Becoming a Techno-Constructivist: Moving Out of the Way

A Reflective Paper

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Becoming a Techno-Constructivist: Moving Out of the Way

Throughout my tenure in the California State University Bakersfield (CSUB) Master of Arts in Education program, I have both rethought and refined my opinions and practices regarding student achievement and the integration of technology into the curriculum. Prior to beginning this program, I considered myself a technology proficient teacher. I used computers in my classroom for word processing, drill and practice, and problem solving. The Internet was an often used instructional tool as well. I e-mailed parents and wrote all of my letters using a word processor; I had a web page and updated it weekly. At that time, I believed there was not a great deal more technology could do to assist me in my classroom. That was where my focus was skewed. I was not the focus of the class, the students were. I was using technology and many other instructional strategies, but was not taking full advantage of integrating and coordinating my instructional efforts into the curriculum to increase student achievement. I had no complete plan for student achievement nor did I stop to look at how the integration of technology could complete the picture within my classroom.

As I began my course work, I moved from the classroom to coordinate the efforts of my school's Western Association of Schools and Colleges (WASC) accreditation review. At this time, WASC was changing the format of their school study from a teacher-centered to a student-centered evaluation. Rather, evaluating the school was no longer a list of what the school has and what it wants. Evaluation was now a controlled study of the student; how students learn and what the school does to promote high achievement. Preparing the WASC self-study was my introduction to moving the teacher from the center to the side of the instructional picture.

WASC's mission/purpose was to have student achievement measured in many different ways. Through the development of measurable goals, reorganization of the curriculum, adapting and changing the way we teach, and changing the way students are assessed, schools needed to become student-centered learning environments. WASC's evaluative changes came from many areas. Second to None: A Vision of the New California High School (1992), It's Elementary! (1992), and Caught in the Middle (1987) created by the California Department Of Education (CDE) offered student-centered recommendations for change in the education of the K-12 student (Robertson, 2001). To learn more about the new WASC process, I was directed to a book that significantly impacted my thoughts regarding not how students learn, but rather how educators need to look at ways to move schools toward impacting effective student achievement: Results: The Key to Continuous School Improvement, 2nd edition by Mike Schmoker. Data driven results that monitor and evaluate a school's progress toward common goals must be the central objective of the school. Teachers must learn the importance of collaboration and actively work to better student achievement by the examination and refinement of their instructional goals. The combination of clear goals, meaningful communication, and data driven assessment produces results that are verifiable by all stakeholders (Schmoker, 1999). What results did I look for in my classroom?

Educators in California must address the state content standards when creating lesson plans and instructional goals. In 2000, the California Department of Education produced Elementary Makes the Grade!. In this report, great attention is paid to a standards-based learning environment, student performance expectations, educator collaboration, effective instructional materials (including technology), professional development, and district support in

order to create an appropriate instructional environment for students (CDE, 2000). The integration of technology into the curriculum such that it supports standards-based instruction is welcomed and encouraged. The research supporting a student-centered environment is strong, so that moving from an instructivist (teacher-centered) approach to a constructivist (student-centered) approach to learning would support the integration of technology into the curriculum. In the constructivist learning theory, students become critical thinkers who are able to make informed decisions. Information is exchanged, not delivered, and learning is proactive and authentic (National Technology Standards Project, n.d.). While considering my philosophy of education, I realized that my ideas regarding a student's ability to learn new skills and concepts were very much in line with the constructivist theory of learning. Piaget's stages of cognitive development were evident to me daily in my kindergarten classroom. For many years, I had told parents of kindergarten age students that there was nothing wrong with their child; the child was just not ready to tie their shoes or read. I believe educators can facilitate active learning through many concrete and manipulative activities, but we cannot force students to learn concepts they are not ready to assimilate. Students need to create or construct meaning and knowledge for themselves. Many students can memorize answers for an objective test, but when it comes time to connect previous learning to new learning or to climb the levels of Bloom's Taxonomy, students must have attached that learning to something within themselves.

