wish to consult evaluation sources such as *An Educator's Guide to Evaluating the Use of Technology in Schools and Classrooms*.

All of these issues are important in using technology to improve student achievement. Educational technology is not, and never will be, transformative on its own. But when decisions are made strategically with these factors in mind, technology can play a critical role in creating new circumstances and opportunities for learning that can be rich and exciting. "At its best, technology can facilitate deep exploration and integration of information, high-level thinking, and profound engagement by allowing students to design, explore, experiment, access information, and model complex phenomena," note Goldman, Cole, and Syer (1999). These new circumstances and opportunities—not the technology on its own—can have a direct and meaningful impact on student achievement.

- Encourage SEAs and LEAs to set aside 10 percent to 15 percent of funds to evaluate their technology grants.
- Provide a model comprehensive plan for states and districts to consider as they design their own evaluation plans to include a statement of purpose, identifies clear objectives, demonstrates valid approaches to research design, and specifies appropriate time frames for analysis and reporting.
- Support efforts to develop shared instruments and sets of common data elements.

- Develop a database of "best practices" for technology programs and applications that have shown to support student achievement in scientifically based research studies.
- Develop a list of highly qualified researchers and evaluators from whom SEAs and LEAs can obtain guidance.
- Explore the development of validated instruments that could be shared across states.
- Review a range of national and state educational standards for student learning (such as those listed in Developing Educational Standards). Seek out content standards that articulate the goals for students to achieve.
- Determine key aspects of national and state student learning standards for the school or district to focus on as educational goals. Involve teachers in this process to ensure that their expertise and opinions are considered.
- Charge cross-disciplinary groups of teachers and technology coordinators with finding new ways that technology can help students to achieve those learning goals.
- Collaborate to create a technology plan for the school. (Refer to the Critical Issue "Developing a School or District Technology Plan.")
- Set one-, three-, and five-year goals for improving student learning through technology.
- Identify specific curricula, practices, skills, attitudes, and policies that can be enhanced through the use of technology to foster significant improvement in the character and quality of student learning. (For example, if the district is interested in improving students' writing performance, word processing with an emphasis on revision and editing should become a salient part of the curriculum across disciplines.)
- Identify classrooms in the district where students are already producing exemplary work using technology; or visit virtual classrooms by viewing CD-ROMs videotapes of technology use in schools (such as the Learning With Technology videotapes), or Internet sites relating to technology integration in content areas (such as lessons using the Amazing Picture Machine and the Handbook of Engaged Learning Projects). Build a database or other resource that allows the school to share these best practices with school staff and the community in general.
- Be aware of state technology plans, district technology plans, and related policies. Ensure that the school is in compliance.

- Become familiar with factors that affect the effective use of technology for teaching and learning. Learn about research studies conducted in real school settings that describe how technology use is influenced by teachers' experience with technology, adequacy of release time, professional development opportunities, and length of class periods.
- Ensure that teachers are aware of the value of technology for all students, especially those considered at risk of educational failure. (Refer to the Critical Issue "Using Technology to Enhance Engaged Learning for At-Risk Students.")
- Ensure that all students have equitable access to effective uses of technology. Develop strategies for addressing access inequities, strategies for addressing type-of-use inequities, and strategies for addressing curriculum inequities.
- Provide ongoing, extensive, and research-based professional development opportunities and technical support to help teachers use technology to develop meaningful instructional strategies for students. (Refer to the Critical Issues "Realizing New Learning for All Students Through Professional Development" and "Finding Time for Professional Development.")
- Ensure that new, research-based approaches to professional development are consistent with the National Staff Development Council (NSDC) standards for staff development.
- Provide incentives, structures, and time for teachers to participate in highly effective staff development (such as study groups and action research) to help them integrate technology into their teaching and learning.
- Find ways to make appropriate structural changes in the school day and class scheduling to support engaged learning with technology. Consider block scheduling as a possibility.
- Educate parents about new assessment methods that enable teachers and administrators to make judgments about the effectiveness of technology in supporting student learning.
- Use appropriate evaluation procedures and tools to determine the impact of technology use on student achievement based on the learning goals that were set. Consult evaluation sources such as *An Educator's Guide to Evaluating the Use of Technology in Schools and Classrooms*. Share findings with the community.

Criticism

Although technology in the classroom does have many benefits, there are clear drawbacks as well. Lack of proper training, limited access to sufficient quantities of a

technology, and the extra time required for many implementations of technology are just a few of the reasons that technology is often not used extensively in the classroom.

Similar to learning a new task or trade, special training is vital to ensuring the effective integration of classroom technology. Since technology is not the end goal of education, but rather a means by which it can be accomplished, educators must have a good grasp of the technology being used and its advantages over more traditional methods. If there is a lack in either of these areas, technology will be seen as a hindrance and not a benefit to the goals of teaching.

Another difficulty is introduced when access to a sufficient quantity of a resource is limited. This is often seen when the quantity of computers or digital cameras for classroom use is not enough to meet the needs of an entire classroom. It also occurs in less noticed forms such as limited access for technology exploration because of the high cost of technology and the fear of damages. In other cases, the inconvenience of resource placement is a hindrance, such as having to transport a classroom to a computer lab instead of having in-classroom computer access by means of technology such as laptop carts.

Technology implementation can also be time consuming. There may be an initial setup or training time cost inherent in the use of certain technologies. Even with these tasks accomplished, technology failure may occur during the activity and as a result teachers must have an alternative lesson ready. Another major issue arises because of the evolving nature of technology. New resources have to be designed and distributed whenever the technological platform has been changed. Finding quality materials to support classroom objectives after such changes is often difficult even after they exist in sufficient quantity and teachers must design these resources on their own.

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