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Theory into practice: social constructivism and technology in instructional technology and teacher education

Muktha B. Jost
Iowa State University

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Theory into practice: Social constructivism and technology in instructional technology and teacher education

by

Muktha B. Jost

A dissertation submitted to the graduate faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Curriculum and Instructional Technology)

Major Professor: Jerry Willis

Iowa State University

Ames, Iowa

1999

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This is to certify that the Doctoral dissertation of
Muktha B. Jost
has met the dissertation requirements of Iowa State University

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Major Professor
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For the Major Program
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For the Graduate College
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GENERAL INTRODUCTION

The summer that I turned nine was a particularly boring one. I hounded my mother and made whiny declarations of "I am bored" at every opportunity I had to make eye contact with her. Either out of exasperation or out of a sense of conniving humor, she dragged me aside after one of those juvenile declarations, pointed to some fabric, chalk, measuring tape, and a pair of scissors laying by her old sewing machine, and herself announced: "I am going to teach you to sew." With the barest of necessities, she lay in my hands an opportunity to understand, design, and create clothing, and with it the very capacity for critical thinking, humanitarian analysis, and technological entanglement.

The first sewing project I worked on was a pleated skirt for my doll. My mother taught me how to hold the measuring tape and record the basic measurements that I needed: around the waist, hip, and the length for the skirt. She then taught me a thing or two about the cotton fabric that she had salvaged from an old and frayed pillow case. I held the fabric and pulled it in different directions and from different ends and concluded that it stretched more -- for some reason -- when I held it diagonally. We then went on to translating those numbers around the waist and hips of the doll to the space they would take on the fabric. Then came the exercise of cutting straight and staying on the line. And then the art of putting it all together.

As my summer vacation wore on, the lessons got longer and more complex. The doll's waist was an unchanging static number, but mine wasn't. The numbers around my waist see-sawed with every breath that I took. By the end of the summer, most of the measurements had changed to reveal the growing bones of a nine-year-old. Just a hole wasn't enough for the arm. The part of the sleeve that covered the front part of my ball-and-socket joint actually needed less fabric than the back. Even though the human body is theoretically symmetrical, in practice there were too many deviations from the norm. The warp and weft of fabrics was an intriguing study of its own.

And then, when I could conceive of designs and fashions and translate them to miniature blouses, skirts, jackets, and hats for every inanimate thing in my room with a face, I graduated to my first lesson on the sewing machine. Up until now, all my "putting together" of the different pieces of fabric for that magical "whole" had been done entirely by hand, with only the technology of a needle and thread, and the technique of threading, poking, pushing,
and pulling one symmetrical little stitch after the other. Now I had arrived. I was big girl enough to be trusted with the machine.

She first showed me the different parts of the machine, including its insides. I remember how the cold and sturdy metal glistened with its latest spray of grease from my mother’s careful hands. She could always tell by the way her machine sounded whether it was hungry for oil, overheated, lethargic from a dust-bloat in its bowels, or simply arguing with a stray piece of thread. At the end of the lesson, I could visualize exactly how the independent and visible top thread and hidden bottom thread came together to trap my carefully cut fabric into a locking seam. I also knew the order in which to thread the machine including the bobbin thread. Most importantly, I knew I had to learn how to let my fingers dance around the vicinity of that fast and noisy needle as I pushed and guided the fabric along for the seam stamp from the needle, but never get them close enough to get " stamped" themselves.

I had barely gotten my teeth into the thrill of this -- my new relationship with a powerful machine when my mother put the lid back on the machine and said I had to go outside and play in the sunshine. Sunshine? But this was my new light of knowledge, power, and ability and how could she disconnect me from it. I went out to play and soon forgot about the seductions of the machine amid the smell of Jasmine flowers, the feeling of sand in my hands, and the salty taste of sea water. Somehow, my mother seemed content when I came in burned-brown to a crisp in the tropical sun with a healthy appetite and a spate of juvenile tales. And she truly listened to every one of them because she checked with me the following day if I had built sand castles in the shade of the same fishing boat as the day before.

I made many mistakes. I made blouses where the sleeves locked out the arm through an inadvertent seam or limited their movement with inadequate fabric. I made garments that were too big or too small, or worse -- too tight. You could get in, but getting out involved the blade ripping the tight seams so dangerously close to skin that could feel and bleed. I made skirts that were too long or too short. I made them in colors that were not suited to playing outdoors or in lengths that dragged a good part of the topsoil into the home. I wasted much fabric, but it was all forgiven since most of it was old curtains and sheets and pillow cases anyway.

In the end, my mother taught me the art of sewing without patterns. I realize today that
through her holistic style of teaching even a technical skill, she transformed the teaching and learning experience to something that applied to life and living. That learning experience was the quintessential combination of philosophy and skill.

And there lies the connection to my education and research, which I now see as an experience that provided a philosophical gift, or a deep and rich anchor if you will, that synergised my self with my beliefs regarding technology in education. Through an educational experience in a simple craft that was designed by a caring teacher, I was able to pursue paradoxes in my research, chase some difficult and often opposing nuances, and distill meaning from difficult ambiguities. My childhood experiences in teaching and learning certainly gave me a taste for holistic learning and for perceptions of culture.

Technology has been the unsolicited learning panacea in a teacher’s life from the audiovisual in the 50s to the computer today (Saettler, 1990). From the President of the country to parents in the community, the expectations of the computer to revolutionize education for the better is a mounting promise. Some promises and predictions have already altered schooling dramatically for, not just learners and teachers, but parents and communities as well. Also, the bulk of the arguments for computers in the classroom come coupled with yet another newcomer to the field of education, a learning foundation. It is often argued that constructivism, especially social constructivism, which emphasizes individual meaning making in a collaborative and social context, goes hand in hand with computers. Together, they are held up as a powerful combination that can reform learning and further educational goals.

Teacher education institutions are required, often mandated, to keep in step with this mounting crescendo for computer adoption and integration in teaching. Preservice teachers seldom graduate without an introductory course in instructional technology, which for the most part, is really about using computers in teaching. Some, who are involved in completing a minor in educational computing may complete six to seven courses in the field. Considering the challenges in inservice technology education, especially because of the busy day of teachers, preservice education seems to be the ideal place for a strong education in technology. That, and the fact that a third of the teacher workforce will be replaced by new teachers in the next ten years underlines the salience of a strong foundation at the preservice level.
The story of education, just as the story of anything else related to the human, points to the inevitability of change, and a change that is most often unpredictable. At the same time, history also teaches us that we can resist and shape change, especially if we understand it. We are at a choice point in educational history when it comes to adopting technology, especially computers, in education. Technology has proved to be a boon in the professional life of an adult, but what are the implications of educating a child in an acute technological culture? What is the nature of knowledge that technology mediates? What kinds of knowledge does technological instruction address? What is the place of technology in the classroom when it is used according to the guidelines of a philosophy that places humans learning from each other at its core?

This research explored the above questions from qualitative perspective through designing and teaching a technology course in education to preservice teachers. Technology courses in education are often designed collaboratively and with some input from those in the schooling context, but the content of such courses has been in flux. As preservice teachers come to college better prepared in using computers and software, a shift is inevitable in a content that centers around training to use the tool to thinking about the tool and the appropriate ways in which to use it for education. What would be the yield from a course that is designed and taught on the basis of a qualitative research design? What would be the content of a course that is designed for preservice teachers through a participatory design model that involves a wide spectrum of those involved in schooling issues? What perspectives and insights can we gain from a theory into practice research project that explores the common ground between technology and social constructivism? What implications can such a theory into practice project have for technology and teacher education?

In some ways, asking these questions was as confusing and bewildering as confronting a piece of fabric, an undefined style in your head, and but a few tools to translate that vague style to a finished garment. Much as those learning-to-sew experiments, I have tried to give shape to those collective ideas about technology and teacher education through a course that was taught in the Spring of 1999 to preservice teachers. Grundy (1987) and many others (Streibel, 1989) have suggested that instructional theories and theoretical musings about designing instruction need to be grounded in experience or in the "lived experiences" of the
human — of designer, teacher, learner, listener, and thinker. This research is an attempt to bring together theory and lived experience in the world of social constructivism and technology.

The research was conducted in three connected phases (define, design and develop, and disseminate) and for the sake of simplicity, I will narrate the "story" of our research along those lines. The goal of the research was to design a course for preservice teachers on constructivist uses of technology. This design was based on qualitative research that would best inform the role of technology in the classroom ecology. Since this was my dissertation research, I conducted all the interviews and observations, but this research would suffer from a serious lack of depth without the insight, support, and contributions from the participatory design team.

