

# Developing Professionals:

## Preparing Technology Teachers



Addenda Series to—*Standards for Technological Literacy: Content for the Study of Technology* and *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards*



International Technology Education Association

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International Technology Education Association

## ITEA Technology for All Americans Project (TfAAP)



## ITEA Center to Advance the Teaching of Technology and Science (CATTS)

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International Technology Education Association  
1914 Association Drive, Suite 201  
Reston, Virginia 20191-1539  
Phone: (703) 860-2100  
Fax: (703) 860-0353  
E-mail: [itea@iris.org](mailto:itea@iris.org)  
URL: [www.iteawww.org](http://www.iteawww.org)



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*“We make a living by  
what we get, we make  
a life by what we give.”*

— Sir Winston Churchill  
(1874-1965, Citation Unknown)

## Preface

With increased support for educational standards, educators need resources to help them engage in standards-based reform. The International Technology Education Association (ITEA) is publishing a series of addenda for this purpose. *Developing Professionals: Preparing Technology Teachers* offers suggestions and tools for those who plan, implement, and/or evaluate the education of teachers of technology. This may include teacher candidates, teacher educators, teachers, principals, and supervisors. Several individuals helped make this document possible, and acknowledgements are provided in Appendix A.

Just as K–12 technology programs should be based upon technological literacy standards, so should professional development programs be based upon the same standards. This ensures that both teacher candidates and practicing teachers are prepared to deliver the content that their students will be expected to know, be able to do, and understand. *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002) contains the only nationally-accepted content standards for technological literacy. *Developing Professionals* is rooted in the professional development standards (chapter 4) of *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL)* (ITEA, 2003). *AETL* is based on *STL*.

Section 1 of *Developing Professionals* provides an overview of standards-based professional development, both in-service and pre-service, and introduces five questions of standards-based planning for use in judging the current state of professional development programs. Section 2 offers a “snap-shot” view of what standards-based professional development programs look like. Section 3 presents an approach for achieving comprehensive professional development for teachers of technology. Section 4 describes approaches and venues for teacher learning. Section 5 provides direction to educators as they evaluate and revise professional development programs. And finally, Section 6 is a call to action with messages for teacher candidates, teacher educators, teachers, and administrators. Several appendices provide helpful information and forms to help users achieve standards-based professional development programs.

*Developing Professionals* is most useful when users are already familiar with the technology content standards in *STL* and the companion standards for student assessment, professional development, and program enhancement in *AETL*. However, users of *Developing Professionals* may find it helpful as a bridge to understanding the vision of the standards as it pertains to in-service and pre-service professional development. Other addenda to *STL* and *AETL* focus on standards-based K–12 technology programs (*Realizing Excellence*), student assessment (*Measuring Progress*), and curricula (*Planning Learning*). See pages iv–v for a listing of the ITEA Professional Series publications. ITEA welcomes feedback on all of the guides in this addenda series as we work together to ensure technological literacy for all students.

## Advancing Technological Literacy: ITEA Professional Series

The Advancing Technological Literacy: ITEA Professional Series is a set of publications developed by the International Technology Education Association (ITEA) based on *Standards for Technological Literacy* (ITEA, 2000/2002) and *Advancing Excellence in Technological Literacy* (ITEA, 2003). The publications in this series are designed to assist educators in developing contemporary, standards-based K–12 technology education programs. This exclusive series features:

- Direct alignment with technological literacy standards, benchmarks, and guidelines.
- Connections with other school subjects.
- Contemporary methods and student activities.
- Guidance for developing exemplary programs that foster technological literacy.

Titles in the series include:

### **Technological Literacy Standards Series**

- *Standards for Technological Literacy: Content for the Study of Technology*
- *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards*
- *Technology for All Americans: A Rationale and Structure for the Study of Technology*

### **Addenda to Technological Literacy Standards Series**

- *Realizing Excellence: Structuring Technology Programs*
- *Developing Professionals: Preparing Technology Teachers*
- *Planning Learning: Developing Technology Curricula*
- *Measuring Progress: A Guide to Assessing Students for Technological Literacy*

### **Engineering By Design: Standards-Based Technological Program Series**

Elementary School Resources

- *Technology Starters: A Standards-Based Guide*
- *Models for Introducing Technology: A Standards-Based Guide*

Middle School Resources

- *Teaching Technology: Middle School, Strategies for Standards-Based Instruction*
- *Exploring Technology: A Standards-Based Middle School Model Course Guide*
- *Invention and Innovation: A Standards-Based Middle School Model Course Guide*
- *Technological Systems: A Standards-Based Middle School Model Course Guide*

### High School Resources

- *Teaching Technology: High School, Strategies for Standards-Based Instruction*
- *Foundations of Technology: A Standards-Based High School Model Course Guide*
- *Engineering Design: A Standards-Based High School Model Course Guide*
- *Impacts of Technology: A Standards-Based High School Model Course Guide*
- *Technological Issues: A Standards-Based High School Model Course Guide*

## Engineering By Design: Standards-Based Technological Study Lessons

### Elementary School Resources

- Kids Inventing Technology Series (KITS)

### Elementary/Middle School Resources (Grades 5–6)

- Invention, Innovation, and Inquiry (I<sup>3</sup>) Units
  - *Invention: The Invention Crusade*
  - *Innovation: Inches, Feet, and Hands*
  - *Communication: Communicating School Spirit*
  - *Manufacturing: The Fudgeville Crisis*
  - *Transportation: Across the United States*
  - *Construction: Beaming Support*
  - *Power and Energy: The Whispers of Willing Wind*
  - *Design: Toying with Technology*
  - *Inquiry: The Ultimate School Bag*
  - *Technological Systems: Creating Mechanical Toys*

### Secondary School Resources

- Humans Innovating Technology Series (HITS)

**Note:** All of the publications in the ITEA Professional Series are available online at [www.iteawww.org](http://www.iteawww.org) or by contacting:

International Technology Education Association  
1914 Association Drive, Suite 201  
Reston, Virginia 20191-1539  
Phone: (703) 860-2100  
Fax: (703) 860-0353  
E-mail: [itea@iris.org](mailto:itea@iris.org)

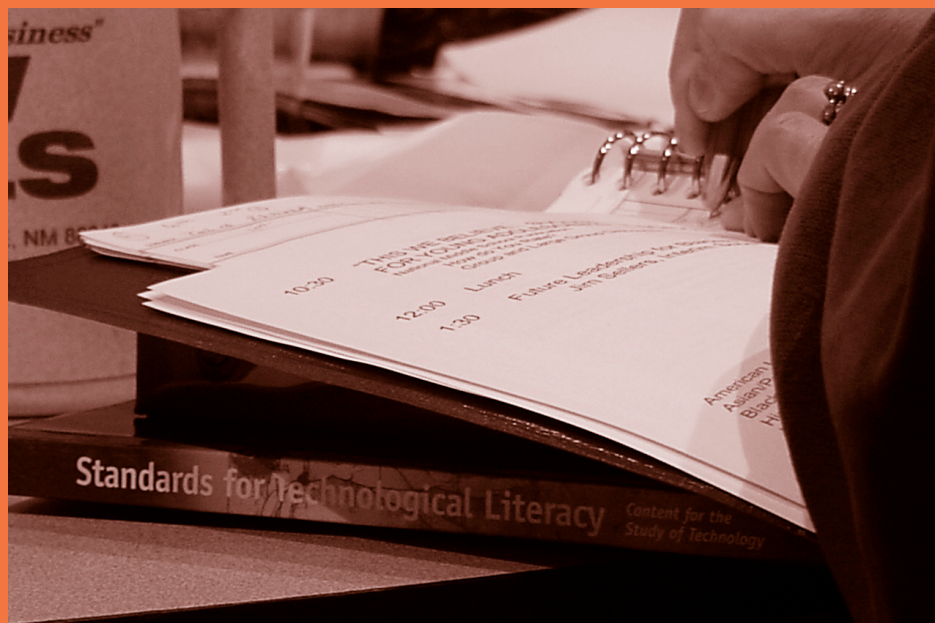
ITEA: Teaching Excellence in Technology, Innovation, Design, and Engineering (TIDE)



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# SECTION 1

## Professional Development: An Overview



This section provides an overview to the standards-based professional development of teachers of technology, which includes pre-service and in-service education.

**Professional development** is a continuous process of lifelong learning and growth that begins early in life, continues through the undergraduate, pre-service experience, and extends through the in-service years.

**Technological literacy** is the ability to use, manage, evaluate, and understand technology (ITEA, 2000/2002). In other words, it incorporates the "...capacity to understand the broader technological world rather than an ability to work with specific pieces of it." (NAE & NRC, 2002, p. 22).

**Developing Professionals** will help those who plan, implement, and/or evaluate the education of teachers of technology, including teacher candidates, teacher educators, teachers, principals, and supervisors.



High-quality professional development is essential for school systems to achieve their goals for student and staff performance. (Hirsh, 2004, p. 15)

Professional development is the continuous process of lifelong learning and growth that begins early in life, continues through the undergraduate, pre-service experience, and extends through the in-service years. Professional development based on the K–12 content in *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002) helps teachers advance K–12 students toward technological literacy, preparing them for success in the technological world. "However, it is clear that many of the nation's teachers are not adequately prepared to teach [science, mathematics, and technology] using standards-based approaches and in ways that bolster student learning and achievement" (NRC, 2001, p. 31). *Developing Professionals* will help those who plan, implement, and/or evaluate the education of teachers of technology. This may include teacher candidates, teacher educators, teachers, principals, and supervisors.

## Using *Developing Professionals*

Professional development must be systematic yet flexible. The characteristics and approaches presented in *Developing Professionals* are intended to hold up over time. In other words, the series of actions that teacher candidates, teacher educators, teachers, principals, or supervisors take to plan and pursue professional development will be repeated. However, the content and processes of professional development will alter over time. These alterations should reflect the changing needs of the teachers and students in K–12 technology laboratory-classrooms as well as the changing nature of technology.

During the pre-service years, teacher candidates prepare to become teachers. They participate in accredited coursework that provides them with basic understandings about teaching, technology, and students as learners of technology. Teacher candidates become responsible for their own continued professional growth. *Developing Professionals* provides suggestions for teacher candidates who are willing to commit to continuous professional learning.

Teacher educators prepare teacher candidates as well as practicing teachers with the knowledge, understandings, and professional commitment for becoming successful technology teachers. They prepare teacher candidates and practicing teachers to implement standards-based K–12 technology programs. They provide coursework that meets university requirements, state/provincial/regional or national accrediting guidelines, and state department of education licensure requirements. Teacher educators should consider the suggestions provided by *Developing Professionals* as they offer programs, courses, and workshops, among other educational opportunities.

In-service education provides learning opportunities to practicing educators to keep them informed of the latest developments in the study of technology. Professional development programs for in-service must be comprehensive. Teachers, principals, and supervisors work together to ensure that the needs of teachers are being met. Teachers, principals, and supervisors should consider the suggestions in *Developing Professionals* from the perspective of what is needed to advance student technological literacy in K–12 classrooms.

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**Technology is the innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.**

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**Teacher candidates are individuals preparing to teach.**

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**Teacher educators are those who deliver pre-service and in-service teacher education, including, but not limited to, college and university faculty.**

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**Pre-service refers to undergraduate education for those who intend to teach.**

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**In-service refers to workshops, lectures, conferences, and other educational opportunities designed to keep practicing educational professionals abreast of the latest developments in their fields.**

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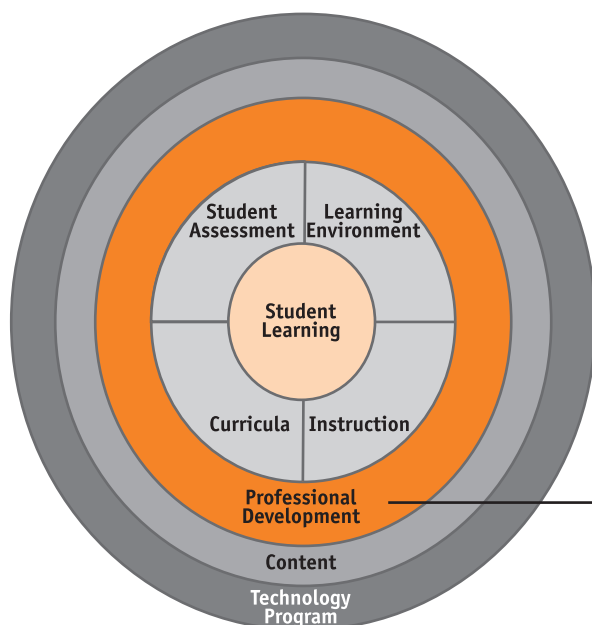
The professional development program refers to everything that affects the learning of teacher candidates and practicing teachers, including content, professional development (of the teacher educator), curricula, instruction, assessment, and the learning environment.

## Professional Development in the Big Picture

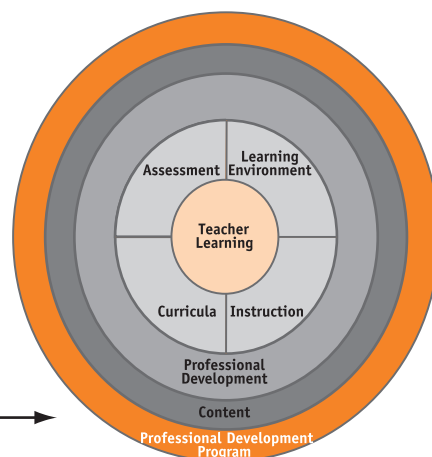
*Program* is a large and all-encompassing term in education. In the companion standards document to *STL, Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards* (AETL) (ITEA, 2003), as well as the addenda publications, program is presented as everything that affects student learning, including content, professional development, curricula, instruction, student assessment, and the learning environment. Figure 1 depicts these program components and their relationship to student learning, which is in the center as the focus of the components. It is important to realize, however, that *Developing Professionals* is more directly related to the *professional development* program, not the K–12 technology program (nor a smaller component, such as the K–5 technology program). In *Developing Professionals*, therefore, program refers to everything that affects the learning of teacher candidates and practicing educators (see Figure 2), including content, professional development (of the teacher educator), curricula, instruction, assessment, and the learning environment.

As previously mentioned, professional development is a continuous process of learning and growth. The undergraduate, pre-service experience is likely the first formalized professional development that teacher candidates will experience. Pre-service teacher education programs prepare teacher candidates

**Figure 1.**  
Selected K–12 Technology Program Components



**Figure 2.**  
Selected Professional Development Program Components





As previously mentioned, professional development is a continuous process of learning and growth. The undergraduate, pre-service experience is likely the first formalized professional development that teacher candidates will experience. Pre-service teacher education programs prepare teacher candidates to become teachers. In such programs, content, professional development, curricula, instruction, assessment, and learning environments contribute to teacher candidate learning. These same elements will affect in-service teacher learning, although they will be embedded within the K–12 technology program. The ultimate goal of both in-service and pre-service education, of course, is to facilitate K–12 student learning by preparing technology teachers to deliver technological literacy based on technological literacy standards (i.e., *STL*).

To produce greater results for students, professional learning must be embedded into a system of comprehensive reform. Such reform must include rigorous content standards, assessment programs that inform teaching and measure student progress toward standards, policy changes that recognize the importance of and provide support for quality teaching, and leadership that advocates high-quality professional learning and communities of learning. (Killion, 2002, p. 9)

A standards-based K–12 technology program provides a comprehensive reform system. *Developing Professionals* focuses on the professional development component of the K–12 technology program. Additional International Technology Education Association (ITEA) addenda examine such topics as standards-based K–12 programs, student assessment, and curricula.<sup>1</sup>

### ***Technological Literacy Standards***

The content of the K–12 technology program is drawn from *STL*. ***STL is the only nationally-accepted set of content standards for technological literacy.*** The 20 standards in *STL* define the technological world. These 20 standards are organized under five major dimensions (categories):

- The Nature of Technology
- Abilities for a Technological World
- Technology and Society
- The Designed World
- Design

A listing of the content standards can be found in Appendix B. Under each of the 20 standards, there are numerous benchmarks, which provide more detail to the standards. The benchmarks are grouped into grade “bands” (i.e., K–2, 3–5, 6–8, 9–12).

<sup>1</sup> *Realizing Excellence: Structuring Technology Programs* (ITEA, 2005b); *Measuring Progress: A Guide to Assessing Students for Technological Literacy* (ITEA, 2004); *Planning Learning: Developing Technology Curricula* (ITEA, 2005a).

Within *Developing Professionals*, the term *content standards* refers to the standards in *STL*. The term *technological literacy standards* refers to the standards in both *STL* and *AETL*.

Three sets of companion standards to *STL* are in *AETL*:

- Student Assessment Standards (see Appendix C)
- Professional Development Standards (see Appendix D)
- Program Standards (see Appendix E)

*Developing Professionals* is based on the professional development standards in *AETL* (see Table 1). In Figure 1, professional development surrounds curricula, instruction, student assessment, and the learning environment, all of which affect student learning. Over time, teachers need to keep updating their knowledge, understanding, and abilities to effectively guide K–12 student learning.

**Table 1. Professional Development Standards from *AETL***

- |       |  |
|-------|--|
| PD-1. | Professional development will provide teachers with knowledge, abilities, and understanding consistent with <i>Standards for Technological Literacy: Content for the Study of Technology (STL)</i> . |
| PD-2. | Professional development will provide teachers with educational perspectives on students as learners of technology.  |
| PD-3. | Professional development will prepare teachers to design and evaluate technology curricula and programs.   |
| PD-4. | Professional development will prepare teachers to use instructional strategies that enhance technology teaching, student learning, and student assessment.   |
| PD-5. | Professional development will prepare teachers to design and manage learning environments that promote technological literacy.   |
| PD-6. | Professional development will prepare teachers to be responsible for their own continued professional growth.  |
| PD-7. | Professional development providers will plan, implement, and evaluate the pre-service and in-service education of teachers.  |

Throughout this guide, the text will indicate “ties” to these standards as well as other *AETL* standards. Users should consult *AETL* to learn more information about the requirements of the standard or guideline being referenced. Appendix D is a listing of the Professional Development Standards with guidelines from *AETL*. *Developing Professionals* is *not* intended to replace the professional development standards, but to supplement them.

The technological literacy standards, *STL* and *AETL*,<sup>2</sup> lay out a well-rounded content and methodology for teaching about technology in Grades K–12. Students learn “...much more than just knowledge about computers and their application” (ITEA, 1996, p. 1). Students learn about medical, agricultural and related biotechnologies, energy and power, information and communication, transportation, manufacturing, and construction technologies. They engage in problem-solving activities that promote an understanding of the nature, behavior, power, and consequences of technology. Students develop knowledge and abilities that help them “make sense” of the technological world and cope with technological change.

## Designing Effective Teacher Professional Development

Professional development design is dynamic.