As I moved into the technology emphasis portion of my program, I began to correlate the constructivist theory of learning to the use of technology in the classroom. There is an old Chinese proverb: I hear and I know, I see and I remember, I do and I understand. In a like vein, technology in its many forms gives the student the opportunity to see, hear, and do. Many

instructional activities such as writer's workshop, cooperative grouping, hands-on learning, whole language, portfolios, and thematic instruction all rise from the constructivist theory of learning. The use of a word processor during writing has been one of my instructional tools for many years; it is also a good example of how students can use technology within a constructivist approach to learning. When I taught a lesson on rewriting a fairy tale during my *Teaching to Standards* class, my student's stories were initially short and not well written. After evaluating the lesson plan, I had the students start their story again this time using *Kidspiration*® software to create a graphical outline of their story. The students then moved to a word processor to write the new fairy tale, and used the process writing approach to complete their work. There was a significant change from first to second draft. These new stories had greater detail, better organization, and were much better written. I cannot afford technology all of the credit for the increased achievement, but the combination of technology, peer editing, and revision gave the students more support to produce a better quality piece of writing. A meta-analysis of fourteen studies on computers and student writing from 1992 to 2002 was completed in 2003 by Goldberg, Russell, and Cook, who looked at studies that evaluated the writing quality and writing quantity for students in kindergarten through twelfth grade. Student support factors such as keyboard training, technical assistance, teacher feedback, and peer editing were identified and found to have no effect on the results for the quantity of student writing. However, significant improvement in the quantity of student writing was found in the electronically produced student work when compared to pencil and paper writing. Factors such as keyboarding experience, student achievement, and grade level were identified as limiting factors for the quality of the elementary student's writing. The quantity and quality of student work produced electronically

was significantly higher for students in middle and high school than the traditional pencil and paper methods (Goldberg, Russell, & Cook, 2003). From my experience and my review of the current research, I believe elementary students should be taught to write using the combined approach of writer's workshop and technology. The exposure to technology at this young age will prove beneficial in the years to follow.

Cooperative grouping has become a standard part of my planning. In both my English language learner (ELL) and gifted courses, I placed cooperative grouping as the central activity in the unit. In the ELL thematic unit on families, the cooperative groups were the families of the students in my class. Student's task cards instructed them to locate information about their family's history, compare and contrast their life with that of a grandparent's, create a family time line of yearly special occasions, and to compile a travel book for their family reunion. Cooperative grouping within the classroom was limited to teacher-to-student, volunteer-to-student, and peer-to-peer grouping to create the PowerPoint slides or research a common country. In the gifted unit, I differentiated the instruction for second grade students in science with second and third grade standards on life sciences. These groups of students were responsible for creating a written report, song or rap about the dinosaur, time line for the age of the dinosaur, games to learn facts, and an artistic portrayal of the dinosaur in order to make a full presentation of the dinosaur to the class. Students who compacted the second grade curriculum were given the option to create projects individually or in groups. All groups or projects were to word process their reports and have a technology element for presentation. Story Book Weaver, Kidspiration, and PowerPoint were the more common presentation choices made by the students. I have used grouping task cards in various forms in the past years with varying success,

and I have found cooperative grouping to be a two-edged sword. While I understood the needs and benefits of cooperative grouping, I did not have enough control over the final product as I would have preferred. I was also troubled by the lack of equality in the work efforts of the students. Through my course work, I began to realize it was not the grouping that was the concern, but the assessment of the outcome. Students had no concrete knowledge regarding my expectations for them in their groups or for their final product. The groups were not well balanced because I had not guided them to work as teams and create a group product. I solved this problem when I took an in-depth look at rubrics and authentic assessments.

Early in my teaching career, I participated in a district workshop entitled Program for Effective Teaching. There, I was introduced to Madeline Hunter's direct instruction method and behavioral objectives using Bloom's Taxonomy. I learned how to write clear objectives that stated my instructional goals. Using an anticipatory set was critical and the assessment was either informal or formal consisting of a teacher-created test at the end of the lesson or unit. I did create and use science projects and experiments, but I did not look at authentically assessing my student's progress, nor did I usually create the assessment at the same time I created the unit. In CSUB's *Technology and Assessment* course we examined different types of assessments and rubrics. Great differences were found between authentic assessment and the tests, both standardized and teacher-created tests we give our students. Authentic assessment takes a variety of forms: checklists, anecdotal observations, performance activities, projects or products, rubrics, and portfolios. Assessments are multiple, no one thing determines the student's mastery or skill level. While a test is a type of assessment it cannot be the only determination of achievement (Chittenden, 1990). I examined my practices regarding assessment and found room