Being part of a participatory design team, especially for a dissertation research, gave me the opportunity to explore the stereotype of the dissertation as a graduate student's lone and intense pursuit of the truth. That would have been impossible in this research, especially considering the social focus of the philosophy that we adopted. At the same time, the departure from the norm had to be acceptable to a committee—a group dissertation or graduation weren't explored, although they could be. And I hope such processes and ideas are explored in the future. Even as we functioned as a group of six graduate students at the define and design stage, and as a group of three graduate students in teaching the course, I took the lead role not from choice but from the obligation to fulfill a dissertation requirement. Although I thoroughly enjoyed the role, others were equally capable of leading the research. Please keep this information in mind when you see the narration see-saw between "I" and "we."

The objective of the interviews and observations at the define stage was similar to consumer research: What would undergraduates expect and wish to learn from a course in a field that was relatively new? What did they want to explore about computers in education? How were teachers in schools using technology? What would they like to see in the area of technology education in the new teachers? What would school principals consider as important in technology education? Would members of the school board have different perspectives?

I conducted approximately 25 interviews with members from the following groups: Undergraduate students, graduate students and instructors who were already involved in
technology education, teacher educators, inservice teachers, principals, and school board members. I conducted a second interview with six of them. I spent approximately 50 hours observing in classrooms, computer labs, and physical education classes, and another 15-20 in meetings where general school issues were discussed. These observations were intended to improve my understanding of the schooling context. I reviewed the literature on existing technology and teacher education approaches, especially undergraduate technology education. I made use of every opportunity to be involved in my children's classrooms and in the professional lives of their teachers, office staff, and principal. I visited with other parents about technology. I participated in three all-day eco trips, and learned immensely from the constructivist structure of this unique educational program at the Ames schools.

At the same time, I was engaged in exploring constructivist applications of technology with the participatory design team. We met every Friday and shared our perspectives, ideas, excitement, and doubts. The most relevant event to this research was the fact that four out of the six members of the design team (including myself) were also part of a graduate course on the social and philosophical perspectives of digital technology. The issues we explored together truly altered our lives. I began to see dimensions of technology and epistemology that I had only felt in my gut. The priceless opportunity to verbalize some of those ideas as they were awakened by the caring and incisive class discussions, readings, and writings lead to a deep struggle for months that colored this research. In my public life as a student and instructor so far, I had only to deal with the clear, compelling, and hopeful message about technology: It was about to change education, the ways in which we view the world and ourselves. Now, I had had the opportunity to look in the rearview mirror, to face some of the paradoxes about technology, and to actually see some of those epistemological "worries" expressed by educators, computer science experts, and media critics being played out in the classes I visited or in the ideas that my interviewees expressed.

In much the same way that I brought my idiosyncrasies to the research, the others in the team generously provided their insights and experiences. At the define stage of the research, we sought to understand the theoretical underpinnings of Vygotsky's brand of social constructivism and how technology could be used in line with that worldview. As we understood the concepts of the non-neutrality of technology, its isolating and objectifying
effects on the human, its male-gendered hegemony, and its tremendous influence on the ways in which children could construe reality, we realized that constructivist uses of technology need to be led very strongly by the philosophical underpinnings and not the technological worldview. At the same time, I was puzzled about the overwhelmingly enthusiastic messages from the interviews, especially with preservice teachers, about extensive training in computer use that would be of immense benefit to the classroom. Except for very few "off the cuff" remarks, I got the consistent message that computers would be a panacea in education, no matter the inconveniences or the technical problems.

According to the methodology of participatory design in ID, the researcher involves those who will ultimately benefit from or use the "product" that is being designed, to shape the product itself. If I were to go by those guidelines, I would have to design a course that was purely technical: how to use this software or that, how to operate this system or that, how to design a lesson using an authoring program, how to set up the computer lab, etc. While all of these are very important and an integral part of technology education, I was reluctant to quit here. Doing that would make the education too straightforward, simple, and prescriptive. Learning the items that were requested by undergraduates in the interviews would be of immense help in the what, when, where, and how of technology, but not the why. True education, especially one based on the philosophy and pedagogy of using technology, ought to engage the why and why not.

Both studies included in the dissertation originated in the next phase, the design and develop focus. Our intent to shape instruction and curriculum based on the philosophy of social constructivism as a theory of learning slowed down the process considerably. We felt that the hard tools suggested by the design model would put technology instead of the philosophy in the driver's seat. Also, the more I read about Vygotsky's ideas, the more I was convinced about the non-neutrality of the tools that we use, the importance of face-to-face human communication, and the need for a holistic technology education for preservice teachers in education. It was through this struggle that I came to realize the link between technique and instructional design.

The last phase was the disseminate stage when we actually taught the course to preservice teachers in the spring of 1999. Both the themes of our study evolved over the
semester—the relationship between technique and instructional design, and the nature of instruction led by social constructivism.

Dissertation Organization

This dissertation includes two papers, and one set of electronic teaching materials as an appendix. The first paper, "Traditional and alternative design of instruction: More grist for the debate mill" expresses what we learned about the design of instruction through this research. Even though we focused on designing a course based on qualitative inquiry and a constructivist framework, we were essentially operating in a behaviorist and quantitative framework, that of the world around us. This paradox of trying to understand one context and operating in yet another gave us the valuable opportunity to explore both paradigms and to make valuable comparisons.

Grundy (1987) argues that instruction, like curriculum, is really a cultural construction and is a "way of organizing a set of human educational practices." Without this human and cultural focus, all we would have is a technical approach to education that simply prioritizes the different means to education including objectives, plan, implementation, product, and evaluation. This article establishes that traditional instructional design systems do indeed make education a technique, where the means themselves become the education, and cautions that alternative instructional design could easily head in that direction for a lack of alternative precedents. This paper explains the concepts of techne in education, its relationship to technique and technology, and establishes traditional instructional design as the reinforcer of techne in education. It then presents an alternative that is more in line with the metaphysical pull of education. Educators, teachers, learners, parents, politicians, civic leaders, even societies, must choose.

The soft pedagogical tools that I borrowed from Postman's ideas in The End of Education (1995) more than helped me design the course: It gave us and the participants in the course a priceless understanding of the workings and depth of the philosophy. Although we had read the theory and even designed the experiences, it was only in the repeated practice of the theory that the meaning made itself evident to us. For instance, we had planned for the course experiences to rely heavily on group interaction, but we didn't realize until the groups
actually began functioning how deep the reflections of participants would be or how crucial their interactions were in the construction and negotiation of knowledge both in and outside the classroom. We had intended to encourage the group's functioning so we could come to terms with our lived experiences, and again, the practice showed us how much better and deeper the experiences really were. We resolved to encourage equality of individuals and a spirit of dialogue instead of debate, and we were stunned by the passion in their sharing, and the comfort in their silence. We learned that it is impossible to predict the meaning they would bring to class as learners, but we also came to understand what it was to "teach—and learn—on the fly."

The second paper titled "From Social Education to Personal Knowledge: Completing the Vygotskian Knowledge Cycle Through Soft Pedagogical Tools" demonstrates the differences in practice since we chose soft pedagogical tools instead of the hard tools suggested by the design model. This paper focuses on one aspect of a dialectic study of social constructivism and technology in Instructional Technology and Teacher Education (ITTE): the use of soft pedagogical tools to initiate and complete the Vygotskian knowledge cycle. The discourse around computers in education and social constructivism includes discursive and often divergent ideas on individualized and social instruction, social and standardized construction of curriculum, prior knowledge, competition and cooperation, and situated and decontextualized knowledge. What is the status of the educational computing course today? How would Vygotskian philosophy translate to practice in an educational computing classroom? What is the nature of that knowledge? How would it influence the curriculum of the class? What tools would best serve instruction in a social constructivist classroom? These and other questions are explored through the observations, reflections, and writings of both instructors and students in the course.

I have also included a brief chapter on general conclusions after the two papers and before the appendix, which is a set of electronic teaching materials titled, "Theory into practice: Social constructivism and technology in education." It presents detailed descriptions of what was included in the course — the major themes and worldviews and the instructional strategies to cover them, details of activities, assignments, journals, interviews, and interactions.
In the end, this is what I learned about my actions as a teacher-designer through designing and teaching this course: We do need to reinvent the wheel every time we face our students. By that I don't mean coming up with new and better methods, measures, and models, but believing in the unique nature of each learner, each learning situation, each environment, and each interaction. I would like to conclude with a poem by Chuang Tzu (quoted in Palmer, 1993) that captures the essence of engagement, doing, learning, and loving. The beauty about the meaning of this poem is that, much like the philosophy and wholeness of my mother's sewing lesson, it lays at our feet the reason for meaning in our "doing" or the "why" in something so routine and mechanical as making a bell stand.

