

## Helping Teachers Design Effective Learning Environments Supported by Educational Technology

### Chapter Focus Questions:

1. What contribution to learning is made by each of the four components of an effective learning environment?
2. How can technology aid a teacher in establishing each of the four components of an effective learning environment?
3. What is the relationship between pedagogical technology knowledge and pedagogical content knowledge?
4. What is the relationship between the classroom-level and school-level Educational Technology Integration and Implementation Principles?

### **Effective Learning Environments**

In *How People Learn* (1999), Bransford, Brown, and Cocking review the cognitive science literature of the last forty years, which now guides what the authors refer to as the new science of learning. The new science of learning focuses on learning with understanding—that is, on students’ developing a conceptual understanding based upon a strong understanding of subject matter that can support more cognitively complex work, such as decision making, problem solving, and invention. In the research examining the development of understanding in learners, many studies emphasize the importance of building upon learners’ prior knowledge about a topic and of learners’ active involvement in their learning. In summarizing the implications of these findings for educators, Bransford, Brown, and Cocking identify four essential elements of effective learning environments: they are learner-centered, knowledge-centered, assessment-centered, and community-centered.

In a learner-centered learning environment, teachers take the knowledge and prior experiences of individual learners into account in their teaching and try to accommodate learners’ strengths and interests. This approach is based on cognitive research findings that prior knowledge is the basis for constructing all new understanding. An example of a learner-centered approach might be a social studies teacher’s asking students about their daily routine as they study the human impact on the environment and how individual actions do make a difference on a global scale.

In a knowledge-centered learning environment, teachers direct learning activities toward developing students’ deep understanding. Research has demonstrated that deep understanding is necessary for learners to apply knowledge in a given situation and to transfer it to new ones. This requires teachers to make a careful analysis of what they want learners to know and be able to do when they finish a learning activity or course and to provide students with the foundational knowledge, skills, and attitudes needed for the successful application and transfer of that learning. For example, a social studies teacher might focus a unit about the civil war on its causes and political context and to support this higher-level conceptual understanding might ask students to compare and contrast more recent wars with the civil war and ask students to memorize dates and names of battles only as is necessary.

In an assessment-centered learning environment, teachers provide students with multiple opportunities to make their thinking visible and with feedback on their efforts. Such feedback

can then guide students' continued thinking and revision strategies. The importance of this aspect of an effective learning environment is supported by research findings that students who are active in and take charge of their learning can better regulate and improve their approaches and efforts. It is also consistent with research showing that students build new knowledge on existing knowledge and that the more visible their thinking is to them, the more effectively they can modify and refine it. For example, a social studies teacher might allow students multiple opportunities to demonstrate their developing understanding throughout a government unit by asking them to create and update a concept map of similarities and differences between local and state governance.

In a community-centered learning environment, students need not only to feel safe to ask questions and to reveal their ideas and difficulties they have in understanding the subject matter, but also to develop norms of behavior that contribute to successful learning in that learning environment. Research shows that social interactions and norms within a community of learners will affect how learners approach their work and that connecting the curriculum to communities beyond the classroom will influence the degree of understanding that students develop. For example, a social studies teacher might put students in contact with other students from another culture or geographic setting to better understand the influence of culture on the topic they are studying.

In conclusion, recognizing these four elements believed to support learning allows teachers to improve upon their learning environments for more effective teaching and learning. As described below, educational technology has the potential to enhance all four elements of an effective learning environment.

### ***Contributions of technology to an effective learning environment***

As we use the phrase here, educational technology includes hardware such as personal computers, smaller peripherals such as Global Positioning Systems (GPSs) and Personal Digital Assistants (PDAs) that interface with computers, and other equipment that can interface with such digital tools, such as video cameras and VCRs. Also included in this definition is the software that runs on these devices and networks that allow them to send and share information among them.

