Sweeder, J., & Bednar, M.R. (2001). "Flying" with educational technology. *Contemporary Issues in Technology and Teacher Education* [Online serial], *1*(3) 421-428.

"Flying" with Educational Technology

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I said I wanna touch the earth
I wanna break it in my hands
I wanna grow something wild and unruly

In their recent CD release, *Fly,* dealing with themes of independence and freedom, the Dixie Chicks (1999) sing about wanting to break the earth in their hands. Being in touch firsthand with any meaningful life experience, be it a personal or professional, is crucial. This may be especially true for preservice teachers who find it challenging to bridge educational theory to pedagogical practice. This is even more pronounced with graduate students who maintain their professional careers while attending classes during evening hours in order to meet family obligations and pay their tuition bills.

Many preservice teachers lack meaningful, extended student-teacher interactions *before* they enter their final capstone experience'namely, student teaching. In addition, these preservice teachers may have had only limited opportunities to connect theory to practice. Students may complete a two-year (or more) program of study only to discover too late that teaching does not suit them and consequently they do not fly. We wanted our preservice teachers to recognize and appreciate how educational theory can inform best practice, yet still retain a willingness to teach creatively, to fly, because learners enjoy flying, learning in a variety of ways.

Our Flight Plan: Rationale and Purpose

During the summer of 2000 the graduate education program at La Salle University piloted its graduate secondary education practicum. The experience consisted of two integrated components. Education 647 was the evening seminar in which graduate students began their discussions about how to structure plans and motivate students using hard and soft technologies (Persing, Molenda, Paulus, Lai Har, & Hixon, 2000), and created unit plans blending the theme of leadership with specific content disciplines. Education 648 was the follow-up clinical experience in which the graduate students implemented their instructional plans with the middle-school students who attended a two-week leadership conference.

The framework for the summer practicum involved an artful integration of idea and product technologies'*educational technology* (Hooper & Reiber, 1995; Ryan, Sweeder, & Bednar, in press; Sweeder, Bednar, & Ryan, 1998). Organizations such as the National Council for Accreditation of Teacher Education, the Congressional Office of Technology Assessment, and the American Council of Education are consistent in their recommendations for integrating educational technology into courses and actual teaching events, as well as requirements for teacher licensure (Dawson & Nonis, 2000; Rogers, 2000; Thomas & Cooper, 2000). Tantamount

to those recommendations, the practicum reflects the President's Committee of Advisors on Science and Technology's concern that there should be a 'focus on learning *with* technology, not *about* technology [italics added]' as well as an emphasis on 'content and pedagogy, and not just hardware' (1997, p. 26).

In this article the varying degrees of success with which the graduate students incorporated educational technology in their planning and instruction to motivate their middle schoolers is discussed. In addition, how Hooper and Reiber's (1995) adoption stages'familiarity, application, integration, reorientation, and evaluation'were used as a way to delineate degrees of educational technology competence is described. Finally, recommendations for improving not only *preservice,* but also *inservice* technology development programs are offered.

The Tarmac and Ground Mechanics: Practicum Specifics

La Salle graduate students were enrolled in a 10-night, 35-hour course of study that was primarily intended to help them bridge theory to practice. Of the 13 graduate students enrolled, 10 sought certification in mathematics and/or science (i.e., general science, biology, chemistry), while 2 sought foreign language certification (i.e., French) and 1 social studies. The primary seminar activities involved videotaped microteaching experiences, which were followed up with instructor and peer feedback. The seminar readings, lectures, and discussions dealt mainly, but not exclusively, with the topics of lesson and unit planning, developing and adjusting instruction, and questioning levels and skills, as well as preventive, maintenance, and interventionary discipline measures. An additional area of emphasis included extending the concepts of 'idea technology' to include multiple intelligence (MI) theory (Armstrong, 2000; Gardner, 1999), cognitive taxonomies of learning (Bloom, 1956), the moral system (Damon 1995), and the Questioning Circle-System (Wilen, Ishler, Hutchison, & Kindsvatter, 2000). The overarching goal of the seminar instruction was to nurture within preservice teachers, a willingness to quote the Dixie Chicks, to "grow something wild and unruly," to be in touch firsthand with a new, meaningful life experience, to get their middle school students excited about learning something new using educational technology. This experience occurred when the graduate students, who were directly responsible for developing the daily leadership conference activities, assumed primary responsibility for instructing and managing their students during the final two weeks of the practicum.