Khing, the master carver, made a bell stand
Of precious wood. When it was finished,
All who saw it were astounded. They said it must be
The work of spirits.
The Prince of Lu said to the master carver:
"What is your secret?"

Khing replied: "I am only a workman:
I have no secret. There is only this:
When I began to think about the work you commanded
I guarded my spirit, did not expend it
On trifles, that were not to the point.
I fasted in order to set
My heart at rest.
After three days fasting,
I had forgotten gain and success.
After five days
I had forgotten praise and criticism.
After seven days
I had forgotten my body
With all its limbs.

"By this time all thoughts of your Highness
And of the court had faded away.
All that might distract me from the work
Had vanished.
I was collected in the single thought of the bell stand.

"Then I went to the forest
To see the trees in their own natural state.
When the right tree appeared before my eyes,
The bell stand also appeared in it, clearly, beyond doubt.
All I had to do was put forth my hand
And begin."
"If I had not met this particular tree
There would have been
No bell stand at all.

"What happened?
My own collected thought
Encountered the hidden potential in the wood;
From this live encounter came the work
Which you ascribe to the spirits. (pp. 33-34)

The educator Parker Palmer writes about the implications for action based on this poem, and these can be easily applied to instructional design. First, he talks about the wood-carver mastering what he did by going beyond the realm of fixed rules and external standards to a place where he was led by the spirit and the inner flow. He brings up the idea of a deep mutuality between the carver and the tree and argues that this mutuality can be achieved only through discipline, which helps him transcend anxieties about self and success. It is only through such disciplines that we can discern the true nature of the problem or person to whom our action relates. As a last point, Palmer states that the action of the woodcarver requires a belief that things and people do have a "nature."

Third, the action of "The Woodcarver" requires a belief that things and people do have a "nature": that is, limits and potentials. The modern mind does not hold this belief. Instead our culture teaches that all things from trees to people are infinitely changeable, malleable, plastic, and can assume whatever shape machine or method can create. Today a bell stand would be made from whatever tree is available (within the limits of economic feasibility) and produced by machine. If we want to change our human shape, physical or psychological, there are a variety of technologies which promise to do so. Most of our social action is based on this assumption, I think: that people can be seduced or compelled into whatever form fits the activist's conception of how things "ought" to be.

The wood carver's message is clearly different. Here, true action, effective action, action that is full of grace, beauty and results, is action based on discernment of and respect for the nature of the other. The reason is simple: Only through such a relationship to the rest of reality can our action flow with the action of the Tao. Only so can we be channels for real power. Oh, we can make bell stands any way we wish. We can hack and hew through forests with no regard for the nature of the wood. We can produce a stand that will hold a bell without bothering about the Tao. But we do so at great cost to the world and to ourselves. Not only do we endanger our own survival when we misuse and abuse the forest, but we also deprive our lives of quality. So it is with much of our social action, action which does not respect the nature of the other, action which depends on human power and is perverted by human pride. (pp. 35-36)
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TRADITIONAL AND ALTERNATIVE DESIGN OF INSTRUCTION: 
MORE GRIST FOR THE DEBATE MILL

A paper to be submitted to Educational Technology

Muktha B. Jost

Introduction

Despite the predominant use of behavioral practices, neither the processes nor the products of Instructional Systems Design (ISD) played a significant role in the Industrial Age classroom. That is about to change. The Age of Information, with its emphasis on technology-enhanced and prepackaged learning resources like subject software, Web-based courses, electronic books, and virtual museums, and the crumbling of walls between super systems like education, military, corporate, health and other institutions, encourages a large-scale consideration of Instructional Systems Design.

An examination of the field of ISD reveals shifts in thinking, the introduction of new and powerful perspectives especially from the constructivist and postmodern circles, and the struggle for turf and acceptance in patterns and trends. These changes are similar to the push and pull between qualitative and quantitative research, postpositivist and constructivist foundations, and universal and contextual considerations. Whatever the ultimate outcome, the focus now seems to be on admitting, examining, and debating fresh perspectives. As Willis (1998) states, the paradigm debates in instructional design seldom focus on the conceptual and theoretical level and are often waged at the level of strategies. While this makes for interesting arguments and cute or acerbic repartees, both dissenting and assenting voices simply stagnate for a lack of focus on fundamental and philosophical differences, and the flow of meaningful ideas. The lack of literature that explains how alternative instructional design models are used also stifles this debate since readers only have a vague idea of how these refreshingly different philosophies and fuzzy models actually work.

A similar debate is ongoing in educational research too. As schools go through the revolution of reforming the reforms and shifting the fundamentals, the traditional quantitative and standardized research designs are being viewed with skepticism for their limitedness in
understanding schooling and schooling issues in their entirety (Eisner, 1991, p.15). At the same time, change is slow to come in an environment that has been significantly conditioned by quantitative patterns of thinking when it comes to validity and truth. Those searching for qualitative meaning in the context of education struggle for "systematic" ways to represent their messy research to a world that is used to, and conditioned by, the orderly and crystal-clear representation of objective post-positivist research. It would be no exaggeration to say that the qualitative and quantitative debate in educational research is carried on at the methods level rather than at the foundations, fundamentals, and theories of the two vastly different worldviews (Guba & Lincoln, 1994).

This paper asserts that traditional ISD limits both instruction and education. Although traditional methods simplify and make learning efficient, their unexamined adoption can result in lower level learning that parallels know-how or knowledge to make a living. Alternative design of instruction that springs from interpretive and emancipatory epistemologies, on the other hand, are fuzzy, less clear or structured, but have tremendous potential for know-why or education to make a life. However, most present-day alternative ID is led by technology and is therefore not much different from the products and processes of traditional ID.

The argument approaches both traditional and alternative instructional design foundations from Byrum's perspectives of Greek techne (1984), Ellul's explication of educational technique (1964), and Habermas' theory of human "knowledge-constitutive" interests (1971). It explains the many places of convergence in the fundamental principles of the three ideas, and offers a meta-foundation to think about education, curriculum, and the design of instruction. The paper also explains the educational risks behind the influence of technique-driven ISD in the classroom through educational resources, and the promise of alternative design of instruction.

Alternative design of instruction and debate on foundational principles often leave a very pragmatic question unanswered or to the imagination: What am I going to do or use in class on Wednesday night? To allay that criticism somewhat, a set of electronic teaching materials is companion to this paper, and is included in the appendix of the dissertation. Although it is filled with flaws, as any first attempt tends to be, it is an effort to try one's hand at constructivist design of instruction based on research. It represents what an alternative
design of instruction and alternative construal of curriculum could look like. This resource is grounded in the work of teacher education and preservice teachers, and in the context of schooling. Although the research process lasted for a little less than a year, it is a relevant experience in examining the theory in light of the practice, and practice in light of the theory.

Traditional ISD and the Design of “Useful” Instruction: Why It’s Not Enough

Our discomfort with traditional or behavioristic models of designing instruction (Dick & Carey, 1985; Criswell, 1989) goes beyond the argument about simplistic and well-defined step-by-step solutions or processes to overcome and control the scurrilous “problems” of learning. Although the perspective of regarding learning as a “problem” and the flaws from designing instruction based on that belief are quite debatable, that is not the focus here. What is at stake here is the scope and breadth of learning, and ultimately knowledge itself. Traditional design of instruction makes the entire process of teaching and learning seem simple because it is capable of addressing only a narrow part of knowledge. This is usually knowledge related to how to do something, or know-how, procedural, or professional knowledge. Traditional models can isolate this knowledge with skill, commoditize it with efficiency, package it with speed, and present it as knowledge in its entirety. Repeated and sole consumption of this attractive but fragmented knowledge leads to dehumanization and the human’s unique capacity for self-awareness and self-understanding. In short, ISD transforms the human art of teaching into a pedagogical technique that desskills and disempowers everyone involved: the teacher, the learner, and even the instructional designer. But how does this happen?

My explanation is inextricably linked to the confusing and confounding theories on technique and technology. Bring out the extremely nuanced but powerful ideas of technique and technology in education, and it is bound to be squashed mercilessly by the thundering voices of technical rationality, pragmatism, and even denial at times. One could talk about the habits of the mind and the training of human will, which really are behind the miasma of the machine, and listeners find it hard to go beyond affirming images of innocuous technology
that have come to represent the very idea of progress. In the following section, I present the ideas of Byrum, Ellul, and Habermas as related to education and instructional design, and then through a discussion of the common threads in their writings, I explain how traditional ID and unexamined alternative ID can both hurt the very sense of agency that true education and instruction are supposed to convey.