Research on ways in which educational technology can make important contributions to effective learning environments was also analyzed by Bransford, Brown, and Cocking, who concluded that technology can enliven teaching and learning by facilitating the incorporation of real-world problems into the curriculum. Educational technology can help make a learning environment more learner-centered by providing a greater variety of resources that allows students to follow their own interests and build upon their strengths. It can also help teachers motivate students to work toward deep understanding or transfer by illustrating how what is under study in the classroom relates to the world beyond it such as by accessing real-time data on current events (Cognition and Technology Group at Vanderbilt, 1992; Duffy & Cunningham, 1996; Honebein, 1996; Riel, 2003). Technology can help teachers meet students' differentiated needs, by serving as a tool for enrichment or review, or for presenting information in additional formats (Berson, 1996; Ehman & Glenn, 1991).

The research literature describes how educational technology can serve as a scaffold or tool that supports learning by allowing the learner to engage in more complex or advanced work than otherwise possible. For example, Geographic Information Systems (GIS) can layer data about population density on top of information about political party affiliation and socio-economic status. Seeing such data simultaneously in tools such as GIS, or simulations, or computer-based microworlds, can contribute to making a learning environment more knowledge-centered by helping students better see complex relationships and address more analytical questions than otherwise possible (Driscoll, 2002; Rieber, 1996).

The research summarized by Bransford, Brown, and Cocking has also shown that technology can make it easier for teachers to provide students with feedback about their work. For instance, it can aid in capturing performances for review and display, and it can provide multiple practice opportunities and track or calculate changes in performance along the way. It can also make it easier to communicate within and outside the classroom, providing additional opportunities for feedback (Driscoll, 2002). Thus, technology can aid teachers in making an educational environment more assessment-centered.

Networked educational technology can also support communication among learners, as well as between their parents and their teachers. By allowing asynchronous and synchronous communication, whether by bulletin board, email, web pages, or chat rooms, technology can enable an exchange of ideas and questions and develop a sub-culture focused on learning and on intellectual habits productive for learning. In these ways, educational technology can aid the development of a community-centered learning environment. Collaborative software such *Knowledge Forum*<sup>™</sup> is designed to let a community of learners share information and build networks of new ideas together

## **Skills Teachers Should Have in Educational Technology**

### ***Standards for teachers and the use of technology that support an effective learning environment***

Reports from prominent technology and teacher education organizations and commissions have acknowledged shortcomings in the preparation of teachers to use technology as an effective instructional tool and have urged that teachers be provided ample opportunities to learn to use technology (American Association of Colleges of Teacher Education, 1999; American Council on Education, 1999; CEO Forum, 1999, 2000; National Council for Accreditation of Teacher Education, 1997; National Commission on Teaching and America's Future, 1996; Office of Technology Assessment, 1995).

In response, standards have now been developed that explicitly define the technology skills that teachers need to be prepared to teach in a 21st century school. Discussed below are the technology-specific National Education Technology Standards for Teachers (ISTE, 2000) adopted as a part of the accreditation requirements of the National Council for Accreditation of Teacher Education (NCATE). Other widely referenced standards for teachers that include technology are those of the Interstate New Teacher Assessment and Support Consortium

(INTASC, 1992), which are used as licensing requirements by many states. Both sets of standards call for teachers to be able to use technology in the classroom to plan and design learning environments and experiences and to support teaching, learning, and the curriculum.

### **National Educational Technology Standards for Teachers (NETS-T)**

First established in 1993 and revised in 1997 and then again in 2000, the National Educational Technology Standards for Teachers both describes the technology competencies included in the National Educational Technology Standards (NETS) for students and spells out the skills and competencies (NETS-T) ISTE feels are necessary for teachers to have to help students master the NETS. In addition to guiding the NCATE accreditation process, the NETS-T have been adopted, adapted, or referenced in the state departments of education documents in 36 of the 50 U.S. states. This widely known and commonly referred-to set of knowledge and skills is presented in Table 1.

