Comments to accompany *Reflective Assessment in Computing Instruction*, a presentation by Doug Peterson and Philip East at the **CS & IT Symposium** ‘2005 (Philadelphia, June 26).

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Why this document?

I have attended many presentations, most of which were organized around a Powerpoint presentation or a set of overhead transparency slides. Often the slides were provided as handouts. In all cases (I think) the slides were not useful after the fact. My own notes on the presentations tend to address ideas sparked by the speaker and, thus, do not really help me remember what was said or even what the various phrases in the presentation referred to.

The CS & IT Symposium requires that presenters provide electronic copy of their presentations for posting on the Web. I have always included “notes” in my presentations but they typically are not included in the posting. This time I am including a separate PDF document that includes those notes.

The notes are not actually what I will say (or will have said) in the presentation. Rather they attempt to communicate my thinking as I prepared the slides. I will speak more off the cuff, less completely, and with various asides than indicated by the notes. However, the notes should provide contextual information that might be useful for those encountering the presentation at a later date. As the purpose of the notes is to communicate basic ideas rather than show a polished product, they are less formally written and less proofed than a published article would be. I hope they are useful and written well enough not to be annoying.

Introduction [slides 1 & 2]

Doug and I may well have had different thoughts when we proposed this session for the Symposium. I was thinking that the practice of reflecting on one’s teaching needs is useful in computing instruction. It is something that I am working on myself and I thought others might be also. Additionally, I have a history of thinking about grading and ways to make it less onerous and more useful to students. And, of course, in the era of “no child left behind”, one must be sure to address the assessment of instruction.

I teach computing at the college level, but much of what I teach is at a level appropriate to pre-college instruction—computer skills and concepts, and introductory computer science and programming. We may teach differently, but presumably we are all interested in having our students learn, doing a good job of teaching, and getting better at teaching.

Our plan is to briefly discuss reflective practice and assessment. Then we will provide a couple examples from our work. Finally, Doug will show an application that can assist in recording grading information in a manner that can allow for data-based reflection on and assessment of instruction.

The hope is that our examples and discussion will provide something that you can use in your teaching or that spurs a thought of something you might try. For those of you who like the general discussion of such topics, get in touch with us after the session or via e-mail—we like to talk ideas. Our other goal is to encourage reflection in teaching.
We chose to address reflection in assessment because both ideas are currently hot topics in education. We also happen to believe both are important.

**Reflective Practice [slides 3 & 4]**

One of the current buzz words in education is reflection or reflective practice. What is reflective practice? An official definition is seldom given. Clearly, however, it relates to explicitly thinking about how one performs as a teacher, not just assuming that the performance is okay or good but working to make it better and to understand how to make it better.

Does good teaching require reflective practice? We think not. However, “better” teaching probably does. Michael Jordan probably started out being fairly good at playing basketball. Had he merely played a bunch of pick-up games he would likely have gotten even better. But, with some coaching, reflection about what/how/why to perform, practice in the performance, and reflection on the practice, he became an outstanding basketball player—certainly significantly better than he would have been with practice alone. People have revised the saying, “practice makes perfect” to “perfect practice makes perfect”. Reflective practice of teaching is similar for those seeking to improve their teaching.

Reflective practice is purposeful. It does not happen by accident. It must be integrated into the teaching cycle. This model provided by Andrew Pollard is one way to think about reflection.

Keep in mind that teaching is multi-dimensional. It involves many things, e.g., planning, telling/demonstrating, assisting students, assessing student performance/understanding, assessing the instruction, etc.

Reflection and planning are critical. The instruction (or student activity or assessment) must be planned and, to make the most of reflection, one must also take into collect and analyze data or information for improving the instruction (or student activity or assessment). In some situations, it may be important to be very precise and formal when planning the data collection and analysis for reflection. In many cases, it is probably sufficient to merely consider various aspects of the activity with a professional eye.

Reflective practice includes thinking about the practice of teaching both before and after the teaching (reflection during teaching is difficult). Thinking before provides the opportunity to consider what teaching activity, assignments, etc. may be effective for student learning. Thinking after practice provides an opportunity to consider how well we performed the activity or how well the assignment worked, etc.

If we are considering reflective practice of assessment then we will be thinking (before the assessment) about what form of assessment will best accomplish our goal or (after the assessment) about how well the assessment was implemented and how well it worked for the goals we had in mind.

A less formal view of reflective practice may be useful. Mostly, it involves paying attention. A classic example of performing without paying attention is driving. Upon my arrival at home I turn into my driveway at home, park the car, and head for the house. Not infrequently, it occurs to me that I remember nothing of the drive home. It happened more or less automatically. Much of what we do, especially for things that are familiar, we do more or less on autopilot. That includes teaching. However, we can reflect on what we plan to do or have done. Teaching without reflection is not good. For college teachers there are the stories of yellowed pages of lecture notes that have not been changed.
in years. When I first taught junior high mathematics, it was a case of merely telling/explaining to the students what the book said and selecting the homework exercises I wanted them to complete. I was not paying attention. (Of course, I was young then and perhaps had an excuse.)