**Technique and Technology**

Some clarification of terms and concepts is in place here to set my explanations and arguments spinning in the right direction. Similar to the misplaced debate on ISD at the level of methods rather than foundations, the argument about technique and technology hovers around the literal polarities of the television or the computer instead of the ideology behind technique. The ideology behind technique is method, means, efficiency, and means as an end, and the arguments focused on this ideology are often conflated with specific products, methods, or technology, and obstruct understanding. To most scholars in education, the very idea of finding the best method to do anything and perfecting that “means” seems innocuous enough to dismiss any vile or undesirable outcomes. Yet, when that “means” to do something becomes an end in itself, as have many elements in education today (standardized testing is one example), then instruction becomes a mere technical device that teaches the ‘how’ and not the ‘why.’ And here, educators would agree. The ‘how’ is practical, pragmatic, and serves a purpose, but it’s the ‘why’ that leads to total or holistic education that liberates the learner.

**Byrum’s Interpretation of Techne**

Byrum anchors his assertions about technical learning, which is similar to the learning resulting from traditional design of instruction, in the aesthetic and balanced ideals of Greek education (1984). In its simplest garb, techne refers to professional skills -- “the pragmatic know-how or techniques necessary to accomplish any task from shoe making to cooking to playing a musical instrument” p. 4). In its most complex depiction, it is the sole victor of every condition of humankind today. Byrum provides a compelling story of techne in Greek society and how the Greeks sought to handle the inadequacies of techne.

According to Byrum, the Greeks who loved proportion, harmony, wholeness and
equilibrium, divided education into three components:

1) commandments (typically rules that related to religious, governmental or parental homage);
2) rules of practical wisdom (learned common sense like that found in the Egyptian wisdom of Amenopet, the Hebrew Proverbs, or even Poor Richard's Almanac); and,
3) professional skills (the pragmatic "know how" or techniques necessary to accomplish any task from shoe making to cooking to playing a musical instrument. (p. 5)

Initially, the Greeks called the last one, the knowledge on how to get something done most quickly, efficiently, and economically, techne. With cautions on mixing our 21st century conceptions of technology with technique, Byrum asserts that technique or techne is the "entire conceptual, organizational, and manual process that leads to the accomplishment of a task" (p. 7), and needs to be separated from technology, which could become an easy scapegoat.

Loath to becoming content with the one-sided knowledge of simply mastering how-to-do-something, the Greeks became interested in the "end" of the matter -- telos. What implications can how-to knowledge have? How can it be applied? What would be the consequences of such an application to the human? Including these concerns and considerations took techne to a form of art for the Greeks instead of a science, which would have stopped at connecting factual considerations to professional skills. Could techne as art teach not just a skill, but an understanding of how that skill could be integrated with being a "good" citizen? Byrum credits the sophist Protagoras for advancing the idea of the telos of techne or the humanitarian consequences to an exclusive focus on know-how knowledge. Plato then picked up on this humanistic emphasis of techne that was introduced and encouraged by Protagoras, and exalted it to education that could teach virtue (arete) and enhance human life.

Through this humanistic emphasis, Byrum contends that the Greeks added a crowning component of culture that included telos, kalon (the beautiful), and kalokagathia (the good and the beautiful). There is now both an ethical and aesthetic dimension that must be considered in any "know how" or "getting the job done." When that attempt failed, the Greeks rejected techne:
In fact, when the pragmatic aspect of scientific techne began to dominate and move unilaterally without sufficient concern for telos, kalon, and kalokagathia, the Greeks fear it would become excessive. A process could be underway that they would not control, and self-control (egrateia) was of such importance that much of the pragmatic techne was rejected. (p. 12)

Ellul's Interpretation of Educational Technique

Although many debate the social implications of technology in an uniquely technological society like the U.S., it is Ellul's work (1964) that provides an incisive and total explication of the role of technique in the technological world today. In his compelling and disturbing interpretation of technique, he acknowledges that technique is the offspring of the machine, and that, despite their intertwined histories, machine and technology are both separate and separable and that technique has overtaken the machine.

Ellul's classical work explains the consequences when techne or technique literally rules the life of the human. According to Ellul, technique refers to any complex of standardized means for attaining a predetermined result. “In our technological society, technique is the totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in every field of human activity” (p. xxv). Throughout his book, Ellul uses the method of observation, in-context facts and figures, and the dialectic to hold a mirror up to the technological society that is dominated by technique in every field of life. His ideas on educational technique are relevant here for this discussion of instructional systems design.

In his section on educational technique, Ellul examines and deconstructs the very idea of progressive education, the unnamed precursor to the now popular theory of constructivism. Ellul’s explanation of how the goals of progressive education in an unexamined society could be transformed to mere technique that controls instead of liberates, is an indication of the Achilles heel in alternative ID that I explain later in the paper. Although Ellul’s denunciations of progressive education as technique may at first seem unfair or even absurd, an examination of his idea in light of his methodology reveals more. In the translator’s introduction to the book, John Wilkinson asserts that Ellul’s methodology is dominated by the principle called Engel’s law or the law asserting the passage of quantity into quality. This, however, is not to
imply a one-way transition but a transformation of quality into quantity through dialectical logic.

In dialectical logic the transformation of quality into quantity is a necessary concomitant of the reversible transformation of quantity into quality. It is, in fact the essence of technique to compel the qualitative to become quantitative, and in this way to force every stage of human activity and man himself to submit to its mathematical calculations. Ellul gives examples of this at every level. Thus, technique forces all sociological phenomena to submit to the clock, for Ellul the most characteristic of all modern technical instruments. The substitution of the tempus mortuum of the mechanical clock for the biological and psychological time "natural" to man is in itself sufficient to suppress all the traditional rhythms of human life in favor of the mechanical. Again, genuine human communities are suppressed by the technological society to form collectivities of "mass men" incapable of obeying any other law than the statistical "law of large numbers." All the technical devices of education, propaganda, amusement, sport, and religion are mobilized to persuade the human being to be satisfied with his condition of mechanical, mindless "mass man," and ruthlessly to exterminate the deviant and idiosyncratic. (pp. xvi-xvii)

It is not the end of progressive education that Ellul finds problematic -- Progressive education has as its end the "happiness" of the child. It entails bright classrooms, understanding teachers, and pleasurable work. Its educational formulas are well-known: the child in school must be relaxed and enjoy himself; he must exist in a balanced environment, get rid of his "complexes," and play while he is learning. All this represents a perfectly valid program. It is the means of awakening the social conscience in the child, the methods through which the child comes to understand life, its needs, the fundamental reason for all existence, and coming to know exactly what he must and must not do for the good of humanity, especially in an unexamined life, that Ellul finds disconcerting. He points out that for this humane education or psychopedagogy to work, education must become a science that is carried out totally by the state, which alone has the means and breadth to carry it through (p. 346). This certainly means the end of private instruction or what Ellul calls a "traditional freedom." In addition to its pantocratic nature, the aims of progressive education require the teacher to be a technician, who must be a remarkable pedagogue to be able to apply it.

Second, this technique is "pantocrator." It must be exercised over all men. If one man is left who is not trained according to its methods, there is the danger of his becoming a new Hitler. The technique cannot be effected unless all children are obliged to participate and all parents to co-operate. There can be no exceptions. If only a minority are educated to comply, this technique can resolve none of the problems it is intended
to meet. Mme Montessori's statement is therefore neither a metaphor nor an exaggeration; all human beings, without exception, must be reached. We note again the aggressive character of technique. Mme Montessori emphasizes the fact that "it is necessary to free the child from the slavery of school and family" for him to enter the cycle of freedom proper to this technique. However, this freedom consists in a profound and detailed surveillance of the child's activities, a complete shaping of his spiritual life, and a precise regulation of his time with a stop watch; in short, in habituating him to a joyful servitude. The most important aspect of this technique is the forced orientation toward it. It is a social force directed toward a social end. (p. 347)

For Ellul, therefore, the aims of progressive education would be fine had they been for the child and just for the child, and not education of the child for the sake of society. Especially when this is a totalitarian society without full justice and truth, and when life in that society is technique itself, designing instruction that is useful for life simply reinforces the technical and makes the individual conform. What on the outside seems like a balanced and happy individual is actually an individual trained to conform:

I have no doubt that it makes men better balanced and "happier." And there is the danger. It makes men happy in a milieu which normally would have made them unhappy, if they had not been worked on, molded and formed for just that milieu. What looks like the apex of humanism is in fact the pinnacle of human submission: children are educated to become precisely what society expects of them. They must have social consciences that allow them to strive for the same ends that society sets for itself. (p. 348)

Habermas' Theory of Human "Knowledge-Constative" Interests

The German philosopher Jurgen Habermas offers a theory of human learning that asserts a fundamental orientation in the human that is life-preserving, and rational (1971). The way these orientations work out determines what is constituted as knowledge. Grundy (1987) provides a fluid and human framework to theorize about knowledge and curriculum that is based on the "knowledge-constative interests" proposed by Habermas. Streibel (1993) then takes the work of Grundy and applies it most effectively in the field of instructional design.