...the design process has a life of its own. It sometimes follows a logical sequence from goal setting to planning, to doing, to reflecting. It often does not. Eventually, however, in some fashion, the implementation of a professional development program, from its initial conception to its postmortem, unfolds over time. (Loucks-Horsley, Hewson, Love, & Stiles, 1998, p. 21)

According to Thomas Guskey’s (2003a) review of professional development, “what works always depends on where, when, and with whom” (p. 30). The knowledge and abilities that teachers gain and the professional learning they experience must be responsive to the students, teachers, practices, policies, and resources of the classroom, school, school district, and state where professional learning occurs.

Designing professional development is an active process that requires thought and reflection. It requires that teacher candidates, teacher educators, teachers, principals, and supervisors make decisions about learning needs; plan or seek learning to satisfy those needs; and make adjustments as necessary to ensure that learning results in the desired outcomes. Revisions are made to reflect the changing needs of teachers and K–12 students, the dynamic nature of technology, and research on teaching, learning, and assessment.

<sup>2</sup> Funding for the development of these sets of standards was provided by the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA). *Standards for Technological Literacy* was endorsed by the National Research Council (NRC).

To assist users as they plan or pursue professional development, **Sections 3–5 provide an approach to the professional development of teachers of technology:**

- Lay the Groundwork
- Frame Professional Education
- Build Teacher Understanding
- Evaluate Professional Education

## Getting Started

Professional development is a process that occurs at multiple levels. In pre-service education, learning occurs in general education courses, teacher preparation courses, and K–12 clinical experiences. For in-service education, teacher learning occurs at an individual teacher level, school community level, and at a school district level. It may also occur at a state or national level. The suggestions presented in Sections 3–5 apply to the planning, implementation, and evaluation of professional learning at every level. It should be recognized, however, that while professional learning will be occurring at multiple levels, actions taken should be coordinated to promote professional development as a comprehensive program. As users plan professional learning for teachers of



technology, they might find it helpful to answer these five questions of standards-based planning:

1. *Where are we now?*
2. *Where do we want to go?*
3. *How are we going to get there?*
4. *What knowledge and abilities must educators possess to get there?*
5. *How will we know when we have arrived?*

Of course, answers will vary depending on who is doing the planning. For example, an individual teacher developing a personal plan will respond differently than a supervisor planning a professional development program for an entire state.

### ***Where are we now?***

**Appendix F is a matrix that can be photocopied** for use in determining how closely pre-service and in-service educational programs align with the professional development standards for technological literacy in *AETL* as well as the suggestions in Section 2 for effective professional development. This matrix is also helpful for individual teachers to determine their personal professional development needs and for teacher candidates to remain informed of expectations for their learning.

For pre-service education, the answer to this question will consider the current state of the technology teacher preparation program. Is there a defined program based on the “Professional Development Standards” (chapter 4) of *AETL*? Are teacher educators aware of and versed in the content standards in *STL*? Have they aligned their courses, requirements, and assessment to these content standards? Are teacher educators familiar with the student assessment and program standards in *AETL*? Are teacher candidates assessed in how well they deliver technological study consistent with the technological literacy standards?

For in-service education, the answer to this question requires that we consider the current needs of K–12 technology programs, focusing on student learning and professional development. We examine student assessment data to see where gaps exist in student achievement. How technologically literate are K–12 students? What knowledge and abilities do teachers of technology possess? Does a professional development program exist? Is the professional development program based on the professional development standards in chapter 4 of *AETL*? Is professional development provided to enable teachers to improve instruction and advance student technological literacy?



### *Where do we want to go?*

We must identify the outcomes we want from professional development. The standards to which teacher preparation programs, K–12 technology programs, schools, school districts, or states are committed can answer this question (Carr & Harris, 2001). “Formally adopting the [technological literacy] standards can help ensure that the standards drive all aspects of professional development planning and implementation” (Hirsh, 2004, p. 15). *Developing Professionals* asserts that professional development should be aligned with technological literacy standards. ***STL and AETL are the only nationally-accepted sets of educational standards for technological literacy.***

Both pre-service and in-service educational programs must base teacher learning on technological literacy standards. In pre-service, professional learning will provide teacher candidates with an initial understanding of teaching technology and develop their skills in helping K–12 students learn and meet technological literacy standards. The knowledge, understanding, and abilities gained by teacher candidates will be consistent with the outcomes defined by the standards.

During in-service, teacher learning will also be based on the technological literacy standards. The specific understandings developed by teachers, however, will be based on the learning needs of K–12 students. Teachers of technology examine data from student assessment practices based on the standards to identify areas demanding improvement. Teacher learning is based on these areas, consistent with the technological literacy standards.

The following statements are the targeted outcomes of professional development for teacher candidates and teachers and correspond with Professional Development Standards 1–6 in *AETL*. Additional information and required guidelines for achieving these outcomes can be found in chapter 4 of *AETL*.

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**Standards are written statements about what is valued that can be used for making a judgment of quality. Guidelines are specific requirements that identify what needs to be done in order to meet a standard.**

---

Professional development will:

- Provide teachers with knowledge, abilities, and understanding consistent with *Standards for Technological Literacy: Content for the Study of Technology (STL)*.
- Provide teachers with educational perspectives on students as learners of technology.
- Prepare teachers to design and evaluate technology curricula and programs.
- Prepare teachers to use instructional strategies that enhance technology teaching, student learning, and student assessment.



- Prepare teachers to design and manage learning environments that promote technological literacy.
- Prepare teachers to be responsible for their own continued professional growth.

Users may also need to consider other state/provincial/regional or national standards or accrediting guidelines.

### ***How are we going to get there?***

*Developing Professionals* is intended to help teacher candidates and teachers of technology meet the goals of professional development, or “get there,” by providing direction to those who plan, implement, and evaluate professional education. Professional Development Standard 7 in *AETL* focuses on the role of professional development providers (or teacher educators) in offering learning opportunities to educators. Additional information and required guidelines for achieving this standard can be found in chapter 4 of *AETL*.

Professional development providers will:

- Plan, implement, and evaluate the pre-service and in-service education of teachers.

Getting there is a matter of considering “where we want to be” and identifying the professional development needed by teacher candidates, teachers, and other educators to get there.

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***Professional development providers are those who organize and/or deliver pre-service and in-service education, including teacher educators, principals, supervisors, and teachers as appropriate.***

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***What knowledge and abilities must educators possess to get there?***

Teacher candidates and practicing teachers are only two groups of educators that need professional development. Teacher educators, principals, and supervisors (among other professional development providers) should seek learning opportunities that enable them to prepare teacher candidates and teachers to implement standards-based reform. Professional development providers must be aware of and versed in the technological literacy standards. They align professional development with the professional development standards in chapter 4 of *AETL*. Professional development providers become familiar with the student assessment and program standards in *AETL*. They possess knowledge and abilities for preparing teacher candidates and teachers to, for example, design and evaluate curricula and programs, use instructional strategies, and design and manage learning environments. Professional development providers will continually update their own knowledge and abilities to remain informed of advancements in the fields of technology and education.



### *How will we know when we have arrived?*

We will know that we have arrived when we can report gains in K–12 student achievement based on the results of student assessment. The only result of professional development that matters is increased student achievement (Killion, 2002). Professional development evaluation will consider student assessment results. The effectiveness of our efforts will ultimately be based on whether or not K–12 students show progress toward becoming technologically literate. Section 5 of *Developing Professionals* describes several general principles to consider when evaluating professional development.

### **Reflecting on the Vision: Providing Professional Development that Matters**

Technological literacy standards support the vision that all students can and should become technologically literate. Professional development can assist teachers in realizing this vision as the education of teachers is planned and implemented to facilitate student learning. Teachers must be provided with ongoing learning opportunities to be able to meet the changing needs of both students within the classroom and the dynamic technological world in which we live. *Developing Professionals* addresses issues related to the professional development of teachers of technology. It will be most useful to teacher candidates, teacher educators, teachers, principals, and supervisors. While others may be responsible for *providing* specific learning activities, each of these audiences has a specific role in establishing conditions that support the pre-service or in-service education for teachers of technology. *Developing Professionals* offers specific suggestions for planning, implementing, and evaluating the education of teachers that offers teacher candidates and teachers the knowledge and abilities needed to develop a technologically literate K–12 student population.

---

**The only result of professional development that matters is increased student achievement (Killion, 2002).**

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**Teachers must be provided with ongoing learning opportunities to be able to meet the changing needs of both students within the classroom and the dynamic technological world in which we live.**

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# SECTION 2

## Effective Professional Development



**This section describes characteristics of effective, standards-based professional development.**

The most important component affecting the quality of any technology program is the teacher. The faculty in technology programs should be both professionally and technologically prepared to provide students with quality and comprehensive technology learning. (ITEA, 2003, p. 59)

Never before has the pressure been so high to find ways to support successful teaching and learning through effective professional development. (Salpeter, 2003, p. 34)

This section of *Developing Professionals* describes the essential characteristics of standards-based professional development. **The characteristics are NOT intended to shorten or substitute for the entirety of “Professional Development Standards” in *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards* (AETL) (ITEA, 2003);** rather the characteristics should be considered in conjunction with “Professional Development Standards.” They are being presented to provide a picture of what standards-based professional development looks like.

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The identified essential characteristics of standards-based professional development provide a “snapshot” of a plan or program for professional development. The characteristics are NOT intended to shorten or substitute for the entirety of “Professional Development Standards” in *AETL*; rather the characteristics should be considered in conjunction with “Professional Development Standards.”

---

## Characteristics of Effective Professional Development

Research supports the need for professional development that is results-driven, standards-based, and systems-oriented (Sparks, 1994). The characteristics that are identified in this section resulted from a review of literature on professional development. Many of these characteristics appear in Thomas Guskey’s (2003b) article entitled *Analyzing Lists of the Characteristics of Effective Professional Development to Promote Visionary Leadership*. Guskey, of the University of Kentucky, Lexington, analyzed 13 lists that identified characteristics of effective professional development to determine consistency among the characteristics.

Effective, standards-based professional development programs:

- Start With Standards.
- Improve Student Learning.
- Enhance Teacher Content and Pedagogical Knowledge.
- Promote Professionalism.
- Align With Other Reform Initiatives.
- Promote Collegiality and Collaborative Exchange.
- Are Ongoing, Career-Embedded, and Sustained.
- Include Accountability Measures.

The descriptions that follow depict the current state of a standards-based professional development program that exemplifies these characteristics.

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**Standards-based professional development programs start with standards. This includes *STL* and *AETL* as well as state/regional/provincial, school district, and school technological literacy standards and other content area standards.**

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## Start With Standards

Just as K–12 student learning is based on standards, effective education of teachers is based on standards (AETL *Professional Development Standard 7, Guideline E*). “Standards-based reform emphasizes improved teaching as the best path to increased learning. But student learning will be transformed only if teachers’ classroom practices reflect high standards” (Birman, Desimone, Porter, & Garet, 2000, p. 28). **The only nationally-recognized standards for the professional development of technology teachers are found in *AETL*.** *Developing Professionals* is based on those standards. As a related issue, effective teacher learning is also aligned with applicable state/provincial/regional and national accrediting guidelines (AETL *Professional Development Standard 7, Guideline D*).

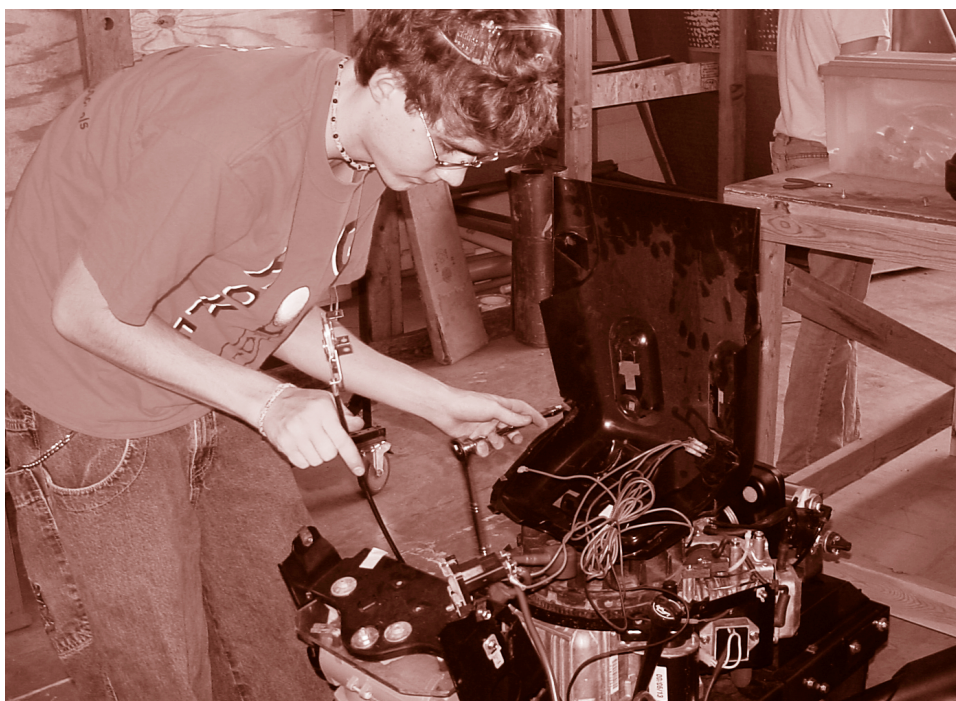
Starting with standards implies the difference between being standards-*based* versus standards-*reflected*. Standards-based professional development starts with the technological literacy standards to establish a base for content and methodology. Professional development providers design teacher education to achieve the desired outcomes suggested by the standards. Standards are not used as a checklist but provide the fundamental ingredients for professional development programs. In standards-reflected professional development, on the



other hand, the standards become an afterthought and are not the central basis for guiding pre-service or in-service education. Standards-reflected professional development is misleading because it gives the impression that teacher education is standards-based when it is not.

## Improve Student Learning

The primary purpose of the education of teachers is to facilitate and enhance K–12 student learning. Therefore, teachers of technology must be comfortable with the content they will be expected to teach. That is, they understand the nature of technology; recognize the relationship between technology and society; know the attributes of design; develop technological abilities; and develop design proficiencies (*AETL Professional Development Standard 1, Guidelines A–E*). Pre-service education prepares teacher candidates with a basic understanding of the content in *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002). In-service education is based on current K–12 student technological literacy learning needs. Practicing teachers and other educators seek learning opportunities to prepare them to advance student learning of the content in *STL* based on the technological literacy needs of students.



## Enhance Teacher Content and Pedagogical Knowledge

Teachers of technology know the content presented in *STL*. Beyond knowing the content required for K–12 students, teachers of technology continually strive to learn more about teaching and how to teach. All teachers are able to design and develop curricula and programs (AETL *Professional Development Standard 3, Guidelines A–D*). But curricula are only as good as the delivery platform. For example, effective teachers also know how to help children learn technology (AETL *Professional Development Standard 2, Guidelines A–D*). They know how to use instructional strategies effectively (AETL *Professional Development Standard 4, Guidelines A–C*). And they know how to design and manage technology learning environments (AETL *Professional Development Standard 5, Guidelines A–F*). As the National Research Council (2001) notes, “the leading proponents of education reform have argued that the attainment of high standards for students—standards that demand understanding and the ability to perform—will be unlikely until teachers are educated in ways that enable them to implement [programs] that are consistent with the vision, goals, and content of the national standards” (p. 18). The education of teachers enhances teacher and teacher candidate understanding of technological content, instruction, and assessment.

## Promote Professionalism

Teachers of technology are committed to seeing that all students attain technological literacy. They recognize the importance of their own learning to advancing student learning and are responsible for their own continuous professional growth (AETL *Professional Development Standard 6*). Teacher candidates and teachers accept leadership roles and participate in professional organizations at local, state, and national levels (e.g., the Technology Education Collegiate Association [TECA] and the Technology Student Association [TSA]). Teacher preparation programs prepare teacher candidates to become professionals.

Teachers recognize that their actions and attitudes have the potential for influencing students. They become role models to their students and conduct themselves ethically. Teachers of technology are dedicated to service, excellence, integrity, and humility (Rouch, 1999). They are professional. “Professionalism is not a set of competencies but predominantly an attitude; a real professional is a technician (one who knows their work) who cares” (Rouch, 1999, p. 18). Department chairpersons and other administrators actively seek professional learning communities and action research opportunities.

## State Supervisor Story

### Implementing Standards-Based Professional Development for Technology Education at the State Level

Mellissa Morrow

Recognizing that the continuum of professional development extending from birth throughout life, Florida Department of Education focuses its Technology Education professional development programs primarily on in-service teachers, with some input into the pre-service experience. This snapshot allows us to concentrate efforts and resources to those in the field who are responsible for affecting change in student achievement. While resources are limited, every attempt is made to educate and develop professionally our greatest asset in the field of technology education: our teachers. We do this by providing workshops and conferences, purchasing publications for dissemination to teachers and administrators, participating in the ITEA Center to Advance the Teaching of Technology and Science (CATTS) consortium, and partnering with organizations that provide a venue for educating others about the value of technology education and the standards-based resources available. We do an exceptional job in meeting some of the professional development standards delineated in *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development and Program Standards* (ITEA, 2003) and have plenty of work to continue.

To date, the resources Florida has used include securing state grants for developing standards-based curriculum and making use of ITEA's standards specialists through numerous local and regional workshops. Teachers from all over the state have been trained in standards-based curriculum development and encouraged to share the results of that training at the Florida Technology Education Association state conference and at district in-service trainings. Follow-up workshops by standards specialists have also been utilized by districts to continue the efforts to implement *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002) in all technology education programs. The initial workshops have been primarily designed to meet Professional Development Standard 3 in preparing teachers to design and evaluate technology curricula and programs. Looking at what is currently done in the classroom and making it standards-based instead of standards-reflected was the first step in implementing professional development programs that support implementation of *STL*. We continue to conduct similar workshops at a variety of conferences and in-service training sessions.



More recently, workshops have begun to focus in specific areas of technology, not in designing and evaluating technology curricula and programs, but more in designing and managing learning environments (Professional Development Standard 5). Innovative teachers who have worked to re-develop their content to align with *STL* are now finding a need to implement that content more effectively and cohesively.

The CATTs Consortium provides standards-based products and professional development opportunities for teachers in Florida. As a member of the consortium, the publications are disseminated in Florida at every opportunity. In the past three years, over 3,000 publications have been put in the hands of technology, mathematics, and science teachers. The professional development component of CATTs includes a “train-the-trainer” session at the ITEA conference on the latest publications. Our trainer then conducts the training at our state conference. This has been a very valuable experience for participants, however, more work needs to be done on making the training available to more teachers and must include a follow-up component. We know that publications are out there, but we have no current system for knowing if they are being utilized. This professional development resource and supporting curricular materials has much potential.

One area for growth and improvement is delineated in Professional Development Standard 6 [which states: Professional development will prepare teachers to be responsible for their own continued professional growth]. All teachers in Florida are required to develop and submit an Individualized Professional Development Plan (IPDP), which directly relates to supporting student achievement as defined in the No Child Left Behind Act. Those teachers who have taken advantage of the professional development resources are among the most innovative in the state, however, the majority of teachers do not participate in content-specific professional development. Districts focus much of their in-service on student data reporting, reading initiatives, and topics essential for all content areas. This hinders participation in professional organizations and their activities and limits teacher opportunity for the benefits provided by those organizations. Accessibility must be a priority for professional development to be as effective as possible.