The clinical component, the leadership conference itself, in which graduate students taught 12 and 13-year-olds from urban and suburban, public, and private schools, was held on La Salle University's main campus in Philadelphia, Pennsylvania. The conference was intended to help those middle-school students discover that they could learn in variety of ways, become more confident when they gave presentations by using different product technologies, negotiate effectively with peers to solve an assortment of problems, and adjust to a simulated high school routine. As conference participants, each student attended three classes per day, typically math, science, and humanities. The conference instructors emphasized how leadership qualities are often reflected in specific subject matter domains as well as the occupational end states of those disciplines. For example, one math class discovered that business leaders need math to make effective production-line decisions for their tee-shirt business, while a social studies class compared and contrasted the different positive attributes of several renowned political leaders.

Flying, Landing, and Deplaning: Design, Instruments, and Results

By reviewing all preservice teacher lesson plans and related materials, we discovered that collectively, the graduate students used a number of idea technologies including multiple intelligence theory with its linguistically adapted 'MI Pizza' (Armstrong, 2000, p. 33); questioning levels (Wilen et al., 2000); K-W-L+ (Carr & Ogle, 1987); the moral system (Damon, 1995; Ryan et al., in press); and small-group cooperative learning. Their product technology use included videocassette players, camcorders, keyboards, music synthesizers, overhead projectors, transparencies, handheld calculators, multimedia computers, and the Internet, as well as a variety of realia (Heinich, Molenda, Russell, & Smaldino, 1999) and manipulatives that supported their content objectives. Despite the array of products and ideas, we were more interested in the degree to which the graduate students were able to bridge theory and practice.

Thus, to what degree were graduate students individually able to bridge theory and practice by using educational technology to plan and motivate? To address this central question, a variety of instruments were used. First, each preservice teacher was observed at least three times, during which university faculty rated each lesson using the Formative Assessment form (Appendix A). Each preservice teacher's unit lesson plans were reviewed for evidence of idea and/or product technology use (Appendix B, part 1 and Appendix B, part 2). In addition, the preservice teachers' final evaluation essays were reviewed (Appendix C).

The Summative Evaluation (Appendix D) represents a comprehensive analysis of each preservice teacher's performance for the entire two-week practicum. Using the Summative Evaluation form each individual preservice teacher was rated by assessing the degree to which she or he successfully blended idea and product technologies in support of adolescent learning. A four-point scale was used: a 4 meant exceptionally competent; 3, very competent; 2, competent; and 1, not yet competent.

Five of the graduate preservice teachers demonstrated exceptional competence, for they used educational technology in a creative and systematic manner. They did not merely blend idea and product technologies competently for one or two 70-minute lessons; rather, they did so throughout their entire two-week units. Equally significant, they put the technologies themselves'both products and ideas'into their students' hand, demonstrating what Hooper and Reiber referred to as the 'reorientation phase...[where students] construct and shape their own knowledge' (1995, p. 158). For example, four chemistry teachers artfully blended MI theory with a variety of product technologies to help their middle schoolers create nutritious food product advertisements, the culminating event for their science units. Learners chose their own collaborative work groups to reflect a balance of 'smarts' using Armstrong's (2000) MI Pizza, which had been presented to them by their teachers. The photos (Figure 1) illustrate one group's final product, an appetizing new breakfast cereal. Teachers such as these 'encourage[d] and expect[ed] students to appropriate the technology in ways that could not be anticipated' (Hooper & Rieber, p. 159).

Figure 1. Final product, new cereal

Five preservice teachers were deemed very competent because they blended one or more product and/or idea technologies into several of their lessons in a controlled and systematic fashion. For example, one social studies teacher, whose unit was entitled, 'Leaders: Past, Present, and Future,' blended Damon's Moral system with Ogle and Carr's K-W-L+ to emphasize more dramatically how effective leaders gather information and make decisions. Such preservice teachers more closely resemble ones who have reached Hooper and Rieber's integration phase, where, when 'the technology is suddenly removed or is unavailable, the teacher cannot proceed with the instruction as planned' (1995, p. 158). Unlike their five exceptionally competent peers, these teachers often focused on teacher instruction rather than on student learning.

Three preservice teachers were judged simply competent because, while they used *either* products *or* ideas to complement individual lessons, they did not *blend* them. Thus, they were best characterized by the application phase, the 'at least I gave it a try' stage (Hooper & Rieber, p. 158). For example, on different occasions, one foreign language preservice teacher used products such as an audiocassette tape player, a multimedia computer, an overhead projector, handheld calculators, and a videocassette player. Nevertheless, none of these product technologies were

used in conjunction with idea technologies in any systematic fashion. Moreover, if any one of these products were to have 'failed,' instruction could have proceeded unencumbered.

In addition to the faculty analysis of their performances, the graduate students submitted final self-evaluative essays reflecting critically upon their instructional, professional, and classroom management skills as well as their teacher/student relationships with the middle schoolers (Appendix C). These documents were reviewed for explicit mention of how idea and product technologies may have helped them structure lessons and motivate students. Twelve of the 13 preservice teachers directly referenced the idea and product technologies they incorporated into their instruction. Interestingly, the graduate students' own self-assessments mirrored Hooper and Rieber's technology adoption stages. For instance, one of the 'competent' graduate students stated,

> I used different types of technology in my classroom: *PowerPoint*, TV, VCR, and overheads, and even though each time they weren't working at first, I stubbornly insisted and eventually succeeded. Using many different forms of technology varies instruction and helps all learning styles.