Grundy identifies three human interests that lead to three different ways of knowing and knowledge. The technical human interest entails empirical and analytical ways of knowing and leads to a knowledge involving facts, laws, and procedures. The practical human interest entails historical and hermeneutic ways of knowing that "represent the physical, social, and cultural worlds as 'texts' that have to be interpreted in order for meaning to emerge." The
emancipatory human interest entails a critical way of knowing in which "critical theorems are
gleaned through collective reflection on social and cultural practices and then used to
restructure future actions."

The practical human interest is focused on understanding the world while the technical
interest is bent on controlling the world. In traditional ID models, like Reigeluth's Elaboration
Theory or Merrill's Component Display Theory, the approach is prescriptive and instruction is
treated as a product of design. In alternative ID models, like Willis' R2D2 and Cennamo's
Layers of Negotiation, the model is used in reflective ways and the goal is to provide
resources for the instructional practitioner in an instructional situation. The major drawbacks
of traditional ID models are that they facilitate reproduction, create and maintain a hierarchy
between theory and practice, and control all of its users. These shortcomings deskill users
(Apple, 1975; 1998), commoditize knowledge, objectify the learner, the learning process, and
learning outcome, and politicize evaluation.

One of the most hopeful aspects of alternative design models is their focus on
hermeneutic understanding and "good" rather than "correct" action (Streibel, 1993). "It
possesses an aspect of moral consciousness which the disposition of techne [i.e., the technical
orientation] lacks" (Grundy, 1987, p. 62). Since designers are led constantly by a qualitative
idea of "good" rather than "correct" and since what is "good" is an integral part of the
instructional situation which cannot be reproduced or predicted, designers are vested with the
responsibility of including "spaces" for teachers and learners to apply their own sense of
good. Since meaningful action and not correct behavior is the outcome of alternative design
models, the instructional situation and situational understanding are of utmost importance.
"Meanings are not out there in situations waiting to be discovered and decoded. That would
treat meaning making as a technological enterprise. Rather, meanings are interpersonally
constructed" (Streibel, 1993, p. 157).

Grundy's definition of instruction as a "way of organizing a set of human educational
practices" instead of a concept, and her claim that otherwise, we would have a technical
approach to education, runs parallel to Ellul's ideas on educational technique. Grundy's ideas
on the "false autonomy" that the technical interest can provide is very similar to Ellul's laments
of humans being conditioned to be happy in a milieu that they would normally find
undesirable, and Byrum's claims on the objectification of learners. The technical interest will not facilitate autonomy and responsibility because it is an interest in control. An interest in control will certainly facilitate independence for some, but this is false autonomy, for it is an "autonomy" which entails regarding fellow humans and/or the environment as objects.

**ID as Technique**

Curriculum and instruction, and many other aspects of schools are really at the core of ID in education, but one has to dig deep to get to that core. Numerous technical words and issues obfuscate the simple themes behind the design of instruction: How, what, when, why, and where children learn. The why of schooling is connected to the metaphysical or intentional dimension of schooling; the when and where to the structural; the how to the pedagogical and evaluative; and the what to the curricular. Connecting all of these in a unique and magical cycle are the processes of teaching and learning. ID, or the design of instruction, really should be about insights into this serendipitous process, and instructional technology about the unique ways to understand and participate in this process. And amidst all of this ought to be a sincere interest of caring about the wondrous and mysterious world of childhood, where all meaning originates.

Much has been written about the limited nature of traditional instruction and traditional ID models to design instruction, and I will not go into those here (Reigeluth, 1996; 1997; Winn, 1997; You, 1993; Wilson, 1993). Suffice it to say that traditional ID, with all of its empirical foundations has been somewhat usurped by alternative ID, which has successfully highlighted the reductionist approach that traditional ID relied on. This usurping of one foundation for another is limited to the pages of educational journals and to the sporadic work of graduate institutions for the most part. Traditional ID based on traditional epistemologies is alive and well in the real context of education mainly because of its emphasis on control, resonance with societal values, and success at reproduction, but I will get back to this point soon.

Alternative ID, on the other hand, has gone the way of what it once condemned through a surrender of its explorations mostly to technology. This is one of the most unfortunate situations in education today. Education made a slow and labored progress in the
last five decades from completely empirical ways to approaching knowledge, learning, and
learners, to a somewhat eclectic context where rich and multiple voices could be heard, if not
accepted. Where there once was a mainstream curriculum that addressed the needs and
learning styles of the utopian learner, there now can be opportunities for learners through
novel and creative approaches to learning like cognitive apprenticeship, situated learning, and
anchored instruction. It’s a shame, however, that these approaches are being turned over
mostly to technology before they can be put to the test by a pedagogy with insights into the
caring connect between content and children. The emphasis is on expressing, evaluating, and
proving these strategies through web-based multimedia reference sites, simulations, database-
driven Web sites, probeware, electronic discovery labs, etc. and not on connecting them to
real pedagogy with real teachers.

The success from these explorations is bound to be limited simply because anything
entrusted to technology will succumb to technique, and as explained so clearly by Ellul,
Habermas, and Byrum, technique and technology can only make contributions to the lowest
common denominator in education. In fact, in self-serving aggrandizement, the focus on
technology and technique will steer learning away from a deep engagement in questions
related to know-why. If this sounds like the all too familiar complaints about traditional ID,
there is a good reason.

When this costly experiment with expensive technology steered by high-priced
technicians flounders at the foundations of “meaning,” the proverbial baby is bound to be
tossed with the bath water. It is not just the technologies but the entire philosophical thought
that claimed to undergird it will get rejected. And that, I repeat, will be a shame because of the
potential in those alternative foundations to address the deep aspirations in teaching and
learning.

For those who doubt this overwhelming and singular tie between alternative ID and
technology, I’ll provide one example that is representative of the hype and mood today in
educational technology. Incidentally, most arguments for alternative ID are indeed based on
this shift from the Industrial Age to the Age of Information, which is supposedly shifting the
fundamental ways in which we regard learning, education, and the world around us. In an
article titled “Learning, technology, and education reform in the Knowledge Age or ‘We’re
wired, webbed, and windowed, now what?" the authors Trilling and Hood (1999) start at the core and discuss the aims of education, the skills needed, modern learning theory, the needed strategies, etc., and conclude with a list of "Top 10" challenges for educational technology today. Despite an elaboration of educational aims focused on contribution to society, fulfilling of personal talents and civic responsibilities, and carrying tradition forward; a list of skills including critical thinking, creativity, collaboration, cross-cultural understanding, communication and of course computing; key principles of learning including context, construction, caring, competence, and community; the authors’ list of challenges show a ridiculous focus on technology. Nine of the ten challenges blatantly suggest a technological fix for the "problem" of learning -- virtual and visceral environments, web-based multimedia reference sites, high-quality instructional and constructional learning simulations and tools, better and faster information storing and searching tools on the Web, online assessment tools, and the like. Even a quick comparison of these tools to match the lofty goals as described by the authors themselves is enough to highlight the shortsightedness and one-sidedness of this venture that is driven by technology and technique.

It is the authors’ last challenge, however, that is most ironic and will take me back to my assertions about the reproductive nature of traditional ID. It reads: "We need to go outside, breathe deep, take a walk, smell the flowers, and forget about technology at least once a day." Indeed we must, because it may be our last and only hope to find out what learning is really all about.

If my argument sounds as if I am confusing technology-led alternative ID with the reductionist traditional ID, that is exactly what I am trying to convey. If alternative ID is led by technology, which is embodied by technique, then it is simply paying lip-service to alternative foundations and ideas like authentic learning, situated learning, cognitive apprenticeship, generative learning, and learning in context. Some like Petraglia (1998) have already highlighted the falsehood of authenticity in technology-led and preauthenticated learning resources, but it is only Ellul who places this argument in entirely humanistic terms. For Ellul, taking the child or the learner beyond the classroom into the "real" world is an authentic experience only if that travel is accompanied by an examination of that real world in terms of what it does to the human through a sentiment of ethics. This outlook is similar to the
"practical human interest" of Habermas that Grundy explicates, and the goal of interpretivist foundations: that of understanding the world. And of course, work in this direction runs parallel to what the Greeks engaged in when they discovered the limiting and objectifying effects of technique in their educational realm.