*Melissa Morrow is a State Supervisor at the Florida Department of Education. She can be reached via e-mail at [Melissa.Morrow@fldoe.org](mailto:Melissa.Morrow@fldoe.org).*

## Align With Other Reform Initiatives

Change in any organization is a comprehensive and systematic process. This is true of educational reform. Professional development is planned to prepare teachers for making change, which requires that it be aligned to other reform initiatives that are being pursued. The education of teachers is promoted as the means for advancing technological literacy for all students and achieving K–12 technology program goals. Pre-service education informs and educates teacher candidates on *STL* and *AETL*. Teacher candidates become aware of standards-based education and develop the knowledge and abilities to successfully reform the technology program at the school in which they will teach.

In-service education for teachers of technology is integrated into the overall school or school district comprehensive improvement plan. Preparing technologically literate K–12 students is viewed as a means for advancing the goals of the larger system. Therefore, in-service education provides teachers with knowledge and abilities for achieving K–12 technology program goals as well as school or school district goals. In-service education is evaluated as part of the overall program, and appropriate revisions to teacher learning are made as necessary.

## Promote Collegiality and Collaborative Exchange

“The challenge facing schools is expanding the ability of a team of teachers to achieve goals for all students and developing the ability of the entire faculty to move the school toward its vision” (DuFour, 2004, p. 63). Pre-service education assists teacher candidates in combating this challenge by providing them with opportunities to work with their peers. Teacher candidates are prepared to engage in teaching with colleagues, whether by collaborative planning, team teaching, or the like. Teacher candidates view students as the center of any learning institution and recognize that everything done in individual classrooms should promote student understanding across disciplines of an entire school or school district. Teacher candidate participation in the Technology Education Collegiate Association (TECA) and the International Technology Education Association (ITEA) also provide avenues for collaboration.

In-service education provides opportunities for teachers to work together to build shared understanding. They share best practices and build upon what each has learned to better understand learning in the context of their school. Teachers support each other in the teaching and learning process through engagement in mentoring, coaching, and team teaching, among other means (*AETL Professional Development Standard 7, Guideline H*). Teachers work together to advance all students toward technological literacy. “Rather than



receiving ‘knowledge’ from ‘experts’ in training sessions, teachers and administrators will collaborate with peers, researchers, and their own students to make sense of the teaching/learning process in their own contexts (Sparks, 1994, p. 2). With support from administration, teachers participate in national and international professional organizations to collaborate with other education professionals (*AETL Program Standard 2, Guideline F*; *AETL Program Standard 5, Guideline K*).

Professional organizations in which teachers of technology might participate include (but are not limited to):

- American Federation of Teachers (AFT)
- Association for Career and Technical Education’s Technology Education Division (ACTE)
- International Technology Education Association (ITEA)
- Technology Student Association (TSA)
- National Education Association (NEA)
- State Technology Education Associations
- Other State or National Educational Agencies

## Are Ongoing, Career-Embedded, and Sustained

Professional development is not regarded as an occasional event but as a process of learning that occurs routinely each day or week. Teacher learning is authentic to the K–12 classroom, and professional development providers model teaching practices that teacher candidates and teachers will be expected to use (*Professional Development Standard 7, Guideline B*).

Pre-service education is promoted as the beginning to an educator’s learning career. Teacher candidates learn to become responsible for their own continued professional growth and recognize the importance of ongoing education. Teacher candidates learn strategies for incorporating professional development into each work day.

The technology program supports teachers as they engage in in-service education. Teachers learn about teaching technological content from students and from other teachers and administration (*AETL Professional Development Standard 7, Guideline F*). “The traditional notion that regarded staff development as an occasional event that occurred off the school site has gradually given way to the idea that the best staff development happens in the workplace rather than the workshop” (DuFour, 2004, p. 63). Teacher learning is integrated into each school day. Career-embedded learning provides “...opportunities for teachers to work in grade level teams, analyze student work, plan classroom curriculum, receive coaching, conduct action research or participate in study groups” (Killion, 2002, p. 208). Teachers participate in professional learning communities with other teachers, teacher educators, and administrators in the district and state. Participation in the professional learning communities enables teachers to conduct and use research in their classrooms. As Stephanie Hirsh (2004) stated, “schools will achieve high levels of performance when professional education is embedded into every school day” (p. 13).

## Includes Accountability Measures

Accountability refers to the quality of being held answerable or responsible. Professional development programs are evaluated to gather evidence and account for the quality of the program. Evaluation enables the professional development program to be monitored and adjusted to address changing circumstances. Teacher and student learning are assessed. The curricula and instruction used in professional development activities are evaluated. A variety of data are gathered to collect evidence that indicates the adequacy of professional education. The evaluation of pre-service education allows teacher educators to report the condition of the teacher preparation program to stakeholders. Technological



literacy standards and accrediting guidelines provide the basis for evaluation. Evidence is gathered to determine the extent to which professional development programs are successfully preparing teacher candidates to serve K–12 students.

During in-service, evaluation data inform stakeholders of the progress that teachers and K–12 students are making toward technological literacy. The ultimate goal

of teacher learning is improved student learning. Evaluation helps teachers and administrators judge whether that goal is being achieved. Professional development and K–12 technology program enhancement decisions are based on the results of professional development program evaluation.

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**The evaluation of professional development is based on the results drawn from multiple sources, including the assessment of teacher learning, the assessment of student learning, curricula and instruction evaluation, among others.**

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## Reflecting on the Destination: Effective Professional Education

Consider the following scenarios.

1. Teaching Technology 101: Teacher candidates sit in a lecture hall as a teacher educator sits behind a computer desk projecting text on an overhead screen. The teacher candidates try to gather as much information as they can about “teaching strategies” from the presentation. Many of the teacher candidates struggle to stay awake. Several are busy browsing the assigned reading, which contains much of the same information. Few have a greater understanding of when to use or not to use the described instructional approaches.
2. Teaching Technology 101: A teacher educator assigns a classroom of teacher candidates into groups. Each group is given a different instructional strategy and is asked to plan a standards-based lesson to teach at a local elementary school. Each group contains members with diverse backgrounds and



experiences. The teacher educator encourages the groups to build on their collective knowledge by sharing their experiences with each other. Once the lessons are outlined, the teacher candidates collaborate with practicing teachers in the elementary school to further develop the lessons and ensure that the needs of the elementary students will be satisfied. Teacher candidates are then asked to present the lessons to their classmates, explaining why the strategies are appropriate for the lessons.

3. A “teachers’ institute” day is held at a local middle school. The teachers sit in a room, listening as an “expert” talks about ways to incorporate reading into every content area. Little connection is made to specific subject areas or to the student population served by the school. Several teachers begin to lose interest and begin talking about their weekend plans. Other teachers sit patiently trying to make a tie between the content of this session and that of previous professional development opportunities. Many of the teachers begin to feel frustrated, feeling as if this “institute” has been a waste of their time.
4. A “teachers’ institute” day is held at a local middle school. Teachers are working in teams by grade level. Each team is busy examining student assessment results. They identify areas of learning need and propose strategies for addressing the student needs. The teachers agree that they will need to enhance their own knowledge and abilities to effectively guide student learning. Each team identifies various strategies or venues for obtaining the needed enhancement. They decide that each team member will focus on a different area and they will come together to share what they have learned and establish a plan for advancing student achievement.

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**We, as educators, must develop a plan for professional education that will enable us to achieve our vision for professional education in the twenty-first century.**

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How do the descriptions presented above compare to each other? Do they present an effective vision for professional education in the twenty-first century? Think about the advancements that are made in the fields of technology and education each day. Consider the “look” of professional education ten or even five years ago. Think about the characteristics of effective professional development. How should professional education “look” today? How close do our images for professional education match the professional development programs that exist at our universities and in our classrooms, schools, or school districts? We, as educators, must develop a plan for professional education that will enable us to achieve our vision for professional education in the twenty-first century.



# SECTION 3

## A Comprehensive Approach to Teacher Learning



**This section presents steps for achieving a comprehensive professional development program for teachers of technology.**

**The approach presented in this section of *Developing Professionals* applies to the overall process of professional development planning rather than the individual instances of teacher learning.**

Staff development is a process, not an event. It begins with creating learning opportunities for educators and ends with students benefiting from the educators' learning. The higher the quality of the complete process, the more effective professional development will be. This requires staff developers to take a new, holistic view of professional development as a system designed to raise the performance levels of both educators and students. (Mizell, 2003, p. 12)

The approach (see Table 2) presented in this section of *Developing Professionals* applies to the overall process of professional development planning rather than the individual instances of teacher learning. We must create a system that is comprehensive and sustained — a system in which individual instances of teacher education contribute to the overall goals and objectives of professional education. To do this, teacher candidates, teacher educators, teachers, principals, and supervisors will need to continually revisit professional learning needs and make revisions to the goals of professional education based on the results of professional development program evaluation and student achievement in Grades K–12. Users should always attend to the ultimate goal of any professional development program for teachers of technology: technological literacy for K–12 students (refer to Figures 1 and 2, p. 4).

**Table 2. An Approach for Planning Comprehensive, Standards-Based Professional Development Programs**

Lay the Groundwork

- Involve Stakeholders.
- Provide Time and Resources.
- Commit to Professional Development.

Frame Professional Education

- Identify Teacher Learning Needs and Establish Goals.
- Define Content.
- Identify Assessment Measures.
- Consider the Context.
- Organize Teacher Learning / Develop a Professional Development Plan.

Build Teacher Understanding

Evaluate Professional Education

## Lay the Groundwork

Teacher professional education must be based on identified needs and be well organized, carefully structured, and purposefully directed. Developing and documenting a comprehensive professional development program can accomplish this. General suggestions for establishing pre-service and in-service professional development programs follow.

***Involve Stakeholders.*** Professional development should be a comprehensive program. Just as other educational programs solicit support and commitment from stakeholders, users of *Developing Professionals* are advised to establish support from the communities their professional development programs serve. Rather than viewing professional education as something that is “done” to teacher candidates and teachers, users are encouraged to view teacher candidates and teachers as primary stakeholders who play an active role in identifying their own learning needs.

During pre-service, teacher candidates and teacher educators can work together to ensure that teacher candidates are prepared with the knowledge and abilities to be successful in today’s schools. One way to accomplish this is by pairing teacher candidates with practicing teachers who can serve as mentors. This model provides multiple opportunities for teacher candidates, teachers, and pre-service faculty to support each other. For example, practicing teachers can serve as advisors to the teacher preparation program faculty. Teacher candidates can serve as mentors to high school students by involving them in activities that connect to the teaching profession. Teacher candidates can also provide valuable input to the mentor teacher with whom they work, if a mechanism to obtain such input is established. Teacher educators should also seek input on the teacher preparation program from K–12 schools and school districts, local and state supervisors, and state and national professional organizations.

During in-service, teacher education should link classrooms, student achievement, and learning beyond the school. Professional education should occur at the school, school district, and state levels. Together, teachers, principals, and supervisors can create environments that promote both K–12 student learning and adult professional growth. Teachers and administrators can work together to make decisions that affect the classroom, school, and school district. Beyond the local school level, commitment should be solicited from K–12 students, parents, and

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**Rather than viewing professional education as something that is “done” to teacher candidates and teachers, users are encouraged to view teacher candidates and teachers as primary stakeholders who play an active role in identifying their own learning needs.**

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**Stakeholders are individuals or entities who have an interest in the success of a specific venture or program. Stakeholders in technology education may include teachers, administrators, school leaders, professional development providers, business and industry leaders, engineers, scientists, technologists, and others.**

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**An advisory committee is an organized body comprised of informed and qualified individuals with a specified responsibility to give advice in the development of an idea or process. Members may include parents, business and industry personnel, local engineers, technologists, university faculty, former students, retired professionals, and interested citizens.**

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communities as well as local and state supervisors and state and national professional organizations. As Stephanie Hirsh (2004) points out, “Michael Fullan noted that for schools to achieve large-scale reform, educators and the public have to be committed to the system’s success and believe that they have a stake in it” (p. 14).

An effective way for involving stakeholders for both pre-service and in-service teacher education is through an advisory committee. An advisory committee is an organized body comprised of informed and qualified individuals with the responsibility to give advice in the planning or implementation of the education of teachers.

### *Organizing an Advisory Committee*

1. Identify a small and manageable number of individuals (no more than eight) to serve as an advisory committee. Members should be selected carefully as it is necessary to represent different constituencies. For example, K–12 students, parents, community members, local school personnel, local and state supervisors, state and national professional organization representatives, university faculty, and technology professionals, among others.
2. Solicit the commitment of the selected individuals to serve on the advisory committee.
3. Hold regular meetings or meet as issues arise that demand input or consensus.
4. Enable committee members to provide input, not merely “rubber stamp” something that has already been finalized.

**Provide Time and Resources.** Teacher preparation programs, leading to licensure, are usually provided in post-secondary institutions. Departments supporting the technology teacher preparation program must provide teacher education faculty with the needed resources to prepare teachers of technology. Courses and other experiences should enable teacher candidates to gain knowledge and abilities for delivering technological study for Grades K–12.

Likewise, school and school district in-service educational programs must provide resources to support teacher professional learning. For example, school and school district budgets should allocate funding to support teachers in the teaching and learning process. Teacher workdays should be designed to provide time for collaboration with grade level teams, other content area teachers, and other educators. Time and other resources should ensure commitment to teacher learning and advancing student technological literacy.

***Commit to Professional Development.*** “School improvement too often has been based on fad rather than on a clear, compelling vision of the school system’s future. This in turn, has led to one-shot staff development workshops with no thought given to follow-up nor to how this technique fits in with those that were taught in previous years” (Sparks, 1994, p. 3). Professional education should be part of a comprehensive program that supports sequenced and integrated professional development activities, for both pre-service and in-service. Professional development should provide connected learning experiences that tie content together, enabling teachers to build their knowledge and abilities from one activity to the next. Consequently, follow-up must occur, and evidence must be gathered to determine whether or not professional development is achieving its intended results. The professional development program should support all educators as they plan and pursue sustained professional growth and development (*AETL Program Standard 2, Guideline F*). Teachers of technology also need support to successfully implement new content and strategies in the laboratory-classroom.



## Frame Professional Education

Both in-service and pre-service professional development programs must remain current with state/provincial/regional and national perspectives. Teacher candidates, teacher educators, teachers, principals, and supervisors should be aware of and versed in the professional development standards in chapter 4 of *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL)* (ITEA, 2003). Professional development courses and other experiences should align with these standards as well as with state/provincial/regional and national/federal accrediting guidelines (*AETL Professional Development Standard 7, Guideline D*). In addition to remaining current, both in-service and pre-service professional development must be oriented toward the future.

***Identify Teacher Learning Needs and Establish Goals.*** The study of technology advances K–12 students toward technological literacy. The content standards in *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002) define the knowledge and abilities K–12 students should possess having engaged in technological study. Teacher education should also be concerned with improving K–12 student learning and achievement. Therefore, teacher education must be tailored to the learning needs of K–12 students.

During pre-service, much of the professional development experience should focus on preparing teacher candidates to promote standards-based technological study. Teacher candidates are at the initial stages of the professional development continuum, and it is likely that they will gain much new knowledge of teaching, technology, and students as learners of technology. Having been students in K–12 classrooms, teacher candidates have perceptions of the teaching and learning process. In some instances, the pre-service experience may challenge teacher candidate perceptions. Teacher educators should consider the needs of teacher candidates and tailor professional education to accommodate these needs. The goals for their learning should incorporate their previous educational experiences as well as their perceptions of the field of education. Ultimately, teacher educators should establish goals that are consistent with the professional development standards and promote an understanding of the content standards in *STL*.

During in-service, K–12 student learning must drive the continued education of teachers. “Successful staff development...works when it is selected or adapted to meet an identified need” (Killion, 2002, p. 202).



Therefore, teachers and administrators should continually refer to the results of student assessment and the learning goals of the school, school district, or state to determine the learning needs of teachers. Formative and summative student assessment results indicate the progress students are making toward technological literacy. Teachers compare relevant student assessment data with the content standards in *STL*. This comparison enables teachers to make judgments about student technological literacy learning. As Joan Richardson (2000) suggests, “examining data identifies areas of student learning needs and guides decisions about adult learning” (p. 56). Based on the available data, users can prioritize teacher learning needs to set goals for professional education.

Also during in-service, the goals of the professional development program should align with the technological literacy goals of the school, school district, or state. Professional development is viewed as one way to advance the school system toward its vision of technological literacy for all students. Teachers and administrators align teacher, school, and school district learning objectives. “Professional development is not the goal; it is a means for achieving a goal” (Rasmaussen, Hopkins, & Fitzpatrick, 2004, p. 20).

### *Identifying Teacher Learning Needs and Establishing Goals.*

1. Determine student learning outcomes based on content standards in *STL* and other relevant school, school district, or state standards.
2. Gather relevant student assessment data.
3. Identify "gaps" in student learning by comparing assessment results to desired learning outcomes. These "gaps" will become future student learning goals.
4. Determine how teaching and learning can produce the student learning goals by defining appropriate instructional practices and policies. Consider available research on teaching, technology, and students as learners of technology.
5. Identify what teachers need to know and be able to do to implement the instructional practices and policies. This may include content knowledge and/or pedagogical skills.
6. Establish teacher learning goals.



**Define Content.** The education of teachers should enhance teacher understanding of technological content (including *STL*), instruction, and assessment (*AETL Professional Development Standard 7, Guideline F*) and be consistent with the professional development standards. Professional Development Standards 1–6 in *AETL* outline the content of professional development (see p. 7).

Users of *Developing Professionals* should also consider other content area standards as well as state/provincial/regional or national accrediting guidelines to determine what teacher candidates and teachers should know and be able to do. In addition to enhancing teacher understanding of the content defined by technological literacy standards, in-service education should prepare teachers with the knowledge and abilities needed to implement new instructional practices and policies. The content delivered by in-service education will be defined by the goals established for teacher learning.

**Identify Assessment Measures.** Teacher learning must be assessed so evidence can be gathered to determine whether or not teacher learning is adequate. As the teacher is the learner, the student assessment standards in *AETL* may be used to frame assessment as well as the document, *Measuring Progress: A Guide to Assessing Students for Technological Literacy* (ITEA, 2004), which is an addenda to the technological literacy standards and provides practical, hands-on suggestions for implementing the standards.

**Consider the Context.** As with many aspects of education, there is not a “one size fits all” approach to professional development. What works in one school or school district may not work in another. What works with a particular group of students may not work with another group of students. “What makes the difference is the context in which the program is operated — the specific situations in the organization that work to support or defeat the innovation” (Loucks-Horsley, et al., 1998, p.174).