Whereas, another 'exceptionally competent' student wrote,

> Idea and product technology was an important part of our lessons. I found that the use of Multiple [I]ntelligence, cooperative learning, questioning levels and peer support helped to provide motivation for our first period students who were often difficult to engage. [I was] also successful in using product technology such as *PowerPoint*, video clips, and overheads...to help get the student interested....I found that if one medium does not seem to be reaching the learners, I need to move on and try another type of technology. This philosophy works for both idea and product technologies.

The middle-school students also provided insight regarding the degree to which their teachers used educational technology to motivate them. On the final day of the summer conference the middle-school attendees completed a 13-question conference evaluation (Appendix E), which consisted of 10 Likert scale items and 2 additional items requiring a narrative response. Several questions targeted student motivation and response to technology issues. For example, one *motivation* question asked, 'Did you talk about the conference with family or friends at home at night?' Another *educational technology* item queried whether or not a middle schooler was more interested when her or his conference teachers used technology such as the computer, VCR, and so forth. In order to encourage the students to share their own feelings about the conference explicitly, two open-ended questions, numbers 12 and 13 respectively were created: 'What part of the conference would you change for next summer?' and ' What part of the conference got you excited?'

A total of 44 middle-school students completed the Summer Leadership Conference Evaluation forms at the end of the two-week period. Analysis of the results is as follows:

- Over 97% of them reported that their conference teachers made them think.
- Ninety-three percent of them responded that they talked to friends and family about the conference, with 59% responding that they did so 'often.'
- Ninety-one percent responded that they were more interested when their teachers used such product technologies as the overhead, VCR, *PowerPoint* presentation, and video cameras.
- Over 82% reported that their teachers taught them in a variety of ways.

- Over 77% responded 'yes, very much' when they were asked whether or not they 'did something creative during the conference.'
- Sixty-two percent responded that the various classroom activities kept them interested.

Preparing for Future Journeys: Discussion and Recommendations

In this study the degree of success with which graduate students used educational technology to structure and motivate middle-school students during a summer immersion program was identified. It appeared that collectively, preservice teachers were successful. Almost all used a variety of product technologies in their day-to- day lessons; most blended specific idea technologies with those products to strengthen and enrich their unit plans and make them more coherent. Several were confident and competent enough to put the technology into learners' hands.

As self-evaluations indicated, preservice teachers were emphatic in their recognition of how much more engaged their students were because their lessons incorporated educational technology. Given the encouraging feedback received, the summer practicum model is offered'with its educational technology emphasis'as a template for fellow teacher educators to adopt.

LaSalle University continues to enroll an ever-increasing number of graduate students seeking secondary teacher certification. These graduate students possess broad ranges of discipline or content area expertise, but little or no actual classroom experience with adolescent learners. Other universities may have a similar shift in graduate student populations. This practicum proved to be helpful to these highly motivated graduate students. They reported that they were much more comfortable in their newly chosen professional roles as teachers as a result of the overall experience. Although these students were at the preservice level, it is believed that this model of using educational technology to structure and motivate could also be used at the inservice level.

But more importantly, the authors realized that Hooper and Reiber's technology adoption model can serve as a useful rubric for assessing the various competency levels that teachers may demonstrate as they instruct in their classrooms. This adoption model could also be easily adapted for inservice use by principals, department chairs, and so forth.

We discovered how teacher educators such as ourselves can more effectively assess the degree to which preservice teachers incorporate/blend idea and product technologies into 'real' planning with 'real' kids by operationalizing Hooper and Reiber's theoretical construct. If, for instance, graduate students approached us and asked what made them 'very competent' student teachers, we could more concretely communicate our assessment by reference to Hooper and Rieber's technology adoption model. We could explain how, in our professional view, 'exceptionally competent' teachers not only integrate educational technology into their instruction, but also empower their students by putting both idea and product technologies into the hands (and minds) of students.

Not merely a theoretical, macrocosmic tool to assist university professors, academic researchers, or technology specialists, Hooper and Rieber's model was a helpful clarifying schema that

allowed us to explore more fully what we, ourselves, meant by our terms *competent* through *exceptionally competent* as we supervised and evaluated our preservice teachers. We recommend that Hooper and Reiber's model be used at the microcosmic (i.e., school or department) level by teacher educators, department chairs, principals, and the like who want to improve the quality of teaching and learning through educational technology infusion. It would serve them in much the same way it served us, a common language to clarify what we observed in the classrooms.

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