Table 1

National Educational Technology Standards for Teachers (NETS-T) (International Society for Technology in Education, 2000).

| <b>National Educational Technology Standards for Teachers</b>  |
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| <p><b>NETS-T I:</b> Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:</p> <ul style="list-style-type: none"> <li>A. demonstrate introductory knowledge, skills, and understanding of concepts related to technology.</li> <li>B. demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.</li> </ul>  |
| <p><b>NETS-T II:</b> Teachers plan and design effective learning environments and experiences supported by technology. Teachers:</p> <ul style="list-style-type: none"> <li>A: design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.</li> <li>B: apply current research on teaching and learning with technology when planning learning environments and experiences.</li> <li>C: identify and locate technology resources and evaluate them for accuracy and suitability.</li> <li>D: plan for the management of technology resources within the context of learning activities.</li> <li>E: plan strategies to manage student learning in a technology-enhanced environment</li> </ul> |
| <p><b>NETS- T III:</b> Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning. Teachers:</p> <ul style="list-style-type: none"> <li>A: facilitate technology-enhanced experiences that address content standards and student technology standards.</li> <li>B: use technology to support learner-centered strategies that address the diverse needs of students.</li> <li>C: apply technology to develop students' higher order skills and creativity.</li> <li>D: manage student learning activities in a technology-enhanced environment.</li> </ul>   |
| <p><b>NETS-T IV:</b> Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:</p> <ul style="list-style-type: none"> <li>A: apply technology in assessing student learning of subject matter using a variety of assessment</li> </ul>  |

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| <p>techniques.</p> <p>B: use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.</p> <p>C: apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.</p>  |
| <p><b>NETS-T V:</b> Teachers use technology to enhance their productivity and professional practice. Teachers:</p> <p>A: use technology resources to engage in ongoing professional development and lifelong learning.</p> <p>B: continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.</p> <p>C: apply technology to increase productivity.</p> <p>D: use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning.</p>  |
| <p><b>NETS-T VI:</b> Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK-12 schools and apply those principles in practice. Teachers:</p> <p>A: model and teach legal and ethical practice related to technology use.</p> <p>B: apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.</p> <p>C: identify and use technology resources that affirm diversity.</p> <p>D: promote safe and healthy use of technology resources.</p> <p>E: facilitate equitable access to technology resources for all students.</p> |

### Interstate New Teacher Assessment and Support Consortium (INTASC) Standards

The Interstate New Teacher Assessment and Support Consortium is a program of the Council of Chief State School Officers, whose members are public officials leading secondary and elementary schools in the U.S. In 1992 a task force from INTASC published its Model Standards for Beginning Teacher Licensing, Assessment, and Development, which consist of ten statements addressing the entire range of knowledge and skills teachers should have, from communication to learning environments, assessment, reflection, and professional development. While none of the ten INTASC standards explicitly mentions technology, four of the sub-statements that elaborate upon them do directly refer to technology (see Table 2).

Table 2

Interstate New Teacher Assessment and Support Consortium Standards that explicitly mention technology.

| Interstate New Teacher Assessment and Support Consortium Standards   |
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| <p><b>Standard 4, instructional strategies.</b> A teacher must understand and use a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills. The teacher must:</p> <p>D. enhance learning through the use of a wide variety of materials and human and technological resources.</p> <p>L. use educational technology to broaden student knowledge about technology, to deliver instruction to students at different levels and paces, and to stimulate advanced levels of</p> |

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| learning.   |
| <b>Standard 6, communication.</b> A teacher must be able to use knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom. The teacher must:<br>K. use a variety of media communication tools, including audiovisual aids and computers, including educational technology, to enrich learning opportunities.    |
| <b>Standard 8, assessment.</b> A teacher must understand and be able to use formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the student. The teacher must:<br>E. select, construct, and use assessment strategies, instruments, and technology appropriate to the learning outcomes being evaluated and to other diagnostic purposes. |

And while the other INTASC standards and sub-statements do not explicitly mention technology, one could certainly use educational technology to work toward achieving many of them. The standards, for instance, include teachers' being able to engage students and gain their active participation as well as accommodate their interests, choices, and individual needs. Similarly, they hold that teachers should be able to create learning situations that facilitate productive, purposeful learning and higher-level thinking, and to help students learn to express themselves, represent information, and communicate to others. They also state that teachers should utilize professional development resources to keep up with new information and improve their skills. Thus, they reference many of the same capabilities included in the NETS-T, even though the NETS-T more directly address how technology can be used to meeting the identified standards.