As professional education is designed for teacher candidates and teachers, users of *Developing Professionals* should remain aware of and account for the contextual factors that will influence teacher learning. The knowledge and abilities that teacher candidates and teachers gain and the professional development experiences that are provided must be “tailored” to the K–12 students, teachers, practices, policies, resources, or other pertinent contextual factors that influence the given situation.

***Organize Teacher Learning / Develop a Professional***

***Development Plan.*** Effective teacher education requires the coordination of content, curricula, instruction, assessment, and the learning environment. Teacher candidates and teachers should develop and update a personal plan for professional development (AETL *Professional Development Standard 6, Guideline A*). Teacher educators, principals, and supervisors should develop and update a plan for teacher education that identifies how teacher learning will be guided.

## Build Teacher Understanding

Plans must be carried out to have value. In other words, teacher candidates and teachers must be engaged in learning. Professional development providers should model teaching practices that teachers will be expected to use in their laboratory-classrooms (*AETL Professional Development Standard 7, Guideline B*). Professional development program implementation brings about changes in teacher practices and advances students toward technological literacy. In pre-service, teacher candidates should participate in teacher preparation programs, leading to licensure, that are consistent with *AETL* and *STL* (*AETL Professional Development Standard 7, Guideline E*) and promote professional growth. During in-service, teachers and administrators should pursue a variety of professional development activities. In both cases, professional development should be planned to provide sequenced learning opportunities. While the professional development program defines what users believe to be the best “plan of action,” the stages that teacher candidates and teachers will go through to arrive at understanding cannot be predicted. Teacher candidates, teacher educators, teachers, principals, and supervisors must remain flexible and expect the unexpected, as teacher understanding evolves (Loucks-Horsley, et. al, 1998).



## Evaluate Professional Education

The professional development program evaluation should assure that the needs of teachers are being met (*AETL Professional Development Standard 7, Guideline C*). Users of *Developing Professionals* should look beyond whether or not teacher candidates and teachers found particular activities “fun” or “interesting;” the focus should be on determining whether or not teachers learned and whether that learning impacted student learning. “Good evaluations don’t have to be complicated. They simply require thoughtful planning, the ability to ask good questions, and a basic understanding of how to find valid answers” (Guskey, 2002, p. 46).

**Section 5 of *Developing Professionals* discusses some evaluation principles that should be considered as professional education is evaluated.**

## Reflecting on the Possibilities

Attaining a technologically literate citizenry is possible through K–12 education. Technological literacy standards identify the “what” (*STL*) and “how” (*AETL*) of technological study. The “who” exists within the some 36,000 technology teachers delivering technology education instruction in the United States (Meade & Dugger, 2004). Achieving the vision expressed by *STL* and *AETL*, that all students can and deserve to become technologically literate, will require this core of teachers and those preparing to become teachers to have access to professional development consistent with technological literacy standards.

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***Evaluation* refers to the process of collecting and processing information and data to determine how well a program and its various components meets the requirements and to provide direction for improvements. For purposes of clarification, in *Developing Professionals*, as in the other addenda documents, the term *assessment* is only used to refer to student assessment.**

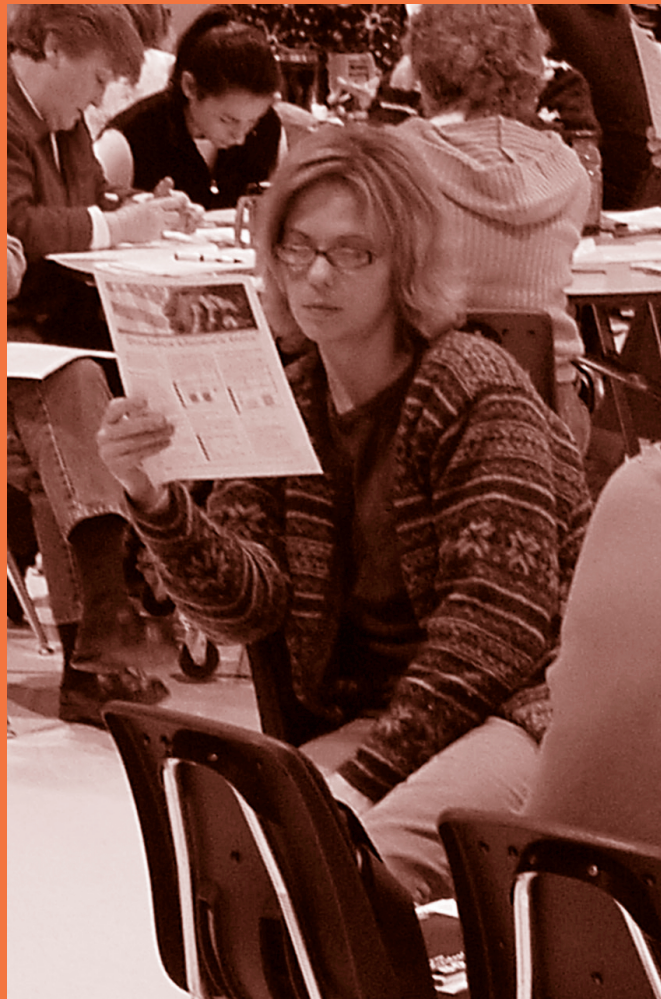
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# SECTION 4

## Teacher Learning Approaches and Venues



**This section describes various approaches to and venues  
for teacher learning.**

Deeper content knowledge, more content-specific instructional strategies, and greater understanding about how students learn will better enable teachers to craft instruction to meet the varying needs of students and help them achieve rigorous content standards. (Killion, 2002, p. 9)

Achieving the goals for student learning defined by technological literacy standards places greater demands on teachers. Teachers need a deeper understanding of teaching, technology, and students as learners of technology. This, in turn, places greater demands on the education of teachers. Teachers of technology must be prepared with knowledge and abilities to meet the changing needs of students while remaining informed of a dynamic discipline. “At the center of professional development planning is the decision about which strategies or approaches to use” (Loucks-Horsley et al., 1998, p. 42).

## Approaches to Teacher Learning

The education of teachers promotes collaborative exchange in which teacher candidates and teachers share common purposes, focus on K–12 student learning, and engage in reflective dialogue (Shellard, 2002). The education of teachers promotes a community that supports teacher candidates and teachers as learners. These professional learning communities enable educators to become responsible for their own continued professional growth. Teacher candidates and teachers of professional learning communities represent a variety of expertise. Rather than every individual in the professional learning community possessing consistent knowledge and abilities, every individual shares his or her own expertise with others, and the group builds on the collective strengths of its members.

Professional development should incorporate a variety of approaches, each aimed at satisfying the needs of the teacher candidates, teachers, and K–12 students being served. The professional development approaches that follow are presented alphabetically. Each approach should be considered for both pre-service and in-service education. While many of the approaches represent what teachers will do in K–12 classrooms, teacher candidates must be prepared to use such strategies. The approaches presented are not intended to provide a complete list of professional development approaches; in fact, there are several excellent resources available on-line and for purchase that do just that. Rather, the list is intended to cause users of *Developing Professionals* to begin approaching teacher learning from new or varied strategies.



### ***Action Research***

In conducting action research, teacher candidates and teachers inquire into teaching and learning by reflecting on classroom practice in an effort to inform and improve teaching and learning. Teachers can do this by examining current practices, identifying areas that need improvement, formulating questions, identifying acceptable evidence, gathering data, analyzing results, revising classroom policies or practices based on the findings, and reporting the outcomes. Action research enables teachers to “test” teaching methods and practices to see what works best and why (Merrill, 2004). This is not

done in isolation, but in cooperation with teachers in other schools, school districts, and states.

### ***Case Discussions***

Narrative stories provide a mechanism for groups of teacher candidates and teachers to reflect on teaching and learning. The stories should depict specific events (i.e., teaching dilemmas, teaching strategies in action, students engaged in technological study) and be written in a manner that triggers discussion or reflection (Loucks-Horsley, et al., 1998). Not only do case discussions enable teacher candidates and teachers to dialogue on specific teaching situations, they are able to reconsider their own classroom practice. Teacher candidate and teacher thinking is often challenged as they reflect on and change their perceptions about teaching, technology, and students as learners of technology.

### ***Internships***

Teacher learning is broadened by engagement in firsthand experiences through means other than classroom learning, such as business and industry involvement. Internships provide opportunities for teacher candidates and teachers to become immersed in technological content. For example, a teacher candidate seeking greater knowledge or abilities related to construction technologies might serve as an intern for a local contractor or construction firm. A teacher wanting to broaden his or her understanding of technological design might serve as an intern for a local architectural or engineering design firm. The knowledge and abilities gained from internship experiences enable teacher

candidates and teachers to bring practical experience into the laboratory-classroom to help guide student learning.

### ***Mentoring***

Mentoring programs should be incorporated into both pre-service and in-service education (AETL *Professional Development Standard 7, Guideline H*). Mentoring provides one-on-one time for teacher candidates and new teachers to develop their teaching repertoire while working with experienced educators. Teacher candidates are paired with practicing teachers and provided time to develop knowledge and abilities based on the expertise of their mentors. While working with mentor teachers, teacher candidates are able to interact with K–12 students. Such interaction in high school links students in Grades 9–12 to post-secondary education, encouraging students to seek careers in technology education and related fields. Outside of the field of education, teacher candidates may be paired with an “expert” mentor in such technological fields as engineering, architecture, and industrial design, among others. New teachers and/or newly re-certified teachers are often paired with experienced teachers, within and outside of the discipline of technology. This collaboration provides an opportunity for these teachers to learn from their colleagues while mastering new practices. Mentoring opportunities outside of the field of education are equally beneficial to practicing teachers.

### ***Partnerships***

Partnerships can take on a variety of forms and may include partnerships between teacher candidates or teachers and technology professionals in business, industry, and higher education, among others. Partnerships enable teacher candidates and teachers to become connected with the technological world outside of the classroom. Partners can serve as mentors, resources for learning technological content, participants in curricula design and evaluation, or technology program decision makers, among other things (Loucks-Horsley, et al., 1998).

### ***Professional Writing***

Teacher candidates and practicing teachers can share their understanding, experiences, and insight by contributing to professional publications. Depending on the type of publication, teacher candidates and teachers might report research findings, comment on classroom practices, or share lesson and/or activity ideas. Authoring such pieces enables teacher candidates and teachers to reflect on teaching and learning while providing readers with information that can be applied to other classroom situations. Professional publications to which teacher candidates and teachers might contribute include (but are not limited to):

## Teacher Story

### Business Partnership

Mark Spoerk

Since the conception of the Lynde & Harry Bradley Technology and Trade School (Bradley Tech) in Milwaukee, Wisconsin, over five years ago, strong community and business partnerships have been viewed as essential to the complete education of every child. While material support from business and industry seems the obvious goal, at Bradley Tech we perceived community partnerships could help the educational process far beyond money and material contributions. Since opening its doors in the fall of 2002, community partnerships have played an integral role in educating the students at Bradley Tech.

The first step in engaging community partners in our school was to identify what types of partnerships could be mutually beneficial. It is important that an advantage is perceived by the intended partners to encourage them to wholeheartedly commit to being fully involved. Bradley Tech identified several broad categories of partnerships: skilled trade unions; technical colleges; four-year universities; and local businesses related to the areas of construction, manufacturing, and communications, the foundation of the organizational structure for Bradley Tech.

Representatives from the various partners were involved early in the development of the programs at Bradley Tech. They were involved in curriculum review and development, ensuring our programs aligned with higher educational opportunities, as well as the needs of local businesses and industry. By involving partners early on in the whole process, not simply asking for money, they took ownership in the programs and became willing and eager partners.

Since that time, technical colleges, universities, and local businesses have been actively involved with teachers and students in and out of school. Milwaukee Area Technical College (MATC) has provided a career coach who works with teachers and students on developing Individualized Technical Career Plans (ITCP) for each student. She helps students prepare résumés, organizes field trips, plans an annual career fair attended by numerous businesses, organizes career mentors for students, and assists students and teachers in a variety of other ways. Waukesha County Technical College (WCTC) and MATC both provide faculty that give students an awareness of programs offered at their respective institutions and the preparations necessary to be successful in these programs. Several four-year universities from Wisconsin have also taken an active role in the educational process for our students. They have arranged field trips to tour their campuses, as well as provided professors as guest speakers, and they have each been able to work alongside students on engineering projects.

MATC has further partnered with Bradley Tech through the 21<sup>st</sup> Century Urban Technical Education Project. One of the main thrusts of this project is to provide a group of approximately 12 “lead teachers” with extensive professional development opportunities, including best practices in education,



brain-based research, and contemporary instructional strategies. These presentations by nationally renowned experts occur throughout the year over approximately seven weekends. These lead teachers, in turn, collaborate with other teachers at Bradley Tech, sharing what they learn. As a result, the entire school benefits from the intensive training received by the lead teachers.

Bradley Tech has many business partnerships, which provide support to teachers and students in a variety of ways. Harley-Davidson, for example, has provided an employee who works full time at Bradley Tech. He counsels students on career choices and preparation. He works with teachers to identify professional development needs, and arranges for relevant activities. He arranges for other employees to speak to classes on relevant topics. Harley-Davidson is recognized as an expert at providing leadership training to its employees. Recently they arranged for department chairs and others in leadership roles to undergo the same extensive training given to their own employees. As a result, these individuals have received valuable training that is not typically part of educational certification programs. Harley-Davidson also encourages educational field trips to their facilities, and hires co-operative education students annually.

Rockwell Automation has provided numerous pieces of equipment for use in classes, and delivered training for teachers so they can adequately utilize the equipment in their instruction. Rockwell has long been recognized for providing exemplary training to its own employees. They have made this training available to teachers at Bradley Tech at no cost. Last summer, eight instructors received three weeks of intensive training on motor controls, sensors, and programmable logic controllers. They also provided cooperative writing opportunities for students. Students are also given numerous opportunities to work with professional engineers in the classroom and at Rockwell's facility.

Pieper Electric has provided a range of opportunities for students in the construction academy. Students are invited to attend and participate in their line-mechanics training school. They are provided with job shadowing opportunities. A retired executive from the company works alongside teachers and students on a weekly basis. He engages in laboratory activities with them, and provides them with valuable insight into the working world of the electrical field. He works with instructors, ensuring their content is contemporary and aligned with current practices.

These are but a few of the positive community partnerships that have been established at Bradley Tech. All of our successful partnerships have several key traits in common. First, their involvement was sought early on, and often. Second, we have been eager to accept more than financial contributions. They have provided much more than material support, and in the long term, this will be more valuable to students. By working closely with instructors and aiding in their professional development, students perceive a high validity in the programs we are delivering.

*Mark Spoerk is a Technology Educator at Lynde and Harry Bradley Technology High School in Milwaukee, Wisconsin. He can be reached via e-mail at [spoerkmj@milwaukee.k12.wi.us](mailto:spoerkmj@milwaukee.k12.wi.us).*

- Professional journals
- Popular magazines and journals
- Newspapers
- Electronic media
- Book chapters
- Independent publishing (e.g., textbooks, resource manuals)

### ***Reflective Writing***

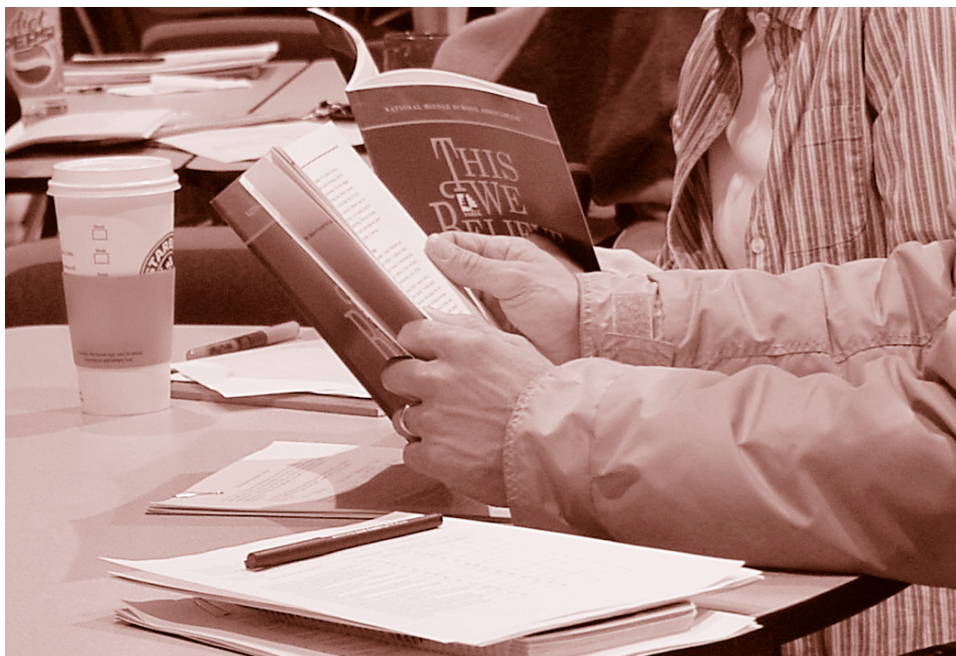
Teacher candidates and teachers should be “reflective practitioners.” Reflective writing is one means for accomplishing this. Teacher candidates and teachers can routinely record instructional practices and policies to reflect upon classroom occurrences. This documentation of their observations, understandings, experiences, or thoughts necessitates that they formatively evaluate teaching and learning. Teacher candidates and teachers must make adjustments to their practices and remain informed of the changes that have occurred over a period of time. Reflective writing is viewed as a means to assist teacher candidates and teachers in analyzing their own classroom practices.

### ***Study Groups***

Study groups provide teacher candidates and teachers with an avenue for investigating teaching and learning. Working together, teacher candidates and teachers are able to investigate an issue or problem and develop a common understanding. They can collaborate to determine what knowledge and skills are needed to address the issue or problem and seek appropriate learning opportunities. For example: “...study groups provide a forum in which teachers can be enquirers and ask questions that matter to them, over a period of time, and in a collaborative and supportive environment” (Loucks-Horsley, et al., 1998, p. 114).

### ***Courses, Workshops, and Institutes***

Courses, workshops, and institutes are “traditional” avenues of professional development. Pre-service education primarily occurs through coursework and other related experiences. Courses are designed to satisfy specific goals, occur during a regular time frame, and are generally facilitated by an identified instructor. Practicing teachers might also complete courses to satisfy re-certification requirements or gain understanding related to a particular area of study. Courses are developed to meet the learning needs of a group of individuals. This is also true of many of the workshops and institutes that teachers regularly attend each school year. An expert provides common experiences and learning to a group of teachers.



### ***Beyond the University Classroom or K–12 Building***

Professional development generally triggers images of a university classroom or K–12 school building. Teacher candidates complete coursework to satisfy university requirements and meet state licensure requirements. While these requirements might involve teacher candidates in K–12 schools, a majority of the learning is facilitated in a classroom. It is also common for practicing teachers to complete coursework to satisfy the demands of re-licensure. Additionally, much in-service education occurs in workshops or institutes held for entire school faculties. As teacher candidates, teacher educators, teachers, principals, and supervisors plan and pursue teacher education, they will find it helpful to think beyond the university classroom or teacher institute day to alternate venues for the education of teachers.