For the rest of the paper, I will engage in such an examination of the educational life today that will be the basis for my recommendations for an alternative design of instruction based on constructivist and critical epistemologies. My criticism about technology is not on technology or computers per se, but on a technology-led curriculum and pedagogy. In my recommendations, the design of instruction is led by foundations, theories, concepts and strategies, and tools, in that order. And technology or computers, or the convergence of these technologies, no matter how powerful, need to be employed with imagination and an ethic of caring for the intrinsic need of the learner. If not, the technique (not the technology) that embodies machines will effortlessly take over the foundations of education, as it has now.

A Learner-Centered Analysis of Schooling

At the risk of overstatement, although very very slight, I assert that almost the entire notion of schooling and education today rests on one materialistic and capitalistic cornerstone: Jobs and money. Indeed, education is about preparing children for the one-sided real world of jobs. And both the traditional and alternative foundations are privy to this goal. A child- or learner-centered analysis of curriculum and schooling that examines how the adult world influences schools and the children it aims to educate is necessary to prove this point.

What underscores the importance of debating ID is an examination of schooling in the societal context today. Education has, and always will be, a part of the larger society and therefore, will be subjected to the needs and demands of the larger "whole" of which it is only an "innocent" and "immature part." An examination of this aspect of schooling reveals the dictates of a technical society that has at its heart, conformity and the making of the child in its own image. One of the realities of society today is money, which is one of the most vivid, most intense experience in human life. It affects every aspect of the life force and is the most common thread in our lives today, and is evident in the fabric of schooling today at the very
heart of our intentions for job training. Although education has wrestled with goals of
democratic equality and social efficiency (Labaree, 1997, p. 40), the social mobility goal is
now the lead player with money as its energizer. This fact poses an especially grave situation
for the children in institutionalized and compulsory schooling because the purposes and
interests of society and schooling are inherently linked (Postman, 1996). There is no escape
from the fashioning of the child in the image of the consumer economy (Barber, 1996; Ritzer,
1993; 1998).

Foundations of Traditional ID in Sync with Society Today

In reflecting on constructivism and instructional design, Wilson (1993) states that the
problem with ID (traditional) is that it is out of sync with the times. I disagree. Considering
the above indications of schooling and the following mechanized condition of society (which
feeds schooling), behaviorist ID is perfectly in sync with the times. The design of instruction
from an alternative foundation is a little less angst-filled when we accept that we do live in a
technique-dominated world where step-by-step recipes and learning objectives and outcomes
would be compatible and in-sync. Deconstruct any argument, any debate, any discourse in
education today, and the principles behind them are competition, job training, stratification,
achievement, and equity based on “correctness,” not “good.” The insidious part of traditional
ID -- technique -- is indeed the pervasive thread in society today. At home through the
television, and at school through uncritical planning and policies, children are bombarded with
messages of the market. TV networks, publishing houses, profit-oriented companies
promoting everything from seemingly free meals to protecting the environment, fund-raising
drives to buy computers or build an outdoor classroom, and promotions from local businesses
all find their way into the home and heart of the child. The message is clear: Money is power.
This focus has placed a system in place that is very little about educating the child.

Schools engage their young learners in this capitalistic, technique-ridden, consume-
conscious reality every time they reach for “authentic” experiences beyond the classroom.
Fund-raising for sick children is conducted through McDonalds and the competitive collection
of pop can lids, saving the environment through buying T-shirts and toys that degrade the
environment, dental education by local dentists topped off with rewards of candy, high scores
on the reading program with bonus points used for shopping, and behavior incentives culminating in video rentals. The paradoxes weight education down to a surrender to market values and human technique. An examination of what is being taught in schools, who is being taught, how it is taught, when and where children are taught reinforces this engagement of the child in a prescriptive, mechanistic reality that has already enslaved the adult. It is the training of the child to conform to this society that Ellul finds problematic and against the goals of progressive education.

**Schooling: Who is Being Taught?**

Schools are for everyone, in theory. Although Horace Mann would have wanted schools to be the breeding ground for equality, shared membership, and fairness in a balanced common culture, schools today are about hierarchy. The political structure of schools and school boards ensure the division of class, intelligence, status, race, gender, and ability all within the four walls of one classroom. Tax bases determine who gets the academically enriched, nourished, or malnourished educational experience. In fact, the marketability of a school system even influences the real estate economy of the community (Labaree, 1997, p. 52). Despite the fact that the layers keep shifting and all hierarchies receive more education than they did before, what is passed off as education deserves a closer look. Both boys and girls are taught, all races and classes are being taught, but they all learn different things about themselves. What they are taught defines who they become.

**Schooling: What is Being Taught?**

What is valued in the school curriculum is “men’s knowledge posing as knowledge for all” and this is evident in the core of all the school subjects (Martel & Peterat, 1994, p. 153). Although a few visionaries struggled against the “seductiveness of leisure and money promised by the industrial ideal” (McCormack, 1994, p. 193) society has overwhelmingly succumbed to the profit motive. It is this knowledge that becomes legitimate and filters through the curriculum, since this is the knowledge of “those who control the means of production” in a capitalist society (Block, 1994, p. 70). Through all the specifics of the curriculum like math, science, social studies, and language arts, there flows a sure and
insidious thread that says to the child "If you want the good life, go for the money." And the jobs -- and money -- are to be found in science and engineering, in the ideal of objective knowledge that is "abstract, value-free, and factual." Knowledge is sometimes possessed by the teacher, often given "through" the teacher in the form of teacher-proof curriculum, but is always representative of, and promoting patriarchy. Children also learn, through all the hierarchies, enrichment programs, strategies to stratify, ubiquitous grading, and other sticks and carrots of schooling, that capability, talent, and even destiny is distributed over a bell curve. The hallmarks of human excellence like compassion, insight, wisdom, questioning, justice, resourcefulness, and originality are all successfully squashed in the mad rush for the spoils -- money and power. This is the hegemonic hand of technique that controls schooling to ensure reproduction.

This is accomplished through all of the dimensions of schooling, especially through the curriculum. The most insidious aspect of this curriculum, no matter the subject, is that children are conditioned into the same behavior that has become the most significant hurdle in resolving some of the pressing problems of the planet. Take environmental problems, for instance. Or water and air pollution, or threats to human life, or threats to the world’s limited resources through incessant and excessive consumption. The prospect of behavioral change is what paralyzes us intellectually. Everyone knows that our fast cars, faster highways, fast-paced and stressful lifestyles, and values on immediate gratification are behind a majority of the problems today. Yet, we cannot bring ourselves to change our lifestyles, to support public transportation, to limit spending, to check our greed, to swallow our wasteful desires. Even as we are stuck in this behavioral gridlock, we are eagerly initiating the next generation into the same kind of uncritical, unquestioning, and unchecked behavioral patterns.

What is taught in schools also makes sure that it leaves in place a line of thought that would serve these behavioral patterns. Children are taught to weigh intellectual work in terms of economic benefit (Labaree, 1997, p. 67), to mistake networks for communities, to learn disembodied male knowledge (Martel & Peterat, 1994, p. 154), to respect girls only through shifting them to the core of male knowledge and ability (through excellence in math, science, and athletics) or of male desire (through their bodies), to view conflict as negative and antithetical to the human order (Apple, 1975, p. 99), and to learn a vision of history that is
This curriculum encourages and nurtures thinking only at the skill level and rarely at the conceptual level.

**Schooling: How is it Taught?**

Children learn through control, manipulation (McCormack, 1994, p. 195), a method of banking education (Freire, 1970), through being still, through behaving as machines, through a definition of themselves that is more denying than affirming (Reynolds & Block, 1994, p. 211), through mixed messages about everything from their bodies to multiculturalism, and through an indoctrinating discourse that is desperate but adamant that there is one way to live life fully, and that is through limited intellectual but unlimited material acquisition. Schooling starts with a bell, a bell not unlike the beastly beckonings for a Pavlovian animal. The bell sets the stage for when children can do what, when they can learn spelling, math, or science. It rings into their exploring and questioning thoughts, and commands them to stop working and thinking about one thing and move to another. It shoos them off outside from their confinement so the adults around them can get a break, even though they have been admonished to be still and soundless. Bells and adults give them permission to exercise bodily function, invade their privacy, subject them to an undignified surveillance, and in short, lead them into very conditional, dependent and addictive behavior. Schools also teach by alienating the child from the family and the community, two of the most nourishing entities of the heart. In school, everything is broken down, and children deal only with a part at a time. Nothing is ever worth pursuing to completion, because the bell says, Stop! There can be no holistic problem-solving or self-awareness in compartmentalized thinking and analyzing.