for growth. As a primary grades teacher, observations and checklists were a large part of my subjective assessments. Students would count to one hundred or read the sight word list and I would check off the skill. This type of assessment was second nature to me, but now I know that these assessments needed to be fair, focused, and well constructed; additionally, technology could make my use of checklists and observations easier. By using a Personal Digital Assistant (PDA), I could easily and quickly check off skills and behaviors as I worked with small groups or observed student teams and activities. No more little notebooks left on tables or observations forgotten before I could write them down. While I have neither mastered the PDA nor had the opportunity to put it into practice in my classroom, I look forward to that day.

Rubrics are another type of assessment that was familiar to me, but not completely understood. I had used rubrics, but I had not clearly stated the differences in the levels of achievement and I had not presented these rubrics at the beginning of the lessons. I was nervous at the beginning of my online classes when I read the two rubrics created for the assessment of my work. Having written many vague rubrics, I was familiar with the total subjectivity that could come from the evaluator. At the same time I participated in a Making Standards Work seminar presented by the Center for Performance Assessment. We evaluated the state content standards in grade level teams and created a list of the power standards, wrote big ideas and essential questions, made interdisciplinary connections, created unit plans for these connections, wrote performance tasks, and created scoring guides (rubrics). These rubrics were very specific, written in student language, and were clearly linked to the state content standards (Reeves, 1998). Now I had a rubric that I could understand and clearly explain to administrators, parents, and most importantly to all to my students. I quickly put these rubrics into practice in my

projects and lesson plans. Regarding student portfolios, I had fallen into the trap of keeping a lot of student work in a file folder and pulling it out twice a year, once for spring parent conferences and again to create work folders for Open House. I did not spend a great deal of time working with my students to refine or select important pieces of work that showed growth during the school year. As I examined electronic portfolios and research regarding the benefits of portfolios, I realized how beneficial these could be, not only to my assessment process, but also to the students in my classes. At this point, I was on my way to becoming a Techno-constructivist educator.

Scott Noon defines four developmental stages of teacher technology efficacy:

- the Preliterate end-user-- knows about technology but does nothing to advance through the stages, these teachers need to see the immediate value in what technology can do for "me" such as differentiated instruction and record keeping.
- the Software technician--can use software for personal needs, these teachers are ready to learn about technology integration and what technology can do in the classroom.
- the Electronic traditionalist--adds technology to their traditional methods, these teachers are ready to branch out into WebQuests, virtual field trips, online collaborative projects, and students taking charge of their learning.
- the Techno-constructivist educator–integrates technology in ways that redefine the curriculum, these teachers scaffold learning with the students to integrate both technology and the constructivist theory of learning.

Teachers can move quickly through the first three stages and are differentiated in their ability by their use of technology for student growth and achievement (McKenzie, 2000). To achieve the

techno-constructivist level takes a lot of reflection, redefining, and relearning on the part of the teacher. McKenzie (2000) suggests that a techno-constructivist teacher coordinates their student's learning efforts, but allows students to make connections between learning activities. Through virtual field trips, collaborative online projects, and technology-infused lesson plans, the classroom is full of integrated active learning. I was the electronic traditionalist who taught in my traditional way and added technology when it was convenient or when it benefitted my work. I rarely looked at the benefit for student growth and achievement. I am still learning how to move to the side of the picture and allow my students to create learning, but the picture of my future classroom is beginning to appear.