### ***Museums, Centers, and Other Informal Education***

*Learning* and *education* are terms generally associated with schools. Museums and science and/or technology centers are two examples of informal educational settings that provide opportunities for the education of teachers beyond the “formal” classroom environment. Exhibits, interactive displays, and other programs at museums and science and/or technology centers provide a wealth of resources to teacher candidates and teachers. Oftentimes the knowledge gained through informal educational venues provide opportunities for K–12 student learning to be connected to life outside of the technology laboratory-classroom.

### ***On-Line Education***

On-line education relies upon the World Wide Web as the primary delivery mode for the communication and presentation of teaching and learning. On-line learning opportunities take a variety of forms, which include workshops, presentations, courses, informal support groups, and other network-supported resources. Teacher candidates and teachers are able to participate in learning activities from remote locations (e.g., their homes) that do not require a presence in a “formal” classroom. Additionally, on-line education offers greater flexibility to teacher candidates and teachers, as they can tailor professional development activities to their own schedules.

### ***Professional Organizations and Agencies***

Professional organizations and agencies provide various resources and learning opportunities to teacher candidates and teachers, among other educators. Periodic workshops, annual conferences, and electronic correspondence provide avenues for teacher candidates and teachers to become aware of what is happening beyond the university classroom or K–12 school building. Professional organizations provide a wealth of printed materials including journals, teacher resources, and promotional materials. Membership in such organizations often includes additional “benefits.” Professional development programs should support professional technology organization engagement by teachers and management personnel (*AETL Program Standard 5, Guideline K*). Some national professional organizations in which teachers of technology, both pre-service teacher candidates and in-service teachers, might participate include (but are not limited to):

- American Federation of Teachers (AFT)
- American Society of Engineering Education (ASEE)
- Council on Technology Teacher Education (CTTE)
- International Technology Education Association (ITEA)
- National Education Association (NEA)
- Technology Education Children’s Council (TECC)
- Technology Education Collegiate Association (TECA)
- Technology Education Division of the Association for Career and Technical Education (ACTE)
- Technology Student Association (TSA)

State-affiliated professional organizations, such as the New York Technology Education Association, also provide professional development opportunities to teachers. So do many state and national educational agencies, including the U.S. Department of Education.

## Teacher Candidate Story

### Professional Involvement

A. J. Applegarth

The Technology Education Collegiate Association (TECA) has been a huge part of my life over the past four years. I first became an active TECA member as a Technology Education student at Virginia Polytechnic Institute and State University. Most of the upperclassmen in my program were involved with TECA, and it seemed like a great opportunity to gain valuable experience as a pre-service teacher candidate. As a Virginia Tech TECA member, I participated in two Technology Student Association (TSA) Fall Rallies. At these rallies, our TECA chapter hosted many TSA chapters from all across southwestern Virginia. As a chapter, we planned team-building activities, physics demonstrations, facility tours, and a tour of the Virginia Tech campus for all of the TSA members. I also attended the 2002, 2003, and 2004 International Technology Education Association (ITEA) Conferences with my TECA chapter. At these conferences, we competed against other TECA chapters from various universities in the region. Competing with my peers allowed me to gain valuable experience working as a team with a common goal. This would later help me as I further developed myself professionally. After being active as a local TECA member, the next logical step was to become involved with TECA on a national level.

Dr. Sharon Brusic (formerly a Virginia Tech professor, and currently a Millersville University professor) is the main reason that I became more involved with TECA on a national level. Her dedication to the field of Technology Education and her confidence in my leadership skills played a major role in my decision to run for an ITEA/TECA officer position. I was elected to the ITEA/TECA office of President-Elect in March of 2002. As President-Elect, I helped the other officers plan the year's events at the Summer Leadership Conference in Fort Collins, Colorado. I also learned about the duties of the office of President and the politics of the organization. In this office, I learned that listening and being observant, sharing ideas with your peers, and having a great supporting cast can make you a very successful leader. After serving as President-Elect for one year, I moved into the office of ITEA/TECA President. As President, I learned how to create a working budget, expand my leadership skills, and use my officer team to make TECA better than ever. At the 2004 ITEA Conference in Albuquerque, New Mexico, my fellow officers and I prepared two interest sessions for the conference. The first interest session was for other pre-service teacher candidates to hear from first-year teachers about their experiences in the classroom. The second interest session was called "Biotechnology in the Technology Education Classroom" and was presented by my officer team and myself. Presenting at a national conference gave me more confidence standing in front of a large group, which will greatly benefit me once I am in the



classroom. I think it is very important to be comfortable talking in front of a group because if you are not, your students will know, and your teaching will suffer. Preparing and presenting two interest sessions at the ITEA Conference was a new step for TECA and we received a lot of positive feedback from the people at the conference.

Other than gaining valuable knowledge, one of the best benefits of being an ITEA/TECA officer was traveling. As a national officer, I traveled to ITEA-related conferences in Virginia Beach, Virginia; Columbus, Ohio; Fort Collins, Colorado; Nashville, Tennessee; Orlando, Florida; and Albuquerque, New Mexico. Another benefit of being an ITEA/TECA officer was being able to network at the ITEA Conferences. I made numerous valuable contacts at all of the ITEA Conferences I attended. Networking is very important as a pre-service teacher candidate because it allowed me talk to teachers in the field and gain useful information about teaching and being in a classroom. I also had the opportunity to talk to members of the ITEA Board of Directors where I learned more about the operation of the organization. I learned a lot during my tenure as an ITEA/TECA officer, and I have Dr. Sharon Brusic to thank for urging me to take the opportunity to build my leadership skills through ITEA/TECA.

Being involved in TECA on both the local and national levels helped me grow both professionally and personally. I also learned a lot about the field of Technology Education, how to work as part of a team to accomplish various tasks, and I gained valuable experience participating in volunteer activities. Most of all, being involved with TECA has allowed me to make numerous friends and contacts from all across the country. I graduated from Virginia Tech in the summer of 2004, and will be teaching at Northside Middle School in Roanoke, Virginia starting in August of 2004. I still plan to be active as an ITEA member, and hope to start a TSA chapter at Northside within the next two years. I also plan to obtain a master's degree in Curriculum and Instruction from Virginia Tech over the next few years. I would eventually like to take on an administrative position, or become a teacher educator. I learned so much from my professors at Virginia Tech, and I hope that I can be as much of a mentor to my students as my professors were to me.

*A.J. Applegarth is ITEA/TECA Past President and a Technology Educator at Northside Middle School in Roanoke, Virginia. He can be reached via e-mail at [aapplegarth@res.k12.va.us](mailto:aapplegarth@res.k12.va.us).*




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**The education of teachers must be planned, implemented, and evaluated to ensure that the needs of teachers are being met and that teacher learning helps K–12 students attain technological literacy.**

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## Reflecting on the Future of Technological Literacy

Few would argue with the assertion that one purpose of public education in America is to educate contributing citizens. As technology increasingly influences everyday life and individuals become increasingly more dependent upon technology, it is essential to consider the role of education in promoting student understanding of technology, including both knowledge and abilities. It is necessary to address questions including: *What type of learning will foster technological literacy? What type of school program will facilitate such learning? What type of teacher can bring about student understanding?* Teachers need access to professional education. The education of teachers must be planned, implemented, and evaluated to ensure that the needs of teachers are being met and that teacher learning helps K–12 students attain technological literacy.

# SECTION 5

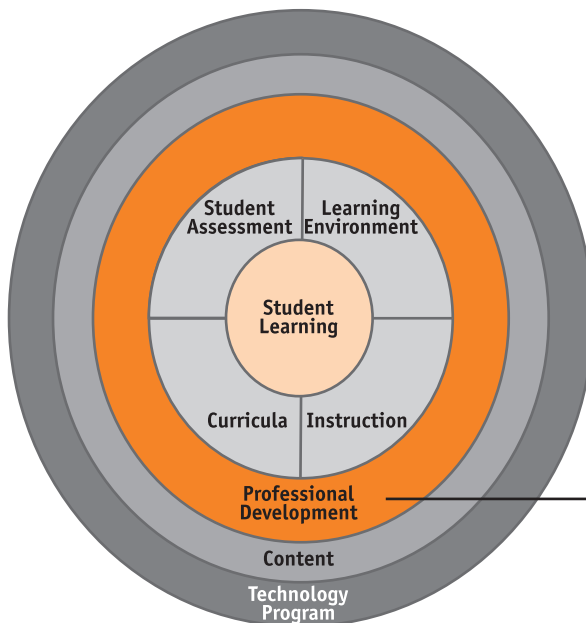
## Evaluating Professional Development



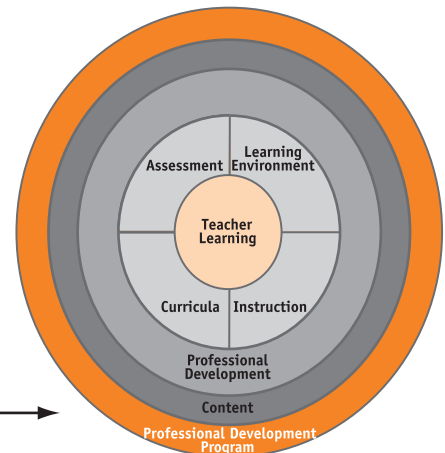
**This section provides suggestions for determining whether professional development meets the needs of those it serves.**

As with any program, teacher candidates, teacher educators, teachers, principals, and supervisors should monitor the professional development program to ensure that it is meeting the needs of those it serves—not only educators, but the K–12 students who will ultimately benefit. Therefore, for both pre-service and in-service, professional development must be evaluated as a program within a program; in other words, professional development must be evaluated both separately and as a component of the larger K–12 educational program (see Figures 3 and 4).

**Figure 3.**  
**Selected K–12 Technology Program Components**



**Figure 4.**  
**Selected Professional Development Program Components**



Moreover, the professional development of professional development providers, or teacher educators (e.g., university faculty, among others), should be addressed and evaluated in a similar manner.

Systematic, continuous evaluation provides the means for gathering and analyzing data to ensure that the purposes of teacher education are being achieved. It allows users to answer specific questions regarding professional



teacher candidates and teachers prepared with the knowledge and abilities to advance student technological literacy? Is professional learning benefiting teacher candidates, teachers, principals, supervisors, and K–12 students? Evaluation allows questions such as these to be answered.

## The Scope of Evaluation

*Realizing Excellence: Structuring Technology Programs* (ITEA, 2005b), the addenda document to *STL* dealing with programs, recommends the formation of a Technology Program Committee and, as appropriate, a Technology Program Advisory Committee at the K–12 Technology Program level. In addition to participating in the planning and implementation process, these committees would also serve to direct and advise the evaluation and revision process of the program. Evaluation of professional development is a vital component of overall program evaluation: “**Program evaluation must encompass the evaluation of all components of the program, including content, professional development, curricula, instruction, student assessment, and the learning environment, across grade levels** (ITEA, 2005b).” For both pre-service and in-service, an additional advisory committee may need to be formed to assist in evaluating the teacher education program.

As Joellen Killion, Director of Special Projects for the National Staff Development Council, states, “with more emphasis on accountability, staff developers will want to explore ways to evaluate their programs and to link staff development to student learning” (2003, p. 15). A primary purpose of educating teachers is to prepare teacher candidates and teachers to advance K–12 student technological literacy. Evaluation goes beyond considering whether or not teacher candidates and teachers found a professional development activity “fun” or “interesting.” Data are gathered to determine whether or not teacher learning will or does impact K–12 student learning.




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***Realizing Excellence* (ITEA, 2005), the addenda document to *STL* dealing with programs, recommends the formation of a Technology Program Committee and, as appropriate, a Technology Program Advisory Committee at the K–12 Technology Program level. In addition to participating in the planning and implementation process, these committees would also serve to direct and advise the evaluation and revision process of the program.**

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**Professional development programs should be evaluated as a whole picture made up of its component parts, including content, professional development (of professional development providers), curricula, instruction, assessment (of teacher candidates and teachers), and the learning environment.**

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**Professional development programs should also be evaluated as part of the bigger picture of K–12 technology programs. The other components include curricula, instruction, student assessment (of K–12 students), and the learning environment.**

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## Evaluation Versus Assessment

For the purpose of clarification in the addenda series, the writers have taken the position that programs are evaluated and people are assessed. Both evaluation and student assessment play significant roles in professional development. Professional development evaluation is the process by which data are collected to determine how well the professional development program is achieving specified purposes and/or requirements. Teacher candidates, teacher educators, teachers, principals, and supervisors use the evidence collected by evaluation to make revisions and plan future professional development. Student assessment, on the other hand, refers to the systematic, multi-step process of collecting evidence of learning, understanding, and abilities and using that information to inform instruction and provide feedback to the learner. In the case of professional development, evidence of teacher candidate, teacher, and/or K–12 student learning is gathered. These assessment results provide one indication of the effectiveness of professional development. While learning outcomes are an important component of professional development, evaluation must consider other outcomes of teacher learning, such as changes in teacher practice, implementation of new K–12 programs, and the development of teachers' leadership capacity (Loucks-Horsley & Matsumoto, 1999).



## Principles of Evaluation

Evaluation of professional development is based on accepted truths, or principles. The principles that follow are not meant to provide an all-inclusive listing. Instead, these principles provide initial direction to users as they approach evaluation. Users will likely consider principles of evaluation that are not listed below. Some principles of effective evaluation of professional development include:

- Occurs systematically and continuously.
- Addresses an identified purpose.
- Is based on standards and/or accrediting guidelines.
- Is research-based and objective.
- Establishes valid and reliable measurements.
- Utilizes fair and equitable methods.
- Incorporates both formative and summative measures.
- Draws data from multiple sources.
- Enhances teacher learning.

***Occurs Systematically and Continuously.*** Users of *Developing Professionals* are aware of the need to employ systematic, continuous evaluation. They establish a system for collecting and analyzing data. Data take many forms, and the evaluation system accounts for this. Mechanisms are in place at the university, classroom, school, school district, and state levels to routinely collect, analyze, and report evaluation data. One such mechanism at the pre-service level is an external review of the teacher preparation program. Decisions about professional learning are made with consideration for the criteria to which the university is held accountable. This includes state/provincial/regional or national standards and accrediting guidelines. Schools and school districts may participate in similar accreditation processes. In any case, evaluation attempts to make judgments about the quality of professional development offered to educators.

***Addresses an Identified Purpose.*** Before evaluation can begin, it is necessary to answer the question: *Why evaluate the professional development program?* Evaluation should be purposeful. We must clarify up front the purposes of evaluation to be able to determine the type of evidence needed to make judgments about the quality of teacher education. The purpose defines why users are evaluating the professional development program. A helpful way to identify the

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***Evaluation refers to the collection and processing of information and data to determine how well a design meets the requirements and to provide direction for improvements.***

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***Student assessment is a systematic, multi-step process of collecting evidence on learning, understanding, and abilities and using that information to inform instruction and provide feedback to the learner, thereby enhancing learning.***

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***Evaluation principles are the basic truths, laws, or assumptions held in the use of evaluation.***

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evaluation purpose is by specifying questions about the program that need to be answered. *Are the strategies or approaches to teacher education helping teachers understand the content? Does the education of teachers resemble the practices that teachers will be expected to use in the classroom?* Questions such as these provide direction to evaluation and offer it purpose.

***Is Based on Standards and/or Accrediting Guidelines.*** It is imperative that evaluation be consistent with the standards and guidelines of *AETL*. This means that teacher candidates and teachers must be prepared to implement *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002) in their laboratory-classrooms. Users of *Developing Professionals* also consider other academic standards as well as state/provincial/regional or national accrediting guidelines.

***Is Research-Based and Objective.*** Evaluation measures are established to reflect current research on evaluation. Evaluation methods are frequently reviewed and revised to keep practices current and up-to-date. Tools and instruments are used that gather data to objectively judge the quality of teacher education. Opinions and feelings are not considered as the primary source for evaluation data.

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***Validity means having or containing premises from which the conclusion may logically be derived, correctly inferred, or deduced.***

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***Establishes Valid and Reliable Measurements.*** Evaluation provides measurable evidence to judge the effectiveness of professional development. In order to judge the quality of professional development, teacher candidates, teacher educators, teachers, principals, and supervisors must have valid data to use when making decisions: "...validity focuses on the accuracy or truth of the information (data) collected in the [evaluation] process, while reliability attempts to answer concerns about the consistency of the information (data collected)" (ITEA, 2003, p. 23). Reliability describes the consistency with which an evaluation measures what it intends to measure. Evaluation methods gather evidence specific to the purposes for which they are designed. The purposes of evaluation remain consistent throughout data collection, analyzing, and reporting.

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***Reliability means capable of being relied upon; dependable; and may be repeated with consistent results.***

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***Utilizes Fair and Equitable Methods.*** The tools and methods used to evaluate professional development, whether assessing teacher understanding, or judging the effectiveness of a particular professional development approach, should be free of bias. "[Evaluation] bias refers to qualities of an [evaluation] instrument that offend or unfairly penalize a group of

examinees because of examinees' gender, ethnicity, socioeconomic status, religion, or other such group-defining characteristics" (Popham, 1999, p. 67). Teacher candidates, teacher educators, teachers, principals, and supervisors select evaluation methods that are fair and equitable.

***Incorporates Both Formative and Summative Measures.*** Evaluation is a continuous process. The ongoing evaluation that occurs throughout professional development is referred to as formative evaluation. Formative evaluation enables those providing or pursuing professional development to adjust learning as it occurs to enhance teacher learning. Some examples of formative evaluation data might include K–12 student assessment results, specific professional development opportunities, and teacher assessment. Evaluation data that are collected at prescribed intervals are called summative evaluation. Summative evaluation is cumulative. It indicates whether or not professional education goals have been achieved. Both formative and summative evaluation are critical to a well-rounded evaluation approach (ITEA, 2004a).

***Draws Data from Multiple Sources.*** Evaluation data should be drawn from all components of the professional development program, including content, professional development (of professional development providers), curricula, instruction, teacher assessment, and the learning environment. Additionally, Thomas Guskey (2002, p. 46) notes, "effective professional development evaluations require the collection and analysis of the five critical levels of information[:]"

- Level 1: Participants' Reactions
- Level 2: Participants' Learning
- Level 3: Organization Support and Change
- Level 4: Participants' Use of New Knowledge and Skills
- Level 5: Student Learning Outcomes

Additional data might be drawn from program data at either the university or K–12 level, such as enrollment data or previous evaluation results.

***Enhances Teacher Learning.*** Professional development evaluation ensures that the needs of teachers are being met. The evidence gathered by evaluation allows judgments to be made about the effectiveness of the education of teachers. These data enable changes to be made to professional learning to ensure that teacher candidates and teachers are developing an understanding of technological content, instruction, and student assessment.