In the end, sadly enough, children learn by “making do” (Reynolds & Block, 1994, p. 217) and get started on the path of least resistance. This is similar to what Ellul calls “adaptation.” In a system where transmission and not transformation is of prime importance, and where learning is a process of consumption, it is impossible for children or adults to explore critical thinking and become aware of the prisons of their own socialization. Here rests the power of hegemony.
Schooling: When and Where?

On the outside, these may appear to be logistical questions, but their examination presents possibilities about some of the most political structures of schooling today. The structures and routines of schooling invariably lead to what Marx identifies as "alienation" (Block, 1994, p. 70). Children are separated from their own activities, their own products, their own thinking and playing, and stuck within the four walls of the classroom in order to ensure reproduction. Everything children do in schools as far as the 'when' and 'where' is connected to convenience for the adults around them. The architecture of schools is stark and shows no warmth or respect for children and portrays a reflection of the modern factory of minds. Here in this multitude, children are taught to conform and obey, since schools with their burden of reproduction cannot have a conscience. Here, away from the natural unfolding of the seasons, away from a confrontation with reality through real charity, real adventures, and real mentors, children eke out the irrelevant life so they leave school with a tool kit of economic survival.

If children are subjected to human technique, it is only because the adults in society around them are in the same fix. From the ways in which we come into this world to the manner in which we leave, through our prescribed ways of gaining an education, raising our young ones, celebrating holidays and special events, getting around in the world, taking vacations, or even keeping ourselves clean and healthy, we seem to be following a very organized set of do’s and don’t’s, a veritable algorithm for every aspect of life as prescribed by experts, specialists, media pundits, advertising consultants, and PR flacks. And there is virtually very little that we can do in life today that is not accompanied by the “merry jingle of the cash register.” What really is behind this mechanistic lifestyle is not ISD much as our lives are designed and planned, but the very fiber of ISD: technique. This is in line with Ellul’s explanation of the technical takeover, which is based “fundamentally on the fact that the material (that is, technical) substratum of human existence, which was traditionally not allowed to be a legitimate end of human action, has become so “enormous,” so “immense,” that men are no longer able to cope with it as means, so that it has become an end in itself, to which men must adapt themselves” (p.xvi).
The Risks of Technology-Led Alternative ID

This condition of society would be inconsequential to our discussion but for the unquestioned, unmediated, and unmoderated thrust of technology in education today from a society that is deeply dependent on technology. Although this new technology -- computers -- is an “old educational enchantment” and although educators have enthused about the revolutionary potential of every new technology in “fixing” education ever since the introduction of school texts in the 1820s (Cohen, 1987), this new technological infiltration in schools has many implications for instructional design. First, it is not just the benign technology that is entering the lives of young learners. This entrance is backed by a multi-million dollar effort from both the government and the private sector, which brings political and economic implications in its wake, and it brings with it a very strong technological worldview and technological ideology that many find detrimental to true education (Roszak, 1986; Talbott, 1995; Bowers, 1988; Monke, 1999).

As I mentioned in the beginning of the paper, there is a growing, almost feverish, demand for prepackaged educational resources, designed courseware, and even entirely packaged and “canned” graduate programs than can be delivered electronically. These products have made the process of instructional design a necessity. What makes this possible is the presence of computers in education. And when technique-oriented computers look around for a partner to design instruction, for all the reasons highlighted by Byrum, Habermas, and Ellul, the natural partnership is with the technique-oriented traditional ISD, not the meaning- and quality-oriented alternative form of instructional design. In fact, some of the key concepts surrounding the issue of computers in the classroom show a vigorous and tangible connect to technique. Technology “integration” is one such concept. Regardless of the conditions and sentient nature of the teacher and learner, advocates of technology in the classroom call for a “seamless integration of computers” with the curriculum and with the learning and instructional processes in the classroom. In fact, a mounting concern in this field is the lack of use by teachers even when computers have been placed right in the classroom, and when teachers have been trained to use them (OTA, 1995). This dilemma deserves
examination at this, its stage of infancy.

Ellul cautions that since the machine is at the origin and even the center of the technical problem, it is convenient and natural to assume that one is dealing with the whole problem when one is dealing with the machine, in this case the computer. "Technique has now become almost completely independent of the machine, which has lagged far behind its offspring.... The balance seems rather to have shifted to the other side. It is the machine which is now entirely dependent upon technique, and the machine represents only a small part of technique" (p. 4). It is now our mechanistic and technique-oriented thinking that is the problem, not just the computer itself.

Ellul also argues that the machine by itself, is not capable of much. It is technique that integrates the machine with the human, and with society, and provides a deceptive semblance of harmony and peace:

But let the machine have its head, and it topples everything that cannot support its enormous weight. Thus everything had to be reconsidered in terms of the machine. And that is precisely the role technique plays. In all fields it made an inventory of what it could use, of everything that could be brought into line with the machine. . . . Technique integrates the machine into society. It constructs the kinds of world the machine needs and introduces order where the incoherent banging of machinery heaped up ruins. It clarifies, arranges, and rationalizes; it does in the domain of the abstract what the machine did in the domain of labor. It is efficient and brings efficiency to everything. . . . Man is not adapted to a world of steel; technique adapts him to it. It changes the arrangement of this blind world so that man can be a part of it without colliding with its rough edges, without the anguish of being delivered up to the inhuman. Technique thus provides a model; it specifies attitudes that are valid once and for all. The anxiety aroused in man by the turbulence of the machine is soothed by the consoling hum of a unified society. (pp. 5-6)

It is no surprise then that we have to rely on technique (ISD) to integrate the machine (computer) and the human (teachers and children). Also, technique in the form of ID can complete successfully in the classroom what has been set in motion outside the classroom through television and video games: integrate the child and the machine (computer). Although this has already approached perfection for some children (Kent & McNerney, 1999), the majority of children the United States still walk in through school doors loaded with backpacks and lunch sacks, and learn in classrooms that have changed but little, under the guidance of a female teacher. I am in no way arguing for status quo, only for change and direction following a deep examination of a child’s life, the status of society around the child,
the conditioning of the adults who are responsible for the child, and the needs of the child in this context. Such an examination includes the role of ID in the classroom.

**My Recommendations**

My recommendations for alternative ID are in line more with pedagogy than technology. When I consider the social and educational milieu of the young learner today, I am inclined to argue that what learners need is not more of technique but more of the human touch — through teaching, caring, responding, and supporting. Here I am in agreement with the pedagogical philosophies of Noddings, Thayer-Bacon, Palmer, and Grossman. Also, as Roszak (1994, p. 88) and Postman (1993; 1996) state, the human mind thinks with ideas, not information, and the task of education is to teach young minds how to deal with ideas, how to evaluate them, extend them, and adapt them to new uses. An excessive use and convergence of technologies on the child simply overwhelms the maturing mind because of their ability to distract and disconnect. This is something to remember in education today. Ideas are generated by other ideas and may create information, but information does not create ideas: “A culture survives by the power, plasticity, and fertility of its ideas.”

And there is a deep need for human-centered ideas today that are out of the stranglehold of technique. But where are these purely human ideas to be found in education? Ellul lays a path of self-realization for us to confront the conditioning that we are in and that we are not free (1990). Yet, he provides us the best direction with

...not by one’s high position or by power, but always after the model of development from a source and by the sole aptitude for astonishment, we profit from the existence of little cracks of freedom and install in them a trembling freedom which is not attributed to or mediated by machines or politics, but which is truly effective, so that we may truly invent the new thing for which humanity is waiting. (p. 412)

For the field of instructional design and educational technology, these “cracks” for ideas and action lie in the design of instruction based on the practical or the emancipatory interest that Habermas and Grundy have explained. For Ellul and many others like Noddings, Habermas, and Grundy, it is action within an ethical realm that can remove us from the dehumanizing and objectifying cycle of technique. It is this action alone that can “design”
meaningful educational experiences, which spark insights and illuminate what's "hidden in the recesses of the mind" through the maieutic of Socrates. Here, the teacher-designer is truly a midwife practicing in the messy world of experience, in the dialectic between the birth and death of ideas, between the individual and the pantocratic, and the ideal and the practical.