One additional area of the techno-constructivist's skill development is the teacher's ability to develop information literacy with their students. Information literacy has been championed in education for several decades; students needed to know how to research, where to research, how to judge their findings, and how to apply their findings to papers and projects created in and for the classroom. In the beginning, information literacy taught students how to appropriately use print sources for research and study. Things have dramatically changed with the necessity to include Internet research in information literacy. It was not until I took the *Fundamentals of School Legal Issues* class that I examined information literacy as it applied to the Internet. I was well aware of the many dangers of chat rooms, e-mail, and discussion groups and I also had definite ideas regarding restricted and unrestricted access to the Internet at school. I believe the school's responsibility is to use the appropriate learning environment for instruction and I believe that my students benefit from the use of the Internet. I also believe that schools and parents must monitor that access. As a primary grades teacher, I allowed my students to use

the Internet sparingly. I freely used websites to instruct my students, but unrestricted access to the Internet in my classroom did not exist. Students were allowed to use bookmarked websites with a parent or staff member sitting beside them. Research was guided and students had bibliographies for each report presented. While the Acceptable Use Policy (AUP) and blocking and filtering software are commonplace in schools today, they are not enough to provide adequate protection for our students. Alan November's approach to the student's use of the Internet is to teach them communications literacy and information literacy. The "grammar" of the Internet or communications literacy begins with understanding the web address and learning how to validate the authenticity of the authors and information they find. Through guided research and problem solving, the students learn to be discriminating users of information (November, 2001). This made sense to me. If I ever work with students in the middle grades, I will use this approach to help them become good consumers of technology. The AUP that I wrote is not enough to adequately "empower my students with technology"; I still need to research and define how I would work with my students regarding information and communications literacy.

Much has been written regarding technology in the classroom, with very mixed conclusions. In the past nineteen years many technological advances have been realized, the microcomputer has evolved from a drill and practice machine to an interactive learning tool–technology has made an impact on students and teachers. The reality of that I see is that we have put in hardware and in some cases software, but we have not integrated technology into the curriculum. The *Enhancing Education Through Technology Initiative*, a part of the No Child Left Behind Act of 2001 (NCLB) set guidelines for the integration of technology into the

curriculum. Technology must be integrated into the learning process, technology's value is not in the access, but in how it is used, and grants will create new ways to make use of this teaching tool. The technology goals of this initiative are grandiose; teachers will be able to integrate technology into the curriculum, student achievement will increase, and technology literacy will take place by the end of the eighth grade (Bush, 2001). I am not sure how much an initiative will change the classrooms, but it is critical for us to demonstrate and encourage educators to integrate technology into the curriculum. In all three of my elective classes, I was tasked with creating a unit plan that integrated technology as a primary component. While researching the benefits of technology in early childhood, gifted, and ELL programs, I kept finding the same theme: "Integrate, Don't Isolate"(Davis & Shade, 1994) . The student populations that I chose to study were a diverse group; however, students in a single classroom could fit into two or even all of these populations, and that's where I found the techno-constructivist correlation.

In both the early childhood and the ELL programs, I found that thematic units were helpful in creating a constructivist atmosphere for learning. In the gifted population, I found that differentiated instruction promotes a constructivist atmosphere. All three populations could benefit from the integration of technology for their specific needs. In early childhood education, teachers need to be the instructor to promote comfort and familiarity with the technology, the coach to provide guidance, the model to show how things are done, and the critic to ensure appropriate technology is placed in the hands of the students (Davis & Shade, 1994). The ELL students benefit from technology by working in cooperative groups of English language learners and English speakers, using thematic instruction, progressing at their own pace, using nonverbal ways to show skill development, and using visual aids and hands-on activities (Lessow-Hurley,

2002). Teams of gifted students can collaborate to create new knowledge and understanding of a specific topic. Their work can encompass online research, word processing, painting/drawing software, web quests, online scavenger hunts, and multimedia projects. Student-teacher learning groups are able to meet the needs of a student who has surpassed the teacher's subject knowledge. Researching a topic together is another benefit of technology integration (Mann, 1994). If these diverse groups benefit so greatly from the integration of technology, then the mainstream learner would reap as many if not more benefits. Once again, I return to my renewed techno-constructivist attitude toward student achievement in my classroom. Technology affords all students great opportunities to succeed, generally in an atmosphere of acceptance and patience; so by integrating technology into the curriculum, I step toward my goal of increasing student achievement.