## The Procedure of Evaluation

How users of *Developing Professionals* approach professional development evaluation will depend upon the purpose of the evaluation, the intended audience for the reporting of results, and the person conducting the evaluation. An individual might conduct the evaluation, or an evaluation committee might be formed to gather the needed data. Data might be gathered from existing data sources or users may design methods to collect “new” information about the professional development program. It is likely that the approach to evaluation taken will demand alteration depending upon when data are gathered and the questions being answered. In any case, it is necessary for users to:

- Plan for Evaluation.
- Collect and Analyze Evidence.
- Gather and Analyze Additional Data.
- Report Findings.
- Revise.

The process that follows is general enough to apply to the evaluation of any professional development program. Adjustments should be made to consider individual needs.

***Plan for Evaluation.*** As mentioned elsewhere in *Developing Professionals*, “good evaluations don’t have to be complicated. They simply require



thoughtful planning, the ability to ask good questions, and a basic understanding of how to find valid answers” (Guskey, 2002, p. 46). Before data collection begins, users make decisions that guide data collection. The purpose of evaluation, the audience to which results will be reported, and the questions that will guide evidence gathering are specified. For example, evaluators will want to consider whether professional development of technology educators is consistent with “Professional Development Standards” (chapter 4) of *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL)* (ITEA, 2003).

**Collect and Analyze Evidence.** What evidence is needed to accurately answer the evaluation questions? Some possible sources from which data might be drawn include:

- Teacher Surveys.
- Teacher Interviews.
- Teacher Observations.
- Teacher Self Assessment / Peer Assessment.
- Other Teacher Assessment Data.
- Information from Students.
- K–12 Student Assessment Data.
- State and Regional Accrediting Association Evaluation Results (e.g., Southern Association of Colleges and Schools or the accrediting process in a given state).
- Results from Previous Evaluations.

Evaluators will use a variety of tools and methods to gather evaluation data. The evidence will then be used to determine the extent to which the professional development program is achieving its purposes. Selection of individual evaluation and assessment instruments will be based on the purpose of the evaluation, the audience to which findings will be reported, and the evidence that is needed to answer specific evaluation questions.

**Gather and Analyze Additional Data.** Evaluators will need to determine if any information is “missing.” In other words, will the evaluators be able to answer all of their questions about the various aspects of the professional development program? Evaluators may wish to use data from the larger aspect of the program within which the professional development program exists. For pre-service, this might include data from the university department within which the program is housed, for example. For in-service, this would refer to the big picture of the K–12 technology program (or

perhaps the K–5, 6–8, or 9–12 technology program, if professional development is being evaluated at a smaller scale). After all of the data has been gathered and analyzed, evaluators must review the data in relation to the questions they have posed about the professional development program. A decision about the effectiveness of the professional development program will need to be made based on all available data.

**Report Findings.** Evaluation results may be used to inform individuals and groups of the quality of professional education provided to teachers of technology. The data that will be valuable to stakeholders will vary. It is essential that we consider the information needs of potential audiences when we report evaluation findings. At the minimum, evaluators should report findings to the larger aspect of the program within which the professional development program exists. Again, for pre-service, this might be the faculty of the university department within which the program is housed, for example. For in-service, this would be the Technology Program Committee responsible for the K–12 technology program (or perhaps the K–5, 6–8, or 9–12 technology program, if professional development is being evaluated at a smaller scale). Listed below are some recommendations for reporting the professional development program evaluation findings:

1. An evaluation report containing data, notations of discrepancies, and recommendations is made annually.
2. Findings from the professional development evaluation are disseminated to the appropriate decision makers for the professional development program and the larger educational program in which it exists.
3. Discrepancies between professional development program status and standards (*AETL*) are reported to the appropriate decision makers.
4. Recommendations for correcting deficiencies are reported to appropriate decision makers.

Typical reports could include the following elements:

- Title.
- Purpose of the program evaluation.
- Background information.
- Who conducted the professional development program evaluation.
- Timetable for professional development program evaluation.
- Specific topics covered in the professional development program evaluation.
- Populations who provided information on the evaluation.
- Analysis of results.
- Summary of results.

**Revise.** The evidence gathered by evaluation enables us to determine whether the needs of teacher candidates and teachers are being met, and ultimately whether we are meeting the needs of K–12 students. Based on the collected data, professional development providers are able to make revisions and plan future teacher learning. Evaluation should occur at regular intervals throughout the implementation of the professional development program.

Evaluation “is an empty process unless the results are used to make positive change” (ITEA, 2004a, p. 21). We evaluate teacher education for a variety of purposes, including:

- Improving K–12 student learning.
- Accountability to stakeholders.
- Ensuring that the needs of teachers and students are being met.
- Enhancing teacher understanding of content, instruction, and student assessment.
- Guiding professional development decisions.
- Guiding K–12 technology program enhancement decisions.

## Reflecting on Systems for Improvement

It is important that ongoing efforts be developed and maintained to assure that the quality of teacher learning is monitored. After all, teacher learning affects student learning. If our goal is for all students to become successful in the technological world, teachers must be prepared to foster success. Evaluation should not be viewed as an event, but as an ongoing process. A formal system of evaluation should be established so that data can be collected on a regular basis in each university, K–12 classroom, school, school district, or state. Through continuous evaluation, programs will be systematically improved, and we can continue to strive toward technological literacy for all students.

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**Evaluation should not be viewed as an event, but as an ongoing process for improving professional development plans and programs.**

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## Teacher Educator Story

### Pre-Service Teacher Education Program Revised

Steve Shumway and Jared Berrett

Technology teacher educators across the nation are considering what changes will be made to their pre-service teacher education programs to implement the standards in *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002) [and *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL)* (ITEA, 2003)] and to help future teachers learn to develop and teach curriculum that is based on those standards (Custer & Wright, 2002). Likewise, many practicing technology teachers are wondering how the standards in *STL* and *AETL* might affect what and how they teach technology. A recent survey (Reeve, Nielson, & Meade, 2003) revealed that in Utah, a majority of Utah teachers have a copy of *STL* and are supportive of the standards, but they want help implementing standards-based technology in their classrooms. In September 2001, students and faculty in the Technology Teacher Education program at Brigham Young University (BYU) began a program redesign effort to meet this challenge.

#### The Scope of Change

Initially, a self-evaluation of the teacher education program at BYU was conducted that included input from students, local teachers, state and district leaders, and an external consultant with expertise in technology teacher education programs. Among a number of internal guidelines for change, the following conclusions were developed:

- First, teacher candidates needed to have earlier and more frequent teaching and curriculum development experiences in the public schools.
- Next, teacher candidates needed to become intimately familiar with the need for standards and learn to develop curriculum based on *STL*.
- Finally, something needed to be done to coordinate efforts and strengthen the partnership between teacher education institutions and local classroom technology teachers.

As ideas were discussed, it was proposed that through improved practicum experiences, both pre-service teacher candidates and supervising teachers could inform one another and learn how to implement standards-based lessons into their curriculum—thus beginning the process of using *STL* as a focus of curriculum development. University technology teacher candidates could be change agents by bringing ideas into the classrooms of our local technology teachers, allowing them to experience more than just a quick workshop fix for incorporating the standards.

## Implementing the Idea

As part of the redesign, all teacher candidates majoring in Technology Teacher Education were required to take a new introductory course entitled Teaching Technology. The required text for the course is *STL*. In this class, several class discussions and activities related to the standards and their importance for literacy are introduced. The teacher candidates are then given their first experience to interact with students in a public school to develop the context in which the standards might be taught. A university supervisor contacts a local elementary school teacher to discuss an upcoming curricular unit and the possibility for university students to have a mentored teaching experience. An elementary school is chosen in order to help university students realize that the standards are designed for grades K–12 and also because at this time, the university students have limited technological content knowledge.

Teams of university students and the college supervisor then meet with the elementary teachers (sixth grade) to discuss outcomes (including state science and technology standards), assessment practices and instruction/activities. Teams of university students then develop a short lesson related to a current sixth-grade unit based on state science standards and the standards in *STL*. Finally, under the supervision of the elementary teachers, the university students team teach the lesson and conduct assessment of student learning. When finished, the teams meet with the college supervisor to reflect on the activity; discussing what they learned and how their learning and the learning of the sixth grade students might have been improved.

## Practicum

After this introductory experience, university students have additional opportunities for mentored teaching experiences as sophomores and again as juniors. As juniors, teacher candidates are required to take an instructional strategies course that includes a practicum component. Because they now have more content knowledge coupled with previous teaching experiences, teams of teacher candidates are given the opportunity to work with local junior high school teachers to develop and teach an entire curricular unit.

To implement the practicum component, the university supervisor contacts 3–4 local middle school technology teachers about the possibility of partnering with the university and the teacher candidates in developing and teaching a curricular unit in their classroom. With some teaching experience and a moderate understanding of standards-based curriculum, the university students are faced with a considerable challenge as they meet with the cooperating teachers and try to establish the attitude that the curricular unit should be standards-based rather than standards-reflective (Barnette, 2003) [see also pp. 17-18 of *Developing Professionals*].



## Implementing Backwards Design

One of the intended outcomes of the introductory and practicum experiences was that local teachers along with pre-service teacher candidates would learn to use the backwards design model (Wiggins & McTighe, 1998) when developing curriculum materials. In this original model, teachers 1) Identify desired results (what you want the students to know and be able to do), 2) Determine acceptable evidence (assessment), and 3) Plan learning experiences and instruction. This model is helpful in helping teachers see that the curriculum is first driven by outcomes rather than by activities.

One of the unintended outcomes of these activities was the way the teacher candidates modified backwards design when given the opportunity to implement it in an authentic setting. The following chart details the difference between the backwards design approach originally presented to BYU teacher candidates and the modified backwards design approach the teacher candidates developed as a result of authentic application:

Backwards Design	Backwards Design (modified)
<ol style="list-style-type: none"> <li>1. Identify desired results               <ul style="list-style-type: none"> <li>– Consider what you want the students to know and be able to do</li> <li>– Align with Standards/Benchmarks</li> <li>– Frame in terms of questions</li> </ul> </li> <li>2. Determine acceptable evidence               <ul style="list-style-type: none"> <li>– Use a variety of assessments to determine if students' knowledge and abilities meet the desired results</li> </ul> </li> <li>3. Plan learning experiences and instruction               <ul style="list-style-type: none"> <li>– Demonstrate understanding through performance</li> <li>– Develop / List major units / lesson / activities</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Identify Desired Results               <ul style="list-style-type: none"> <li>– Standards / Benchmarks</li> </ul> </li> <li>2. Determine acceptable evidence (General)</li> <li>3. Plan Learning Experiences and instruction               <ul style="list-style-type: none"> <li>– Unit Outlines</li> <li>– Lesson Plans</li> <li>– Activities</li> </ul> </li> <li>4. Enrichment (adding other appropriate standards / benchmarks)</li> <li>5. Determine acceptable evidence (Specific)</li> <li>6. Evaluation of curriculum and continual refinement</li> </ol>

The first step was for teams of students to meet with cooperating teachers and ***Identify the Desired Results*** (what you want the students to know and be able to do) based upon the appropriate standards and benchmarks.

The next part of the process was to ***Determine Acceptable Evidence***—how you are going to be able to know how and when students have learned or mastered the things you identified as being important for them to know and be able to do. Additionally, there needs to be a discussion of the types of assessment practices that might be used and then to choose assessment tools/methods that are appropriate for constructs to be taught. In this step the students expressed frustration at trying to determine assessment procedures when in fact no unit or lesson plans with associated activities had been developed. This frustration was overcome in our classes by just determining ***general*** procedures (e.g., portfolios, projects, etc.) that might be used to assess the various standards and benchmarks identified with the actual development of more specific assessments to be performed later.

Once the desired results and general assessment procedures have been identified, it is time for the teams of teacher candidates, under direction of the cooperating teacher, to ***Plan the Learning Experiences***, including instructional strategies and activities. As a group, the students meet to develop a unit plan with associated lesson plans and any supplemental materials (i.e., worksheets, design briefs, etc). It is also at this time that specific assessment tools/methods and related assessment materials can be developed. A template for the lesson plans and other materials useful for implementing this activity can be found on the Technology for All Americans Project (TfAAP) website: <http://www.iteawww.org/TAA/Resources/TeacherToolsPage.htm>.

Finally, the supervising teacher and the university students informally participated in a formative evaluation of their work that was later entitled “*Enrichment*.” In this step, the university students stop and evaluate the standards they had earlier identified and then determine if these standards are still appropriate or if additional standards might be easily added to the existing unit plan without detracting from the original learning experience.

Once the unit plan, lesson plans, assessment tools/methods and other materials have been developed, the university students submit them to the cooperating teacher for feedback and acceptance. With the cooperating teacher’s supervision, teams of university students then teach the unit to the middle school students. At the conclusion of the unit instruction, the teams submit a portfolio to the university supervisor that includes the unit plan, lesson plans, supplemental materials, assessment tools/methods, a group self-evaluation & reflection, and an evaluation from the cooperating teacher and middle school students.

It should be noted that the modified backwards design approach presented here resonates with the modified backwards design approach presented in the addendum to *STL, Measuring Progress: A Guide to Assessing Students for Technological Literacy* (ITEA, 2004). The approach in *Measuring Progress* was developed independently of the model that originated with the BYU program redesign; therefore, the approaches serve, to some degree, to validate each other. More information on the modified backwards design approach developed by the International Technology Education Association's TfAAP staff is available in the addendum to *STL, Planning Learning: Developing Technology Curricula* (ITEA, 2005b).

## Conclusion

The reactions of the university students, cooperating teachers, and elementary and middle school students regarding this activity have generally been positive. The experiences and processes described here are evidence of one possible strategy in implementing the standards in *STL* [and *AETL*] into the curriculum development process. One of the benefits of this strategy is that technology teachers are able to work with teacher educators and pre-service teacher candidates in a curriculum development process from start to finish that is more than a quick workshop. Some drawbacks to this approach are that initially few teachers are involved, and the scheduling between schools and the university students is difficult. The end result is that pre-service teacher candidates are becoming more excited about their teaching profession and becoming better prepared as student teachers through the program changes made.

## References

- Barnette, E. (2003). The role of technology teachers in ensuring standards-based programs. *The Technology Teacher*, 62(7), 32–35.
- Custer & Wright (2002). Restructuring the technology teacher education curriculum. In Ritz, J., Dugger, W., & Israel, E. (Eds.), *Standards for technological literacy: The role of teacher education* (pp. 99–120). 51<sup>st</sup> CTTE Yearbook, New York, N.Y.: Glencoe McGraw Hill.
- International Technology Education Association. (2000/2002). *Standards for technological literacy: Content for the study of technology*. Reston, VA: Author.

International Technology Education Association. (2004). *Measuring progress: A guide to assessing students for technological literacy*. Reston, VA: Author.

International Technology Education Association. (2005). *Planning learning: Developing technology curricula*. Reston, VA: Author.

Reeve E., Nielson C., & Meade, S.D. (2003). Utah junior high teachers respond to Standards for Technological Literacy. *The Technology Teacher*, 62(8), 26–29.

Wiggins, G., & McTighe, J. (1998). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.

TfAAP website: <http://www.iteawww.org/TAA/Resources/TeacherToolsPage.htm>

*Steve Shumway and Jared Berrett are assistant professors at Brigham Young University, School of Technology, Technology Teacher Education Program. They can be reached at: [steve\\_shumway@byu.edu](mailto:steve_shumway@byu.edu) or [jared\\_berrett@byu.edu](mailto:jared_berrett@byu.edu).*

***Note: This Teacher Educator Story is adapted from the article by Steve Shumway and Jared Berrett that appeared in the November 2004 issue of The Technology Teacher.***

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# SECTION 6

## Roles and Responsibilities: A Call to Action



**This section includes individual messages to users. These messages highlight the actions that teacher candidates, teacher educators, teachers, principals, supervisors, and other administrators can take to ensure a technologically literate populace.**



*Developing Professionals* is intended to be used by a variety of audiences from those more interested in pre-service technology teacher education to those more concerned with in-service issues. Therefore, this section is divided by subheadings that address the main audience groups.

## A Message for Teacher Candidates

Chances are that at one time or another you have been told that you don't know what your future holds. This same adage applies to your professional career. While you may not know exactly where your future will take you, you do know that you want to become a teacher. You also probably have some idea about the kind of teacher you want to be and the type of influence you would like to have on the students, teachers, and administrators that you will work with. So, what actions can you take as a pre-service teacher candidate to make your vision a reality? A key word in this question is "action."

**Get involved.** Teacher preparation programs are designed to prepare teacher candidates to become licensed teachers. You complete between 12 and 18 hours of coursework each semester. You begin to wonder if there is anything else to this great learning adventure. The answer is YES! As a future teacher, you should know that learning occurs beyond the classroom. This is as true for adults as it is for children. So, get involved. Consider all of the opportunities that your college and/or university and community offer. You might consider ways that you can become involved with your university department of study (e.g., student worker),

the community in which you live (e.g., Habitat for Humanity, Boys and Girls Club, local Departments of Parks and Recreation), or professional organizations (e.g., Technology Education Collegiate Association [TECA], Technology Student Association [TSA], state and national technology education associations). And approach each new experience as an opportunity to learn.

**Network.** Begin “networking” early. This will enable you to share your experiences with others and keep informed about the profession beyond your college’s and/or university’s campus. Many professionals are committed to technology education and seeing that all K–12 students attain technological literacy. Position yourself to meet these people by participating in local, state, or national technology education conferences and becoming involved with state or national educational agencies.

**Try new things.** You will likely spend much of your time as a teacher candidate working to build your understanding of the teaching profession. You will likely look for experiences that complement what you know (or do not know) about technology, teaching, and students as learners of technology. As you seek such opportunities, do not be afraid to try new things. Look beyond what is “familiar” or what you are “used to.” Find out what it means to “broaden your horizons.” Challenge your interests, opinions, and attitudes from both a professional and personal perspective.

**Take it in stride.** Post-secondary institutions provide a wealth of resources and opportunities to teacher candidates. At times, you may get distracted or lose focus. Remember that you are becoming a professional. You will soon be responsible for your own continued professional growth. What are your career goals? How can you begin reaching those goals now? You don’t have to do it all today but as you start thinking toward your future, you may find that there is a wealth of opportunity for you to consider (e.g., higher education faculty positions, educational research opportunities, etc.) Don’t sell yourself short. If you put your mind to it, you can be anything you want to be. And it is all right to change your mind. Take it in stride. Enjoy what you do each day.

## A Message for Teacher Educators

The teacher is the most important factor affecting the quality of the technology program. Teacher educators prepare teacher candidates to become teachers and life-long learners. It could be argued that teacher educators have a responsibility to ensure the quality of K–12 technology programs, as they have the responsibility of preparing the most important factor affecting K–12 programs—the teacher. A connection could further be drawn to the responsibility of teacher educators to

developing technologically literate K–12 students. In short, teacher educators have a role in developing technologically literate K–12 students. How can we, as teacher educators, fulfill this role? First of all, we must be committed to professional growth. This requirement extends beyond the expectations of the college or university in which you may teach. Your commitment to professional growth is based on your commitment to the teacher candidates that you serve. Your goal is to impact their learning. You engage in learning that will help you meet their needs. Secondly, we must remain informed by the advancements that are made in the fields of technology and education. Technology is a dynamic field of study. If you are to prepare teacher candidates to influence K–12 students, you must think ahead to the future and adapt your programs to meet the changing demands of a technological society. And finally, we must believe that technological literacy is a reasonable goal for every citizen living in the twenty-first century. Recognize that you are one link in making this goal a reality.