### ***Instructional design demands of technology integration***

Implicit in the standards discussed above are ways in which technology can benefit to teachers and learners. To obtain those benefits, teachers not only need to know how to operate technology and their subject matter and curriculum, but they must also know how to connect the two. This understanding can be thought of as pedagogical technology knowledge (Dexter 2003), meaning that to help all students learn, the teacher must know how to utilize technology as a part of a wide array of instructional strategies in order to integrate technology with content matter in ways that are clear and meaningful to students (Dexter, Doering & Riedel, 2004; Doering, Hughes & Huffman 2003). Pedagogical technology knowledge can be thought of as a special sort of pedagogical content knowledge (Shulman, 1986; Shulman 1987), a key dimension of teacher knowledge. Shulman describes pedagogical content knowledge as a way of understanding content that pertains to designing instruction about it such as the ability to develop "analogies, illustrations, examples, explanations, and demonstrations--in a word, the ways of representing and formulating the subject that make it comprehensible to others" (1987, p. 9). This also includes understanding what makes learning something easier or more difficult than learning something else and how prior experiences and knowledge might affect learners' approaches to new subject matter. Implicit in these definitions of technological content knowledge and pedagogical content knowledge is a recognition that a key role of teachers is to serve as instructional designers of effective learning environments.

The research on teachers and instructional planning illustrates that teachers rely on routines to guide their instructional decision making, which has been shown to be a multifaceted course of action during which teachers gather, organize, and interpret information, generate alternatives, select a specific course of action, and after its implementation, evaluate the effectiveness of the decision (Clark & Yinger, 1977). The research literature emphasizes how critical teachers' planning and interactive decisions are in determining what they do, or do not do, in the classroom (e.g., Clark & Yinger, 1977; Jackson, 1968; Shavelson, 1976; Peterson & Clark, 1978). The planning of a lesson is typically depicted as involving four essential steps: (1) specification of objectives; (2) selection of learning activities; (3) organization of learning activities; and (4) specification of evaluation procedures (Taba, 1962; Popham, 1970; Taylor, 1970).

All four of these steps are incorporated into the principles for effectively integrating and implementing technology into instruction that are discussed below. These principles can form what several researchers refer to as the "routines" or schema that they posit influence teachers' decision making (Joyce, 1978-79; Morine-Dersheimer, 1978-79; Shavelson & Stern, 1981; Yinger, 1977).

## **The Educational Technology Integration and Implementation Principles (eTIPs): Principles for Instructional Decision Making about Technology Integration and Implementation**

Principles can serve as a type of organizing idea that deals with relationships. Understanding principles can assist learners in recognizing and connecting ideas and in seeing how new and old ideas relate, which are key tasks in developing more elaborate schemas. Identifying an underlying set of principles can be a useful step in teachers' efforts to integrate technology into their instructional designs effectively. The Educational Technology Integration and Implementation Principles (or eTIPs) discussed are one such set of principles that can help teachers organize their instructional decision making about the integration and implementation of technology. Together, these eTIPs embody the findings of the educational technology research literature as to the conditions under which educational technology integration and implementation are likely to be most effective (c.f. Dexter, 2002).

### **Overview of eTips**

The Educational Technology Integration and Implementation Principles address two different dimensions of integration efforts, the classroom level and the school-wide level. The classroom principles follow from the premise that effective technology integration requires the time and attention of teachers as instructional designers. Yet part of what makes teachers' integration activities feasible is the level of technology support at their school. Thus the three school-wide principles focus on those technology features of high-quality technology support programs that are positively correlated to teachers' increased use of educational technology.

The first three eTIPs focus on technology integration—that is, the instructional decision making of teachers when considering the use of education technology resources in the classroom. They follow from the premise that teachers acting as instructional designers must consciously plan for the use of the technology if it is to support student learning. In other words, educational

technology does not possess inherent instructional value: a teacher designs into the instruction any value that technology adds to the teaching and learning processes. Thus, the three classroom eTIPS prompt teacher-designers to consider what they are teaching, what added value the technology might bring to the learning environment, and how technology can help to assess student learning.

