Standards-Based Curriculum Development for Pre-Service and In-Service: A “Partnering” Approach Using Modified Backwards Design

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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 (STL)* (ITEA, 2000/2002) and to help future teachers learn to develop and teach curriculum that is based on those standards (Custer & Wright, 2002). Likewise, many practicing technology education teachers are wondering how the standards might affect what and how they teach technology. A recent survey (Reeve, Nielson, & Meade, 2003) revealed that in Utah, a majority of teachers have a copy of the standards and are supportive of them, but they want help implementing standards-based technology education 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. This article will describe how technology teachers can create standards-based curriculum. These concepts are couched in a description of how change can be facilitated by having local technology teachers work with teacher educators and pre-service teacher candidates in a collaborative effort. Modifications that were made to the backwards design model (Wiggins & McTighe, 1998) during authentic application will be revealed.

**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 education students needed to have earlier and more frequent teaching and curriculum development experiences in the public schools.
- Next, students 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 teachers 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 education students 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 students majoring in Technology Teacher Education were required to take a new introductory course entitled Teaching Technology. The required text for the course was *STL*. In this class, several class discussions and activities related to the standards and their importance for literacy are introduced. The students 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 college 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), assessments, 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, students 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 students are given the opportunity to work with local junior high 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 our students in developing and teaching a curricular unit in their classrooms. 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) cautions that, “Trying to make the lessons fit into the standards generally results in a curriculum that merely reflects the standards.” This was common practice when the standards were first released. Teachers evaluated their current lessons and activities, compared them to the 20 standards, saw several connections, and declared their curriculum to be standards-based. A chart in which the basic components of standards-based versus standards-reflective is shown below:

### Standards Based
- Start with Standards & Benchmarks.
- Identify assessments that will aid in delivery of identified concepts and principles.
- Develop lessons and activities to deliver “Big Ideas.”
- Results in a curriculum that is standards-based and addresses technological literacy.

### Standards Reflective
- Start with cool activity.
- Identify what concepts and principles may also be addressed during the activity.
- Identify standards & benchmarks that may align.
- Select assessments.
- Results in a curriculum that does not necessarily address technological literacy.

**Technology for All Americans Project (TfAAP): Adapted from Standards Interpretation Presentation**

**Implementing Backwards Design**

One of the intended outcomes of the introductory and practicum experiences was that local technology teachers, along with preservice technology teachers, 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 these individuals 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 students developed as a result of authentic application:
**Backwards Design**

1. Identify desired results
   - Consider what you want the students to know and be able to do.
   - Align with Standards/Benchmarks.
   - Frame in terms of questions.
2. Determine acceptable evidence
   - Use a variety of assessments to determine if students’ knowledge and abilities meet the desired results.
3. Plan learning experiences and instruction
   - Demonstrate understanding through performance.
   - Develop/list major units/lesson/activities.

**Backwards Design (modified)**

1. Identify desired results
   - Standards/Benchmarks
2. Determine acceptable evidence (General)
3. Plan learning experiences and instruction
   - Unit Outlines
   - Lesson Plans
   - Activities
4. Enrichment (adding other appropriate standards/benchmarks)
5. Determine acceptable evidence (Specific)
6. Evaluation of curriculum and continual refinement

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) and then align these with 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 that might be used and then assessments chosen 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 students, 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 assessments and related assessment materials can be developed. A template for the lesson plans and other materials useful for implementing this activity can be found in the Technology for All Americans Project (TfAAP) Web site: www.iteaww.org/TAARources/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 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, assessments, and other materials have been developed, the students submit them to the cooperating teacher for feedback and acceptance. With the cooperating teacher’s supervision, teams of 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, assessments, a group self-evaluation and 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 (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 will be available in the upcoming addendum to STL, Planning Learning: Developing Technology Curricula (ITEA, In Press).

**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 in this article are evidence of one
possible strategy in implementing the standards in STL into the curriculum development process. One of the benefits of this strategy is that technology teachers are able to work with teacher educators and preservice teacher education students 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 education students are becoming more excited about their teaching profession and becoming better prepared as student teachers through the program changes made.

References


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Assignment: As reflective practitioners, participants will identify three sessions that they attended at the conference and explain how these topics will influence their practice, whether as a teacher or administrator. The assignment will be sent to CMSU by May 1, 2005.