### A Message for Teachers

Technology is an evolving discipline. For teachers to be prepared to teach students about the technological world, their learning must evolve as well. What are the learning needs of students in your classroom? What knowledge and abilities do you need in order to meet student needs? How can professional education help you gain the needed knowledge and abilities? Teachers committed to advancing student technological literacy must also be committed to their own continued professional growth. This includes being a positive role model for the next generation of adults and potentially the next generation of technology teachers; facilitating collaboration with others in your school, school district, state, and even within national and international networks; participating in professional organizations where such networking is facilitated; and serving as advisors to student technology groups (AETL *Professional Development Standard 6, Guidelines A-E*). In short, by providing leadership to your students as well as your peers, you can be the catalyst that inspires standards-based reform (AETL *Professional Development Standard 6, Guideline F*).

### A Message for Principals, Supervisors, and Other Administrators

Administrators view teacher learning as an investment; “...schools are beginning to acknowledge that investing in teaching quality is a powerful leverage point for increasing student success” (Killion, 2002, p. 12). As administrators, we support teachers of technology as they engage in professional education. However, an administrator’s commitment to professional development extends beyond teacher learning. Administrators engage in professional education to serve the needs of our schools, school districts, and states. We engage in learning opportunities to





continually update our own knowledge and abilities to become better facilitators of educational change. We recognize the importance of technological literacy to the nation's students and citizens. Technological literacy is a goal to which administrators take action by aligning school, school district, and state policies. The administrator as a facilitator is an extremely powerful change agent to teachers. Access to regular funding to meet professional development needs is a motivator for many teachers (*AETL Professional Development Standard 7, Guideline G*). As an administrator, you must work with teachers of technology to advance all citizens toward technological literacy.

## Preparing Technologically Literate K–12 Students

Together, teacher candidates, teacher educators, teachers, principals, and supervisors can bring about changes needed to develop a technologically literate populace, if they remain committed to personal professional growth. Effective professional development ensures that what happens in K–12 technology laboratory-classrooms results in student technological literacy. The vision of *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA, 2000/2002) and *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL)* (ITEA, 2003) supports the assertion that *all* students should study technology throughout Grades K–12. Making this vision a reality requires that educational professionals take action.



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# APPENDICES

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## APPENDIX A

### Acknowledgements

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#### **International Technology Education Association Staff Members Who Assisted with *Developing Professionals*:**

Kendall N. Starkweather, Executive Director  
Leonard F. Sterry, Senior Curriculum Associate  
Barry Burke, Director, CATTS (*after June 2004*)  
Kathleen B. de la Paz, Communications/Publications Coordinator  
Kathie F. Cluff, Assistant Editor/Publications Specialist

#### **ITEA's Technology for All Americans Project Staff Members:**

William E. Dugger, Jr., Project Director  
Shelli Meade, Assistant Project Manager and Editor  
Lisa Delany, Senior Research Associate  
Crystal Nichols, Editorial Assistant and Data Coordinator

#### **ITEA-CATTS Consortium 2004 Member Representatives:**

Ronald Barker, Georgia Department of Education  
Thomas D'Apolito, Tennessee State Department of Education  
Richard Dieffenderfer, Ohio Department of Education  
Donald Fischer, North Dakota Department of Career and Technical Education  
Marquita Friday, Maryland State Department of Education  
Henry Lacy, Kentucky Department of Education  
Doug Miller, Missouri Department of Elementary and Secondary Education  
Mellissa Morrow, Florida Department of Education  
Melvin Robinson, Utah State Office of Education  
Thomas Shown, North Carolina Department of Public Instruction  
Mark Spoerk, Lynde and Harry Bradley Technology High School  
George Willcox, Virginia Department of Education

#### **ITEA-TfAAP Standards Specialists:**

Elazer Barnette, North Carolina A&T State University  
Barry Burke, Montgomery County Public Schools (*until June 2004*)  
Michael Daugherty, Illinois State University  
Ed Reeve, Utah State University  
Steve Shumway, Brigham Young University  
Anna Sumner, Westside Middle School

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## Reviewers

Ronald Barker Technology Education Program Specialist Georgia Department of Education Atlanta, Georgia	Education Frankfort, Kentucky	Joseph Scarcella Professor of Education California State University, San Bernardino San Bernardino, California
Elazer Barnette Dean, School of Technology North Carolina Agricultural and Technical State University Greensboro, North Carolina	Chris Merrill Assistant Professor Illinois State University Normal, Illinois	Anthony Schwaller Professor and Chair St. Cloud State University St. Cloud, Minnesota
Barry Burke Director Montgomery County Public Schools Rockville, Maryland	Doug Miller State Supervisor for Technology Education Missouri Department of Elementary and Secondary Education Jefferson City, Missouri	Thomas Shown Technology Education Consultant North Carolina Department of Public Instruction Raleigh, North Carolina
Phillip Cardon Assistant Professor Eastern Michigan University Ypsilanti, Michigan	Melissa Morrow State Supervisor for Technology Education Florida Department of Education Tallahassee, Florida	Steve Shumway Assistant Professor Brigham Young University Provo, Utah
Aaron Clark Associate Professor North Carolina State University Raleigh, North Carolina	Robert Raudebaugh Professor of Technology Education Western Washington University Bellingham, Washington	Mark Spoerk Technology Educator Lynde and Harry Bradley Technology and Trade School Milwaukee, Wisconsin
Michael Daugherty Professor Illinois State University Normal, Illinois	Edward Reeve Professor Utah State University Logan, Utah	Anna Sumner Engineering and Technology Instructor Westside Middle School Omaha, Nebraska
Donald Fischer Technology Education Supervisor Department of Career and Technical Education Bismarck, North Dakota	Diana Rigden Vice President Council for Basic Education Washington, DC	Scott Warner Assistant Professor Ball State University Muncie, Indiana
Henry Lacy State Supervisor for Technology Education Kentucky Department of	Jill Russell Executive Assistant to the President Springfield College Springfield, Massachusetts	Jane Wheeler Principal Monte Vista Elementary School Rohnert Park, California

## Teacher Story Credits

- pages 20-21    Implementing Standards-Based Professional Development for Technology Education at the State Level. Written by Mellissa Morrow, Florida Department of Education, Tallahassee, Florida.
- pages 43-44    Business Partnership. Written by Mark Spoerk, Lynde & Harry Bradley Technology and Trade School, Milwaukee, Wisconsin.
- pages 48-49    Professional Involvement. Written by A.J. Applegarth from Northside Middle School, Roanoke, Virginia.
- pages 62-67    Pre-Service Teacher Education Program Revised. Written by Steve Shumway and Jared Berrett, Brigham Young University, Provo, Utah.

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## APPENDIX B

### Listing of STL Content Standards

From International Technology Education Association. (2000/2002). *Standards for technological literacy: Content for the study of technology*. Reston, VA: Author.

**Note:** *These standards are provided for reference only. All standards should be met through the benchmarks that follow each standard in Standards for Technological Literacy, which is available online at [www.iteawww.org](http://www.iteawww.org).*

#### The Nature of Technology

- Standard 1. Students will develop an understanding of the characteristics and scope of technology.
- Standard 2. Students will develop an understanding of the core concepts of technology.
- Standard 3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.

#### Technology and Society

- Standard 4. Students will develop an understanding of the cultural, social, economic, and political effects of technology.
- Standard 5. Students will develop an understanding of the effects of technology on the environment.
- Standard 6. Students will develop an understanding of the role of society in the development and use of technology.
- Standard 7. Students will develop an understanding of the influence of technology on history.

#### Design

- Standard 8. Students will develop an understanding of the attributes of design.
- Standard 9. Students will develop an understanding of engineering design.
- Standard 10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

#### Abilities for a Technological World

- Standard 11. Students will develop the abilities to apply the design process.
- Standard 12. Students will develop the abilities to use and maintain technological products and systems.
- Standard 13. Students will develop the abilities to assess the impact of products and systems.

#### The Designed World

- Standard 14. Students will develop an understanding of and be able to select and use medical technologies.
- Standard 15. Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
- Standard 16. Students will develop an understanding of and be able to select and use energy and power technologies.
- Standard 17. Students will develop an understanding of and be able to select and use information and communication technologies.
- Standard 18. Students will develop an understanding of and be able to select and use transportation technologies.
- Standard 19. Students will develop an understanding of and be able to select and use manufacturing technologies.
- Standard 20. Students will develop an understanding of and be able to select and use construction technologies.

## APPENDIX C

### Listing of AETL Student Assessment Standards

From International Technology Education Association. (2003). *Advancing excellence in technological literacy: Student assessment, professional development, and program standards*. Reston, VA: Author.

**Note:** *These standards are provided for reference only. All standards should be met through the guidelines that follow each standard in Advancing Excellence in Technological Literacy, which is available online at [www.itea.org](http://www.itea.org).*

**Standard A-1:** Assessment of student learning will be consistent with *Standards for Technological Literacy: Content for the Study of Technology (STL)*.

**Standard A-2:** Assessment of student learning will be explicitly matched to the intended purpose.

**Standard A-3:** Assessment of student learning will be systematic and derived from research-based assessment principles.

**Standard A-4:** Assessment of student learning will reflect practical contexts consistent with the nature of technology.

**Standard A-5:** Assessment of student learning will incorporate data collection for accountability, professional development, and program enhancement.

## APPENDIX D

### Listing of AETL Professional Development Standards with Guidelines

**Standard PD-1: Professional development will provide teachers with knowledge, abilities, and understanding consistent with *Standards for Technological Literacy: Content for the Study of Technology (STL)*.**

Guidelines for meeting Standard PD-1 require that professional development providers consistently prepare teachers to

- A. Understand the nature of technology.
- B. Recognize the relationship between technology and society.
- C. Know the attributes of design.
- D. Develop abilities for a technological world.
- E. Develop proficiency in the designed world.

**Standard PD-2: Professional development will provide teachers with educational perspectives on students as learners of technology.**

Guidelines for meeting Standard PD-2 require that professional development providers consistently prepare teachers to

- A. Incorporate student commonality and diversity to enrich learning.
- B. Provide cognitive, psychomotor, and affective learning opportunities.
- C. Assist students in becoming effective learners.
- D. Conduct and use research on how students learn technology.

**Standard PD-3: Professional development will prepare teachers to design and evaluate technology curricula and programs.**

Guidelines for meeting Standard PD-3 require that professional development providers consistently prepare teachers to

- A. Design and evaluate curricula and programs that enable all students to attain technological literacy.
- B. Design and evaluate curricula and programs across disciplines.
- C. Design and evaluate curricula and programs across grade levels.
- D. Design and evaluate curricula and programs using multiple sources of information.

**Standard PD-4: Professional development will prepare teachers to use instructional strategies that enhance technology teaching, student learning, and student assessment.**

Guidelines for meeting Standard PD-4 require that professional development providers consistently prepare teachers to

- A. Coordinate instructional strategies with curricula.
- B. Incorporate educational (instructional) technology.
- C. Utilize student assessment.

**Standard PD-5: Professional development will prepare teachers to design and manage learning environments that promote technological literacy.**

Guidelines for meeting Standard PD-5 require that professional development providers consistently prepare teachers to

- A. Design and manage learning environments that operate with sufficient resources.
- B. Design and manage learning environments that encourage, motivate, and support student learning of technology.
- C. Design and manage learning environments that accommodate student commonality and diversity.
- D. Design and manage learning environments that reinforce student learning and teacher instruction.
- E. Design and manage learning environments that are safe, appropriately designed, and well maintained.
- F. Design and manage learning environments that are adaptable.

**Standard PD-6: Professional development will prepare teachers to be responsible for their own continued professional growth.**

Guidelines for meeting Standard PD-6 require that professional development providers consistently prepare teachers to

- A. Assume commitment to self assessment and responsibility for continuous professional growth.
- B. Establish a personal commitment to ethical behavior within the educational environment as well as in private life.
- C. Facilitate collaboration with others.
- D. Participate in professional organizations.
- E. Serve as advisors for technology student organizations.
- F. Provide leadership in education.

**Standard PD-7: Professional development providers will plan, implement, and evaluate the pre-service and in-service education of teachers.**

Guidelines for meeting Standard PD-7 require that professional development providers consistently

- A. Plan pre-service and in-service education for teachers.
- B. Model teaching practices that teachers will be expected to use in their laboratory-classrooms.
- C. Evaluate professional development to assure that the needs of teachers are being met.
- D. Support technology teacher preparation programs that are consistent with state/provincial/regional and national/federal accrediting guidelines.
- E. Provide teacher preparation programs, leading to licensure, that are consistent with *AETL* and *STL*.
- F. Provide in-service activities to enhance teacher understanding of technological content, instruction, and assessment.
- G. Obtain regular funding for in-service professional development opportunities.
- H. Create and implement mentoring activities at both in-service and pre-service levels.

## APPENDIX E

### Listing of AETL Program Standards

From International Technology Education Association. (2003). *Advancing excellence in technological literacy: student assessment, professional development, and program standards*. Reston, VA: Author.

**Note:** *These standards are provided for reference only. All standards should be met through the guidelines that follow each standard in Advancing Excellence in Technological Literacy, which is available online at [www.iteawww.org](http://www.iteawww.org).*

**Standard P-1:** Technology program development will be consistent with *Standards for Technological Literacy: Content for the Study of Technology (STL)*.

**Standard P-2:** Technology program implementation will facilitate technological literacy for all students.

**Standard P-3:** Technology program evaluation will ensure and facilitate technological literacy for all students.

**Standard P-4:** Technology program learning environments will facilitate technological literacy for all students.

**Standard P-5:** Technology program management will be provided by designated personnel at the school, school district, and state/provincial/regional levels.



## APPENDIX F

### The Current State of Professional Development: *Where Are We Now?* Pre-Service Education

Directions: Circle the most appropriate answer.

Considerations for Standards-Based Pre-Service Professional Development Planning		Yes	No	Not Applicable N/A	Comments
Is there a professional development program?		Yes	No	N/A	
Is the professional development program content aligned with STL?	?? Understand the nature of technology.	Yes	No	N/A	
	?? Recognize the relationship between technology and society.	Yes	No	N/A	
	?? Know the attributes of design.	Yes	No	N/A	
	?? Develop abilities for a technological world.	Yes	No	N/A	
	?? Develop proficiency in the designed world.	Yes	No	N/A	
Is the professional development program content aligned with other content area standards?		Yes	No	N/A	
Is the professional development program aligned with NCATE requirements?		Yes	No	N/A	
Is the professional development program based on the state requirements for technology education majors?		Yes	No	N/A	
Is the professional development program based on the standards in AETL?	?? Professional development will provide teachers with knowledge, abilities, and understanding consistent with <i>Standards for Technological Literacy: Content for the Study of Technology</i> .	Yes	No	N/A	
	?? Professional development will provide teachers with educational perspectives on students as learners of technology.	Yes	No	N/A	
	?? Professional development will prepare teachers to design and evaluate technology curricula and programs.	Yes	No	N/A	
	?? Professional development will prepare teachers to use instructional strategies that enhance technology teaching, student learning, and student assessment.	Yes	No	N/A	
	?? Professional development will prepare teachers to design and manage learning environments that promote technological literacy.	Yes	No	N/A	
	?? Professional development will prepare teachers to be responsible for their own continued professional growth.	Yes	No	N/A	
Is the professional development program evaluated on a continuous basis?		Yes	No	N/A	

## APPENDIX F

### The Current State of Professional Development: *Where Are We Now?* In-Service Education

Directions: Circle the most appropriate answer.

Considerations for Standards-Based In-Service Professional Development Planning		Yes	No	Not Applicable N/A	Comments
Is there a professional development program?		Yes	No	N/A	
Is professional development implemented at the individual level?		Yes	No	N/A	
Is professional development implemented at the school level?		Yes	No	N/A	
Is professional development implemented at the district level?		Yes	No	N/A	
Is professional development implemented at the state level?		Yes	No	N/A	
Is the professional development program content aligned with STL?	Understand the nature of technology.	Yes	No	N/A	
	Recognize the relationship between technology and society.	Yes	No	N/A	
	Know the attributes of design.	Yes	No	N/A	
	Develop abilities for a technological world.	Yes	No	N/A	
	Develop proficiency in the designed world.	Yes	No	N/A	
Is the professional development program content aligned with other content area standards?		Yes	No	N/A	
Is the professional development program based on the standards in AETL?	Professional development will provide teachers with educational perspectives on students as learners of technology.	Yes	No	N/A	
	Professional development will prepare teachers to design and evaluate technology curricula and programs.	Yes	No	N/A	
	Professional development will prepare teachers to use instructional strategies that enhance technology teaching, student learning, and student assessment.	Yes	No	N/A	
	Professional development will prepare teachers to design and manage learning environments that promote technological literacy.	Yes	No	N/A	
	Professional development will prepare teachers to be responsible for their own continued professional growth.	Yes	No	N/A	
Are the professional development program objectives and goals consistent with the objectives and goals of the school/district?		Yes	No	N/A	
Is the professional development program evaluated on a continuous basis?		Yes	No	N/A	

## APPENDIX G

### References and Resources

- Birman, B.F., Desimone, L., Porter, A.C., & Garet, M.S. (2000). Designing professional development that works. *Educational Leadership*, 57(8), 28–33.
- Brandt, R. (2003). Is this school a learning organization? 10 ways to tell. *Journal of Staff Development*, 24(1), 10–16.
- Carr, J.F., & Harris, D.E. (2001). *Succeeding with standards: Linking curriculum, assessment, and action planning*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Dede, C. (2003). *A call to action for the national commission on teaching and America's future: Enabling distributed-learning communities for educators via emerging technologies*. Developed for the National Commission on Teaching and America's Future.
- DuFour, R., (2004). The best staff development is in the workplace, not in a workshop. *Journal of Staff Development*, 25(2), 63–64.
- DuFour, R., & Berkey, T. (1995). The principal as staff developer. *Journal of Staff Development*, 16(4), 2–6.
- Guskey, T.R. (2002). Does it make a difference? Evaluating professional development. *Educational Leadership*, 59(6), 45–51.
- Guskey, T.R. (2003a). Scooping up meaningful evidence. *Journal of Staff Development*, 24(4), 27–30.
- Guskey, T.R. (2003b). Analyzing lists of the characteristics of effective professional development to promote visionary leadership. *NASSP Bulletin*, 87(637), 4–20.
- Hirsh, S. (2004). Putting comprehensive staff development on target. *Journal of Staff Development*, 25(1), 12–15.
- International Technology Education Association. (1996). *Technology for all Americans: A rationale and structure for the study of technology*. Reston, VA: Author.
- International Technology Education Association. (2000/2002). *Standards for technological literacy: Content for the study of technology*. Reston, VA: Author.