Mostly, we think, reflective practice involves considering alternatives and asking many questions both before and after the practice. When planning, before you teach (or assign or assess or …) ask about or consider your goal(s), why the particular approach should work, what alternatives exist, why they would work less well, etc. After you complete the teaching ask if it seemed to work, if the reasoning about why it works still makes sense, alternatives or modifications that might be better, were the goals really appropriate, …

One cannot address the whole of their teaching activity when reflecting on practice. Therefore, it is most useful to pick one or two things to focus on. In our experience, most teaching activities are so interrelated that a single focus will touch many aspects of teaching.

We chose to address reflection on assessing student performance and what happens there. Thus, a little information about assessment is called for.

Assessment [slide 5]

Assessment is a big idea. Many things can be assessed—students, teachers, a lesson, a course, a school, a school system, an approach, … Assessment can be used to “grade” (summative) an outcome or to provide data about how to change some practice, assignment, etc. (formative). One can be formal and plan explicitly the data to be used in the assessment and how it will be analyzed. Or, a more informal approach can be used. If instruction is being assessed, the assessment can occur during (mostly for formative purposes) or after (for both summative and formative) the instruction. All sorts of mixes and matches of these ideas are possible.

Formative assessment gathers information for the purpose of seeing whether and how a practice (or assignment or other educational artifact) should be changed. Summative assessment gathers information for the purpose of determining if particular goals were reached. Summative assessments generally supply a yes or no answer and very little guidance as to change. One could, however, use yes or no answers from summative assessments to determine where effort should be focused.

As noted above, summative assessments provide (mostly) yes or no answers to questions. Did the students master a skill or concept? Were the goals of the instruction achieved? Did the teacher produce learning for the students? Of course the answers might not be simple yes or no answers, e.g., appropriate learning might have occurred for 60% of the students.

A critical first/early step in reflective assessment is to clarify/explicate the general purpose of the assessment: summative?, formative?, both?, for the teacher?, for the student?.

You will also need to determine the “content” of the assessment. This seems relatively straightforward, but may not be. For example, if we want students to learn spreadsheets they need to learn what spreadsheets can do, how to make them do desired tasks, and what tasks are needed to accomplish the overall desired result. On which of these should we assess the students?
Many now believe assessment should actually guide most everything we do in education. Assessment allows you to know if or to what extent you are succeeding. If we do not assess what we are doing we will never know if we succeed and we cannot get better.

Example 1 [slides 6 & 7]

This first example focuses on the process of assessing student performance in creating a Web page/site in a fluency course. However, the point is not the assessment of students but rather that in reflecting on my practice of student assessment I not only changed the assessment, but I also changed my instructional practice.

In my course, Computing Skills and Concepts, I assign three projects. In the first one, students are expected to learn and use a variety of HTML codes as they design and implement a Web page. I have several goals for the assignment, that students:

- handcode Web pages using HTML
- design and debug computer artifacts
- enhance computer system usage skills (file transfer, access control, etc.)
- understand Web usage errors/problems

I have used this assignment for a number of years now. The latest incarnations of the assignment and the rubric I use in grading it are available on the Web at

http://www.cns.uni.edu/~east/scholarship/cs_it/2005/rubric1.html
http://www.cns.uni.edu/~east/scholarship/cs_it/2005/project1.html

The real import of the example is not all that obvious when examining the assignment or the rubric. I believe the assignment is a good one, it is a “project”, students are mostly enthusiastic about it, it meets a number of educational goals, etc. The rubric is not particularly special, though I do find it useful to me. The example comes from what I did when reflecting on the success of the project.

Over several offerings of the course I had been disappointed in the actual quality of student work. The design work was marginal and students seemed to do a few flashy things with pictures or a similar thing over and over but not really consider the qualities I thought important. My reflection on why this was so led me to several conclusions.

At first I thought that perhaps I was not including enough information about what the assignment entailed. So, I worked on making the description better. That might have helped, but not much.

Then I thought that perhaps the students did not understand what constituted good performance on the assignment. For some time I had expected students to judge their own work by indicating whether they thought it was okay, good, or excellent, but I had not suggested what those terms meant. So, I included in the assignment description some characteristics of the various categories of quality. That helped some, but not a lot.

“My” natural thought (yours might have been different) was that I did a poor job of describing the characteristics. So, I worked to make those assessment ideas better and required that students indicate what they thought their work was “okay” or “good” or “excellent”. Again, some improvement, but not much.
For some reason, my next conclusion was that students did not really understand what I meant when I asked them to “design” a Web page. So, I added a requirement that a diagram of their desired page/site be submitted. Again, some improvement. My next step was to add a bit of class time discussion about design and to encourage them to do some design. Again, some improvement.

For some time, I have believed that many students do not really know how to “solve” or think through problems and plan a course of action. That was particularly obvious with programming. In my discussions with some college of education faculty, I have often said, “If you them to be able to do something, you have to teach them to do that thing.” It finally dawned on me that I need to teach Web page design if I want students to design Web pages. So that is my next step.

The point of this example is not that I have a marvelous assignment and rubric for grading it. Regardless of the quality of that assignment and rubric, my initial reflection on how well the assignment was accomplishing its goals had led to a change in my instructional practice and clarified/strengthened one of my philosophical ideas about teaching (that if you want students to be able to do something, you have to teach them to do it).

I encourage you to think about your own instructional practice (teaching). Think broadly as you do so. A very good place to start reflecting on your practice is with student assessment.

That concludes my part of this presentation. Doug Peterson has a different example/perspective to share.