- eTIP 1: Learning outcomes drive the selection of technology.
- eTIP 2: Technology use provides added value to teaching and learning.
- eTIP 3: Technology assists in the assessment of the learning outcomes.

The second three eTIPs focus on technology implementation and describe the environment necessary to support teachers' integration activities. That is, how a setting creates a context for teachers where the necessary access to technology and technical and instructional support are available, and there is a positive climate for professional collaboration about educational technology tools. These principles follow from the premise that, to be effective, the school environment must support teachers' integration of technology by providing adequate technology support. As guidelines, they can help teachers evaluate the level of access and support available to them in their integration work, which in turn may help teachers determine whether, given their available resources and planning time, a particular integration goal is realistic. Although individual teachers do not usually control the conditions associated with these three eTIPs, as a part of a school staff they do have opportunities to influence the conditions they address.

- eTIP 4: Ready access to supported, managed hardware/software resources is provided.
- eTIP 5: Professional development is targeted at successful technology integration.
- eTIP 6: Professional community enhances technology integration and implementation.

The alignment of the eTIPs with the NETS-T standards (the major areas of knowledge for teachers with regard to educational technology) is shown in Table 3. Organizing the NETS-T standards into a smaller number of eTIPs makes them easier to teachers to hold in mind when planning for the integration of technology or its implementation, making them more likely to be used to guide teachers' instructional decision making..

Table 3

Alignment of Educational Technology Integration and Implementation Principles (eTIPs) with National Educational Technology Standards for Teachers (NETS-T) Standards

| eTIP  | NETS-T   |
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| <b>1. Learning outcomes drive the selection of technology</b> | <p><b>NETS-T II:</b><br/>           B: Teachers apply current research on teaching and learning with technology when planning learning environments and experiences.<br/>           C: Teachers identify and locate technology resources and evaluate them for accuracy and suitability.</p> <p><b>NETS- T III:</b><br/>           A: Teachers facilitate technology-enhanced experiences that address content standards and student technology standards.</p> |
| <b>2. Technology provides added value to teaching and</b>     | <p><b>NETS-T II:</b><br/>           A: Teachers design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.</p>  |

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| <b>learning</b>  | <p><b>NETS-T III:</b><br/> B: Teachers use technology to support learner-centered strategies that address the diverse needs of students.<br/> C: Teachers apply technology to develop students' higher order skills and creativity.</p> <p><b>NETS-T VI:</b><br/> B: Teachers apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.<br/> C: Teachers identify and use technology resources that affirm diversity.</p>  |
| <b>3. Technology assists in the assessment of learning outcomes</b>          | <p><b>NETS-T IV:</b><br/> A: Teachers apply technology in assessing student learning of subject matter using a variety of assessment techniques.<br/> B: Teachers use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.<br/> C: Teachers apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.</p>   |
| <b>4. Ready access to supported, managed technology is provided</b>          | <p><b>NETS-T II:</b><br/> D: Teachers plan for the management of technology resources within the context of learning activities.<br/> E: Teachers plan strategies to manage student learning in a technology-enhanced environment.</p> <p><b>NETS-T III:</b><br/> D: Teachers manage student learning activities in a technology-enhanced environment.</p> <p><b>NETS-T VI:</b><br/> A: Teachers model and teach legal and ethical practice related to technology use.<br/> D: Teachers promote safe and healthy use of technology resources.<br/> E: Teachers facilitate equitable access to technology resources for all students.</p> |
| <b>5. Professional development targets successful technology integration</b> | <p><b>NETS-T I.</b><br/> A. Teachers demonstrate introductory knowledge, skills, and understanding of concepts related to technology.<br/> B. Teachers demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.</p> <p><b>NETS-T V:</b><br/> A: Teachers use technology resources to engage in ongoing professional development and lifelong learning.<br/> C: Teachers apply technology to increase productivity.</p>  |
| <b>6. Professional community enhances technology integration and</b>         | <p><b>NETS-T V:</b><br/> B: Teachers continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.<br/> D: Teachers use technology to communicate and collaborate with peers,</p>   |

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| <b>implementation</b> | parents, and the larger community in order to nurture student learning. |
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Next, we give a brief overview of the classroom level eTIPs, which are then further described in chapters two, three and four. The school level eTIPs are discussed further in chapter five.