- International Technology Education Association. (2003). *Advancing excellence in technological literacy: Student assessment, professional development, and program standards*. Reston, VA: Author.
- International Technology Education Association. (2004). *Measuring progress: A guide to assessing students for technological literacy*. Reston, VA: Author.
- International Technology Education Association. (2005a). *Realizing excellence: Structuring technology programs*. Reston, VA: Author.
- International Technology Education Association. (2005b). *Planning learning: Developing technology curricula*. Reston, VA: Author.
- Killion, J. (2002). *What works in the elementary school: Results-based staff development* (National Staff Development Council & National Education Association). Oxford, OH: National Staff Development Council.
- Killion, J. (2003). Solid footwork makes evaluation of staff development programs a song. *Journal of Staff Development*, 24(4), 15–21.
- Loucks-Horsley, S., Hewson, P.W., Love, N., & Stiles, K.E. (1998). *Designing professional development for teachers of science and mathematics* (The National Institute for Science Education). Thousand Oaks, CA: Corwin Press.
- Loucks-Horsley, S., & Matsumoto, C. (1999). Research on professional development for teachers of mathematics and science: The state of the scene. *School Science and Mathematics*, 99(5), 258–269.
- Meade, S.D., & Dugger, W.E. (2004). Reporting on the status of technology education in the U.S. *The Technology Teacher*, 64(2), 29–35.
- Merrill, C. (2004). Action research and technology education. *The Technology Teacher*, 63(8), 6–8.
- Mizell, H. (2003). Facilitator: 10, refreshments: 8, evaluation: 0. *Journal of Staff Development*, 24(4), 10–13.
- National Academy of Engineering & National Research Council. (2002). *Technically speaking: Why all Americans should know more about technology*. (A. Pearson & T. Young, Eds.). Washington, DC: National Academy Press.

- National Research Council. (2001). *Educating teachers of science, mathematics, and technology*. Washington, DC: National Academy Press.
- Newberry, P. (2001). Technology education in the U.S.: A status report. *The Technology Teacher*, 61(1), 8–12.
- Popham, W.J. (1999). *Classroom assessment: What teachers need to know*. Boston, MA: Allyn and Bacon.
- Rasmussen, C., Hopkins, S., & Fitzpatrick, M. (2004). Our work done well is like the perfect pitch. *Journal of Staff Development*, 25(1), 16–25.
- Richardson, J. (2000). Learning benefits everyone. *Journal of Staff Development*, 21(1), 54–59.
- Rouch, D.L. (1999). Professionalism and leadership in technology education. In Anthony F. Gilberti & David L. Rouch (Eds.), *Advancing professionalism in technology education* (CTTE 48<sup>th</sup> year-book, pp. 15–32). New York: Glencoe McGraw-Hill.
- Salpeter, J. (2003). Professional development: 21<sup>st</sup> century models. *Technology & Learning*, 24(1), 34–36, 38, 40, 42, 44, 46, 48, 50.
- Shellard, E. (2002). High-Achieving schools: What do they look like? The Informed Educator Series, 1–7.
- Sparks, D. (1994). A paradigm shift in staff development. *Journal of Staff Development*, 15(4), 26–29. Retrieved March 11, 2005, from <http://www.nsdc.org/library/publications/jsd/sparks154.cfm>.
- Sparks, D. (2004). A call to creativity. *Journal of Staff Development*, 25(1), 52–62.

## APPENDIX H

### Glossary

The terms defined and described in this glossary apply specifically to *Developing Professionals: Preparing Technology Teachers*. These terms may have different meanings in different situations.

#### Some Acronyms Used in this Publication

<b>AAAS</b>	American Association for the Advancement of Science	<b>NASA</b>	National Aeronautics and Space Administration.
<b>ACTE</b>	Association for Career and Technical Education	<b>NCATE</b>	National Council for Accreditation of Teacher Education.
<b>AETL</b>	<i>Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards.</i>	<b>NEA</b>	National Education Association.
<b>AFT</b>	American Federation of Teachers	<b>NRC</b>	National Research Council.
<b>CATTS</b>	Center to Advance the Teaching of Technology and Science	<b>NSDC</b>	National Staff Development Council.
<b>CTTE</b>	Council on Technology Teacher Education	<b>NSF</b>	National Science Foundation.
<b>ITEA</b>	International Technology Education Association.	<b>STL</b>	<i>Standards for Technological Literacy: Content for the Study of Technology.</i>
<b>NAE</b>	National Academy of Engineering.	<b>TECA</b>	Technology Education Collegiate Association
		<b>TECC</b>	Technology Education Children's Council
		<b>TfAAP</b>	Technology for All Americans Project.
		<b>TSA</b>	Technology Student Association

#### General Glossary Terms

**Ability** — The capacity to determine the application of knowledge and skills.

**Activity** — A process, function, or task that occurs over a period of time and has recognizable results.

**Accountability** — The quality of being held answerable or responsible for, which may make one liable to being called to account.

**Accreditation** — A system designed to attest to the act of accrediting or the state of being accredited. An accreditation system would involve the approval of an institution of learning as meeting a prescribed standard or standards through a review board.

**Across disciplines** — Inclusive of all content area classrooms as appropriate to develop technological literacy.

**Across grade levels** — Inclusive of all grades specified in the identified levels of an institution of learning, such as across grades kindergarten through twelve for public education.

**Action research** — Inquiry-based research conducted by teachers that follows a process of examining existing practices, implementing new practices, and evaluating the results, leading to an improvement cycle that benefits both students and teachers.

**Administrator** — Professional who manages any aspect of the educational system, including supervisors and teachers as appropriate.

**Advisory committee** — An organized body comprised of informed and qualified individuals with a specified responsibility to give advice in the development of an idea or process. Members may include parents, business and industry personnel, local engineers, technologists, and interested citizens.



**Assessment** — 1. See student assessment. 2. See evaluation. Note: *Developing Professionals* differentiates between assessment and evaluation, taking the position that students are assessed and programs are evaluated.

**Audience** — Those for whom material is intended.

**Budget** — A detailed plan of income and expenses expected over a certain period of time.

**Checklist** — An evaluative tool, which can take many forms, from a simple listing to a formal quarterly report of progress.

**Clinical experience** — An on-the-job training experience that is part of the teacher-training preparation. It may be in a classroom or a related clinical setting, such as an internship, in preparation for certification as a school psychologist or school counselor. Most of this takes place outside of the classroom.

**Coaching** — Teaching specific skills and then providing guided feedback.

**Collaboration** — A cooperative relationship that enables goals to be accomplished more effectively and comprehensively than by individual efforts.

**Collaborative exchange** — Opportunities for colleagues to work together, sharing best practices and supporting each other through such efforts as mentoring, coaching, and team teaching.

**Collegiality** — The relationship of colleagues.

**Community** — A body of people living in the same place under the same laws.

**Constituent/Constituency** — A person or entity that patronizes, supports, or offers representation.

**Content** — See content standards.

**Content standards** — 1. The standards in *Standards for Technological Literacy: Content for the Study of Technology* that provide written statements of the knowledge and abilities students should possess in order to be technologically literate. 2. The standards in other content areas that specify what students should know and be able to do, including those in *National Science Education Standards* or *Principles and Standards for School Mathematics*.

**Context/Contextual** — The circumstances in which an event occurs; a setting.

**Continuous** — Uninterrupted in time, sequence, substance, or extent.

**Course** — A series of units that lasts for a specified period of time (semester, year, etc.) and is designed around a specified school subject.

**Criteria** — Desired specifications (elements or features) of a product or system.

**Curriculum/Curricula** — Specification of the way content is delivered, including the structure, organization, balance, and presentation of content in the laboratory-classroom.

**Data collection** — Procedure in which information from various sources are accumulated.

**Decision makers** — Those responsible for examining several possible behaviors and selecting from them the one most likely to accomplish the individual's or group's intention. Cognitive processes such as reasoning, planning, and judgment are involved.

**Design** — An iterative decision-making process that produces plans by which resources are converted into products or systems that meet human needs and wants or solve problems.

**Design process** — A systematic problem-solving strategy, with criteria and constraints, used to develop many possible solutions to a problem or to satisfy human needs and wants and winnow (narrow) down the possible solutions to one final choice.

**Disciplines** — Specified realms of content.

**Discussion** — An assessment approach that involves idea-sharing of subject matter between student and teacher or among students. Teachers consider student ability to verbalize content and make “sense” of topics, issues, or information.

**Distance education** — Teaching and learning in which learning normally occurs in a different place from teaching.

**Educational standards** — See standard.

**Educators** — Those professionals involved in the teaching and learning process, including teachers and administrators.

**Effective** — Produces the desired results with efficiency.

**Embedded** — To set or fix firmly into a statement or activity.

**Engineering** — The profession of or work performed by an engineer. Engineering involves the knowledge of the mathematical and natural sciences (biological and physical) gained by study, experience, and practice that are applied with judgment and creativity to develop ways to utilize the materials and forces of nature for the benefit of mankind.

**Engineering design** — The systematic and creative application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems.

**Equitable** — Fair, impartial, or just.

**Evaluate/Evaluation** — Collection and processing of information and data to determine

how well a design meets the requirements and to provide direction for improvements. Note: *Developing Professionals* differentiates between assessment and evaluation, taking the position that students are assessed and programs are evaluated. See also program evaluation.

**Evaluation principles** — The basic truths, laws, or assumptions held in the use of evaluation.

**Evidence** — The information that is intended to demonstrate or prove a level of understanding.

**Expectations** — Anticipated action that demonstrates understanding.

**Expert** — Having specialized knowledge and/or ability.

**Fair** — Not biased or discriminatory.

**Feedback** — Using all or a portion of the information from the output of a system to regulate or control the processes or inputs in order to modify the output.

**Flexibility** — The quality of being adaptable or variable.

**Formative evaluation** — Ongoing evaluation that occurs throughout professional development. It enables those providing or pursuing professional development to adjust learning as it occurs to enhance teacher learning.

**Formative student assessment** — Ongoing student assessment in the classroom. It provides information to students and teachers to improve teaching and learning.

**Goal** — The expected end result. In standards-based education, this can be specifically applied to learning, instruction, student assessment, professional development, and program enhancement.

**Grade band** — A grouping of different grades in school (e.g., K–2, 3–5, 6–8, and 9–12).

**Grade level** — 1. A stage in the development of a child's education (i.e., K, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12). 2. From grade to grade and across grade bands (i.e., Grades 2-3 or Grades 3-5).

**Guideline** — 1. In *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards* (ITEA, 2003), it is a specific requirement or enabler that identifies what needs to be done in order to meet a standard. 2. A suggestion to consider.

**Implement/Implementation** — To proceed with practical application.

**Informal education** — The acquisition of knowledge and skills through experience, reading, social contact (e.g., museum).

**Innovation** — An improvement of an existing technological product, system, or method of doing something using both natural resources and human resources.

**In-service** — 1. A practicing educator. 2. Workshops, lectures, and other educational opportunities designed to keep practicing professionals abreast of the latest developments in their fields.

**Instruction** — The actual teaching process that the teacher employs to deliver the content to all students.

**Instructional strategies** — All of the elements necessary in the teaching and learning process. This includes curriculum development, laboratory-classroom planning, and evaluation, in addition to the delivery system to be used in the teaching process.

**Integrated/Integration** — The process of bringing all parts together into a whole.

**Internship** — Any agreed-upon experience in a work setting that is driven by intentional learning goals and accompanied by sustained reflection. What distinguishes an internship from a job is that first and foremost it is a deliberate learning experience.

**Knowledge** — 1. The body of truth, information, and principles acquired by mankind. 2. Interpreted information that can be used.

**Laboratory-classroom** — The environment in which student learning takes place related to the study of technology.

**Learning activities** — Experiences provided to students that enable them to gain understandings.

**Learning environment** — Formal or informal location where learning takes place that consists of space, equipment, resources (including supplies and materials), and safety and health requirements.

**Lesson** — Day-by-day plan for learning in the classroom.

**Mathematics** — The study of abstract patterns and relationships that results in an exact language used to communicate about them.

**Measurements** — Collecting data in a quantifiable manner.

**Mentoring** — Mentoring is an educational process where the mentor serves as a role model, trusted counselor or teacher who provides opportunities for professional development, growth, and support to less experienced individuals in career planning or employment settings. Individuals receive information, encouragement, and advice as they plan their careers.

**Mission (statement)** — The articulation of organized goals and strategies for realizing goals.

**Objective** — A specific item or procedure that meets a designated goal.

**Observation** — The act or practice of noting and recording facts and events.

**Online education** — Education that relies upon the World Wide Web as the primary delivery mode for the communication and presentation of teaching and learning.

**Outcome** — A term used to indicate the result or the expected result of an educational plan or program. Outcomes can also be the consequences of decisions made.

**Partnerships** — A relationship between teacher candidates or teachers and technology professionals in business, industry, and higher education, among others that builds a connection to the technological world beyond the classroom.

**Pedagogical knowledge** — Knowledge about effective teaching and learning processes.

**Performance** — A demonstration of student-applied knowledge and abilities, usually by presenting students with a task or project and then observing, interviewing, and evaluating their solutions and products in order to assess what they actually know and are able to do.

**Plan/Planning** — A set of steps, procedures, or programs worked out beforehand in order to accomplish an objective or goal.

**Presentation** — An assessment approach that involves the performance or delivery of information.

**Pre-service** — 1. A teacher candidate. 2. Undergraduate education for those who intend to teach.

**Process** — 1. Human activities used to create, invent, design, transform, produce, control, maintain, and use products or systems. 2. A systematic sequence of actions that combines resources to produce an output.

**Professional development** — A continuous process of lifelong learning and growth that begins early in life, continues through the undergraduate, pre-service experience, and extends through the in-service years.

**Professional development providers** — Those who organize and/or deliver pre-service and in-service education, including teacher educators, principals, supervisors, and teachers as appropriate.

**Professional learning community** — Individuals from all parts of a school working collaboratively at all levels on issues dealing with learning, students, and teaching.

**Professional organizations** — Organizations of and for professional people.

**Professional writing** — The sharing of understanding, experiences, and insight by contributing to professional publications.

**Professionalism** — The conduct, aims, or qualities that characterize or mark a profession or a professional person.

**Program** — Everything that affects student learning, including content, professional development, curricula, instruction, student assessment, and the learning environment, implemented across grade levels.

**Program evaluation** — Collection and processing of information and data to determine how well all components of the program—including content, professional development, curricula, instruction, student assessment, and the learning environment—meets the requirements and to provide direction for improvements.

**Reflective writing** — A means of assisting in analyzing classroom practices by recording instructional practices and policies to reflect classroom occurrences. This documentation of observations, understandings, experience, or thoughts necessitates the formative evaluation of teaching and learning

**Research** — Systematic, scientific, documented study.

**Resource** — The things needed to get a job done. In a technological system, the basic technological resources are: energy, capital, information, machines and tools, materials, people, and time.

**Reliable/Reliability** — Capable of being relied upon; dependable; may be repeated with consistent results.

**Science** — Understanding the natural world.

**Society** — A community, nation, or broad grouping of people having common traditions, institutions, and collective activities and interests.

**Stakeholders** — Individuals or entities who have an interest in the success of a specific venture or program. Stakeholders may include teachers, administrators, school leaders, professional development providers, business and industry leaders, engineers, scientists, technologists, and others.

**Standard** — A written statement or statements about what is valued that can be used for making a judgment of quality.

**Standards-based** — Educational standards provide the content basis on which student learning is built. Everything that affects student learning is planned to support students as they attain standards.

**Standards-based reform** — An educational movement that supports maintaining high academic expectations, or standards, for all students that holds schools, teachers, and students accountable for student learning and achievement.

**Standards-reflected** — A connection is made to educational standards, but standards do not necessarily provide the basis for student learning. Standards being taught and assessed is “hit or miss.”

**Strategy/Strategies** — An elaborate and systematic plan of action.

**Student assessment** — A systematic, multi-step process of collecting evidence on student learning, understanding, and abilities and using that information to inform instruction and provide feedback to the learner, thereby enhancing learning.

**Student learning** — The act or process of acquiring knowledge, abilities, or understandings.

**Study of technology** — Also referred to as technological study. Any formal or informal education about human innovation, change, or modification of the natural environment. See also technology education.

**Summative evaluation** — Cumulative evaluation that is collected at prescribed intervals. It indicates whether or not professional development goals have been achieved.

**Summative student assessment** — Cumulative student assessment that usually occurs at the end of a unit, topic, project, or problem. It identifies what students have learned and also judges student performance against previously identified standards. Summative student assessment is most often thought of as “final exams,” but it may also be a portfolio of student work.

**Sustainable/Sustainability** — An action or process that is capable of continuing indefinitely.

**System** — A group of interacting, interrelated, or interdependent elements or parts that function together as a whole to accomplish a goal.

**Systematic** — Occurring on a regular basis; having a plan or order.

**Systems-oriented** — Looking at a problem in its entirety; looking at the whole, as distinct from each of its parts or components, taking into account all of the variables and relating social and technological characteristics.

**Teacher candidates** — Individuals preparing to teach.

**Teacher education** — The in-service and pre-service education of teachers.

**Teacher educators** — Individuals who deliver pre-service and in-service teacher education, including, but not limited to, college and university faculty.

**Teaching** — The conscious effort to bring about learning in a manner that is clearly understood by the learner and likely to be successful.

**Team teaching** — When teachers collaborate and jointly teach a group of students.

**Technological literacy** — The ability to use, manage, understand, and evaluate technology.

**Technological literacy standards** — The standards in *Standards for Technological Literacy: Content for the Study of Technology* and *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards* that identify the content and provide criteria for the implementation of that content for developing technological literacy.

**Technological study** — See technology education.

**Technological world** — The products, methods, and processes involved in the innovation, change, or modification of the natural environment (world) to satisfy perceived human wants and needs.

**Technology** — The innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.

**Technology education** — A school subject specifically designed to help students develop technological literacy.

**Technology program** — Everything that affects student attainment of technological literacy, including content, professional development,

curricula, instruction, student assessment, and the learning environment, implemented across grade levels as a core subject of inherent value.

**Test** — 1. A method for collecting data. 2. A procedure for critical evaluation.

**Understanding** — A synthesis of knowledge and abilities that involves sophisticated insights and is reflected through performance in various contexts.

**Unit** — An organized series of learning activities, lectures, projects, and other teaching strategies that focuses on a specific topic related to the curriculum as a whole.

**Valid/Validity** — Having or containing premises from which the conclusion may logically be derived, correctly inferred, or deduced.

**Vision** — A contemplative image of future promise and possibility articulated with the intention to inspire others.

**Workshop** — A meeting or series of meetings devoted to discussion and demonstration of practical applications in a specialized field or subject.



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Fax (703) 860-0353  
E-mail [itea@iris.org](mailto:itea@iris.org)  
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