An additional component of the theories of learning that I believe impacts technology in the classroom is cognitive science which has brought to the forefront by people like Howard Gardner. His multiple intelligences theory has caused educators like me to look more carefully at our students. I look at my students now to determine how they learn, not what I need them to learn, and work to provide a learning atmosphere that provides the proper stimulation and motivation for achievement. While I value the academically gifted student, I must also look for the musical or interpersonal student and draw out these skills just as I work with academics. In 1996, Veenema and Gardner offered two educational goals for cognitive science: deep understanding of the lessons, and a wider view of how a student can learn. They have determined that technology itself will not enable students to learn, but the proper integration of well planned lessons, assessment, and technology will allow more students to take advantage of

learning experiences (Veenema & Gardner, 1996). The Apple Classroom of Tomorrow Project correlated technology activities to each of the multiple intelligences. From word processing, to multimedia presentations, to communication skills, to synthesizers, technology provides a means from which all students can achieve (National School Boards Association,1995). When one looks at the combination of constructivism, technology, and cognitive science, a more complete picture of learning and student achievement starts to emerge. I am looking for measurable results regarding student achievement, so it encourages me to find so many ways to reach the students in my classroom through the integration of technology into my curriculum.

This past January I accepted a position as a University Supervisor. To date, I have had the pleasure of working with forty-three student teachers and forty-four master teachers. When I brought up questions about technology integration or even the use of technology in the classrooms, specifically regarding computers and the Internet, most of these pre-service and in-service teachers avoid the question. Several directed me to the computer lab, while others said they just did not know what to do with it. I have not had one student teacher teach a technology-infused lesson. Some have presented lessons where the students have written a poem that the student types using a word processor, others ask for Internet research from home. Unfortunately, I have only visited one class that actually made use of the computer– and this was for drill and practice. When I talked with the master teacher regarding the computer use, she described the fun and excitement the children experienced when using the computer. Her kindergarten class is forty-five percent bilingual and the bilingual students are the first to ask to use the computer. Daily group rotations allow all students the opportunity to use the reading and math programs. These students are making great progress in their language acquisition, math skill development

and easily use the computer software from startup to shutdown. Through her own efforts, this teacher has moved to the electronic-traditionalist stage.

When determining a project to complete my journey, I selected the opportunity to write the technology objectives and workshops for the Santa Clarita Induction Program. I spent time talking with the program coordinator and the assistant superintendent of the Saugus Union School District regarding their goals and ideas for the Induction technology standards. We looked at the transition of the Beginning Teacher Support and Assessment Program (BTSA) to Induction (SB 2042) and evaluated how these changes would affect the program and support system. The BTSA program's primary goals were to increase the retention rate of beginning teachers, and to provide support to develop within these teachers effective classroom strategies for student growth and achievement. Throughout it's tenure, BTSA has achieved a better than ninety percent retention rate for beginning teachers participating in the program. Induction moves BTSA into a program that will confer the California Professional Teaching Credential on participating teachers who complete the two year program. Additional standards for content and pedagogy, technology, equity and diversity, healthy environments, English language learners, and special populations have been added to the original BTSA standards in order to satisfy the credentialing requirements. The learning continuum is aligned with the California Standards for the Teaching Profession; specifically the technology standard is aligned with the California Technology Assistance Project standards levels one and two (K. Harvey, personal communication, April 23, 2003).

In order to create these objectives and outlines, I reflected on my experience with technology and what I had learned within my CSUB program. I wanted to create concrete

objectives and outlines that reflected my learning and studies. As I looked at the technology standards, I found it easy to come up with performance-based assessments and activities to meet the state requirements, but I felt something was missing. I returned to the techno-constructivist model and found that I needed to redefine the curriculum. I needed to integrate the technology throughout the program, not just teach the technology as an additional subject area. Therefore, I revisited the Induction standards and began to align the technology portion to the program's additional standards and requirements. The technology objectives remained the same, just as the state content standards did for our students, but the approach to the workshops and requirements changed. I looked first at how technology can fit into Induction Standard 15, Standards and Pedagogy. One major requirement of this standard was to create standards-based lesson plans; technology definitely fit into this standard. The workshop that dealt with finding and creating technology-infused standards-based lesson plans would meet both the Standards and Pedagogy and Technology standards. As I continued through the other four standards, I began to correlate the amount of support that technology could afford the participating teachers during their Induction Program. I saw technology as the overarching component of the program. If I could correlate the remaining standards to the technology standards, then the program would be infused with technology serving a viable purpose, and the technology would be truly integrated into the program.