### ***Classroom-level principles***

#### **eTIP 1: Learning outcomes drive the selection of technology.**

For learning outcomes to drive the selection of technology, teachers must first be clear about their desired student learning outcomes. This important first step will allow teachers to more efficiently search for available and appropriate technologies because they will be able to quickly eliminate those that do not support their learning outcomes. This principle is elaborated upon in the discussion of content area standards in the social sciences in chapter 2.

#### **eTIP 2: Technology use provides added value to teaching and learning.**

In this context, added value refers to the particular packaging, delivery method, or combination of services in a product that brings additional benefits beyond those one would otherwise receive. The use of technology brings added value to the teaching or learning process when it makes possible something that otherwise would be impossible or less viable to do. This principle is elaborated upon in the discussion of specific technologies that are particularly helpful in the social sciences classroom in chapter 3.

#### **eTIP 3: Technology assists in the assessment of the learning outcomes.**

Planning for the assessment of students' learning outcomes is a key component of designing instruction. At times, teachers will want to collect and return to students' formative data, to let them know about their learning progress. Almost always, teachers will want to collect summative information about students' achievement of the learning outcomes. Technology can assist teachers in collecting both formative and summative data that will help them understand how students are meeting or have met the learning outcomes for that lesson or unit. This principle is elaborated upon in the discussion of specific assessment needs in the social sciences classroom in chapter 4.

### ***School-level principles***

The following principles of technology implementation are applicable to the larger school technology environment shared by all teachers at the same school. These school-level principles are further discussed in chapter 5.

#### **eTIP 4: Ready access to supported technology is provided**

Teachers must have convenient and flexible access to and support for appropriate educational technology in order for them to utilize it in their classrooms. Ready access means that the technology should be conveniently located and flexibly scheduled so that it is easy for teachers to sign up for and use it when it is relevant for classroom work. As used here support specifically refers to the technical domain, like troubleshooting help and scheduled maintenance.

### **eTIP 5: Professional development is targeted at successful technology integration**

Professional development in the use of technology is key to teachers' learning how to integrate it effectively into the classroom (CEO Forum, 1999). Teachers' learning needs include learning to operate the software and to use that software as an integrated instructional tool in the classroom. Too often, teachers' learning opportunities are limited simply to the operation of the software. Teachers must also be given learning opportunities that address more than these basic skills. Possible formats for providing such learning include access to shared resources, training modules, mentoring, face-to-face classes, or online, asynchronous professional development courses or Internet seminars. Whatever the format, the goal of professional development in technology use must be to help classroom teachers examine the goals of their instruction and related educational technology resources in order to construct a meaningful understanding of how educational technology can serve as an instructional tool.

### **eTIP 6: Professional community enhances technology integration and implementation**

This principle calls for a collaborative professional environment for integrating and implementing technology. Such an environment will render technology use more effective because the school organization recognizes the contribution that each individual makes to the collective knowledge of the school and works toward consensus about the school's performance, in this case with technology, and how they could improve it (Marks & Louis, 1999; 1997). A collaborative professional community serves as a vehicle for school-wide knowledge processing about technology integration and implementation, increasing the likelihood of reflective dialogue, sharing of instructional practices, and collaboration in developing new practices.

## **Conclusion**

Together, these principles for educational technology integration and implementation point to the two key aspects of teachers' designing effective integrated instruction: the technology use must match and support teaching and learning goals, and the larger school environment must provide support for the logistical and learning demands that technology integration makes on teachers.

The eTIPs are arranged in terms of six, somewhat sequential, points of consideration when making instructional decisions about integrating and implementing educational technology. The eTIPs align with the NETS-T standards (see Table 3), and represent major areas of knowledge for teachers with regard to educational technology.

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