It was my intention that the integration of technology into the Induction Program would provide the participating teachers with an example of how they can integrate technology into their curriculum. McKenzie suggests that planning for technology integration requires the team to look at the "orchestration...of program elements and possibilities into a comprehensive,

coherent whole" (McKenzie, 2001, p. 14). While this applies to schools planning for technology, it also applies to professional development. By taking the best of what research has to offer, technology planners can use their higher order thinking skills of application, analysis, synthesis, and evaluation to create a program that challenges and encourages the participants to use their higher order thinking skills to integrate technology into the classroom. The Apple Classrooms of Tomorrow (ACOT) research team observed five measurable stages of teacher use of technology: Entry, Adoption, Adaptation, Appropriation, and Invention (ACOT, n.d.). When correlating these to Noon's developmental stages of teacher technology efficacy, I determined that participating teachers would probably go through the first four ACOT stages during the Induction workshops without reaching the techno-constructivist level of Noon's stages. Since teachers who participate in the Induction Program will also be going through stages to develop their skills as a teacher, I had to take into consideration how their developing ability to teach would affect their ability to integrate technology into their lessons. Berliner defined the stages of developing expertise or exemplary performance in the teaching profession as moving from a rigid factual user of the teaching process to the expert who is an intuitive rational performer (Berliner, 1994). I correlated the three stages in this way:

Stages of Teacher Development		
Noon (technology efficacy)	**ACOT (technology use)**	**Berliner (exemplary performance)**
Pre-literate end user	Entry	Novice
Software technician	Adoption	Advanced Beginner
Electronic traditionalist	Adaptation	Competent
	Appropriation	Proficient
	Invention	Expert
Techno-constructivist		

Each of these models builds skill through experience and study. The BTSA program is well set to move the participating teachers through Berliner's Stages of Exemplary Performance. Technology Induction Standard 16 provides the direction and training to move the participating teachers through the stages of technology use. The question I faced was: could I write the workshop outline so that the teachers simultaneously moved through Noon's Technology Efficacy stages and ACOT's Technology Use stages? In my opinion, participating teachers could enter ACOT's Invention and Berliner's Expert stages, but would probably remain in the Electronic-traditionalist stage because they have not redefined their instruction in such a way that their whole philosophy of teaching is transformed. An exception to this would be the participating teacher whose philosophy of teaching is founded in the constructivist model. Then it would be possible to integrate technology in such a way that the teacher begins to enter the Techno-constructivist stage.

From my perspective as a university supervisor and graduate student, I knew that the incoming Induction participants would generally be at the Entry or Adoption stages of

technology use. Therefore I tasked myself with writing objectives that would provide the support for the participating teachers which would raise their understanding of technology and simultaneously apply it to their assignment. In order to help them reach the stages of Adaption and Appropriation, I needed to provide practice with collaborative project-based learning. Each workshop outline is written to encourage collaboration to create projects for inclusion in their Induction portfolio. As the two year Induction Program is completed, participating teachers will have had many opportunities at workshops, study groups, grade level teams, site teams, and with their individual support providers to work in teams to produce measurable results.

I have learned how to successfully integrate technology into my lessons to promote student achievement, and I am comfortable guiding instead of leading. I now believe that students should construct their own learning, and that technology is another wonderful tool to meet that need. Assessment needs to be specific, clear and authentic. Results must be collaborative, measurable, and student-centered. I have redefined my thoughts regarding the integration of technology into the curriculum. I see the value in working collaboratively to create measurable goals. Have I reached my goal? I have produced workshop outlines that I believe will provide the opportunity and the guidance to develop within the participating teachers the ability to integrate technology into their classrooms. More importantly, I have changed and grown. I know the picture I want to paint in my classroom. I see the students in my class as active participants in their learning process, and I see myself as both guide and facilitator. I know there are many skills that I must teach in order to meet the standards and glean the data to provide meaningful results. I also know that I have redefined my approach to learning and how I will present my curriculum. I still have a lot to learn and a lot to put into

practice in my classroom. I am working to redesign how I work with my student teachers in order to increase their comfort level with the integration of technology into their curriculum to facilitate student achievement. I am becoming a techno-constructivist, but there is still more to do.

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