In my recent research and ID experience, I did struggle with the truth that ID is largely technique and with the overwhelming task of designing a course and experiences for preservice teachers that would convey the dialectic in the teaching foundations and the technology of instruction so that they could examine their own instruction in the light of the condition of schooling and its inherent paradoxes. I used a constructivist ID model (Willis, 1995) within Eisner's (1991) qualitative framework, educational connoisseurship and criticism. When it came time to design the instruction and define the curriculum, we took the route of the 'soft pedagogical tools' instead of the 'hard pedagogical tools,' (which the design model makes room for) and I am convinced that this move helped us design more meaningful experiences for preservice teachers as the feedback from the course participants shows us. Worldviews and our teaching based on worldviews were at the core of this course, and we borrowed what Postman (1995, p. 175) calls the most potent elements with which human language constructs a worldview for use as our soft pedagogical tools: definition, questioning, and metaphor.

Meaning making through experience lies at the heart of constructing our worldview, and Postman berates educators for failing to dissect the definitions of words, to examine the "principal intellectual instrument" of questions, and to demonstrate the richness of metaphors (p. 173). If there was anything that helped us stray outside the realm of technique in designing that course, if was the use of the soft pedagogical tools that the design model lead us to. The second factor was the role that I played as both teacher and designer. This teacher-designer hat helped me include those "spaces" for learners that Streibel (1993) explains. If knowledge is ill-structured, as alternative foundations show us, then soft pedagogical tools help us keep the design and instruction ill-structured too.
Conclusions

"Technique transforms everything it touches into a machine." Ellul's prophetic words evoke the image of the kind but rather shortsighted King Midas who consistently showed poor judgment much to the wrath of the Greek Gods, Dionysus and Apollo. His shortsightedness and greed not only turned his daughter into gold, but culminated in his shameful abdication to hide deep in the woods where no one could see the donkey's ears that Apollo doomed him with, in his anger. This Midas-like value and belief that technology and technique will keep the economy afloat and net the gold is widespread in society today. With this focus flowing into education today through the wiring of schools and mechanization of education, we could very well turn one of our age-old treasures -- our children -- into bright and vapid gold. I, therefore conclude that a deep and critical examination of this connection between technique and ID is long overdue, and might direct ID toward a practice that can include quality, meaning, and education of the child within an ethical and moral framework.

What is inherent in the writings of Ellul, Habermas, and Byrum is the insidiousness of the technical approach to education. All three would agree that such an approach limits education, even renders it chillingly one-sided. Worse, the technical approach skillfully exorcises discussions of what is "good" and "qualitative" in education, and instead focuses merely on what is correct. This is very obvious in issues of policy, school restructuring and reform, which are dictated by test scores, standardized curriculum, and quantitative proof.

More than two thousand years back, when the Greeks shifted from an oral to written culture, their Malthusian attitude and preoccupation with balance, harmony, and wisdom led them to question how they could "find a bridge between know-how and know-why." Even though they did not succeed, this attitude represented what we now venerate about them -- the apex of civilization and intelligence. As we shift from one century to the next and from the written to digital or electronic communication, how deep and "good" are our questions about education going to be?
References


FROM SOCIAL EDUCATION TO PERSONAL KNOWLEDGE: COMPLETING THE VYGOTSKIAN KNOWLEDGE CYCLE THROUGH SOFT PEDAGOGICAL TOOLS

A paper to be submitted to the Journal of Technology and Teacher Education

Muktha B. Jost

Introduction

Background and Rationale for Study

Could educational computing possibly be a discipline? Although there were a few doubts a decade ago, there is no doubt now in anyone's mind today that indeed it is. Not only has it been accepted as a discipline, it has shown such an astounding growth (through students enrolling in courses and educational computing minors, and the corresponding growth in assistant professor positions for instructional technology or educational technology) that it is impossible to contest its status in the field of education without sounding a little obtuse. In fact, it has become so important that the federal government, among other things, is pumping millions in subsidies and grants into wiring schools and purchasing hardware and software. Private telecommunication companies have created positions for "educational consultants" and "learning analysts" and beefed-up their end-user education departments to tap this new and lucrative market. EPSS (Electronic Performance Support Systems) is one of the latest buzzwords in the corporate world, which is gleefully engaging in the "knowledge management" industry for the education of America's youngest learners. In response to this mushrooming demand for technology-mediated education, the Chronicle of Higher Education recently introduced a new section for jobs in distance education.

Just ten years back, in the 1990 issue of "Computers in the Schools," which was also the issue that published selected papers from the first conference focused on the topic of technology and teacher education, Johnson and Maddux titled their (and the first) article, "The Birth and Nurturing of a New Discipline." Conference organizers received an overwhelming
100 proposals when they anticipated fifteen. The call for papers for the 1999 conference received more than 1000 proposals. In the article on the birth and nurturing of a new discipline, Johnson and Maddux (1991) rate the discipline as “strong” in four of the five elements commonly associated with a discipline of study, including “a group of people with common interests and concerns; a body of knowledge built on a variety of theoretical underpinnings; an objective effort to expand the body of knowledge; the gathering of disciples which means to teach, to train, or to bring up” (p. 6). They rate the discipline as weak in the last element or “a set of coherent theories and philosophies.” Johnson and Maddux also point out the pitfalls in the field and caution those in the discipline against over-optimism, falling prey to the Everest Syndrome or the belief that “computerizing an activity automatically improves it,” and suggest research and practice led by true educational principles.

In the same issue, Michael Apple (1991) warned about the dangers of surrendering to technology in the education field, of the relationship between the curriculum in schools and corporate needs, and of technological myths and economic realities. Through issues of equity and social literacy, he highlights the ethical dilemma for educators inherent in the educational computing issue because of the huge omissions in the discourse on educational computing about the origins of computer development and about the negative consequences of technology in society. In closing, he lists a series of meaningful questions to explore in the field, and implores them to be included in teacher education programs. His argument that it is all too easy for critical issues highlighted by the negative side of technology to be swept aside considering the immense amount of work that school personnel are responsible for places a heavy burden on preservice teacher education programs for a balanced technology education.

A close look at research, teaching, and professional practice in the field of educational technology shows very little movement toward a holistic perspective as recommended by Maddux and Apple. An examination of educational technology courses in the last ten years suggests that those meaningful questions so essential for an ethical direction in education have indeed been swept under the carpet. In the absence of a philosophical and conceptual basis to technological education in preservice teacher education, the “gee-whiz” consensus is more strident than ever. Although disturbing, this trend is understandable in light of what we know now about technological determinism, non-neutrality of technology and technoutopianism.
A new and encouraging trend is the pedagogic liaison between technology and the social constructivist perspective. Since the 60s the computer was used in behavioristic ways via drill-and-practice software, programmed instruction, and tutorials, but failed to show much promise in educational reform. Constructivist uses of the computer is now the area with the most potential, and this research examines the relationship between social constructivism as a guiding philosophy for the design and dissemination of a course in educational computing. This paper is based on the research, but focuses on one aspect of it, the use of soft pedagogical tools to initiate and complete the Vygotskian knowledge cycle. I explain the difference between hard and soft pedagogical tools later in the paper.

After establishing the need for holistic technology education through a brief examination of educational computing courses, I explain the qualitative research framework, the constructivist instructional design model that guided the processes of the research, and the brand of social constructivism that we chose for the research. This is followed by the design and develop part of the research that focused on choosing an emphasis. I explain why and how we chose the philosophy to lead the design of classroom experiences instead of the technology. I also elaborate on the idea of the “soft pedagogical tools” that guided the course design at the level of foundations. The rest of the paper provides contextualized information to support my belief that the soft pedagogical tools helped initiate and complete a Vygotskian knowledge cycle through observations, reflections, and writings of both instructors and students in the course. Also, this provides a hermeneutic perspective since this “soft” data comes out of our use of instructional materials in the context for which they were designed.

**Personal Notes**

I wouldn’t be exaggerating to say that of late, in education, many are dropping the myths about objectivity and the ability to eliminate the subjective, including the effect of personal characteristics of the researcher on the research. It only seems natural that who we are, and the cultural and social experiences we have had would influence the very questions we have about this world, and therefore, our research is wonderfully colored even before we take the first step. I claim no exception to this natural human order. The only claims I would
make are to fairness and ethics. In light of this acceptance of subjectivity, I think it is only appropriate for me to share a few personal perspectives.

I grew up in a city of five million people in India. I spent a good part of every summer in my mother’s ancestral home in a historical town called Tanjore in southern India. As far as technology, it felt like I was going back to the previous century every summer when we left the city. And then, when I moved here to the U.S. when I was 24, I felt like I had been transported in time to the next century. Suffice it to say then that I feel somewhat like an anomaly—with privileged peeks into different ways of living and learning. Although the challenges of adjusting to these travels in time have made excruciating demands on my composure, patience, and humor, I must have built a bank of experiences and observations about the tools we use as humans and the ways in which they influence our life, learning, and teaching. I am convinced these insights have influenced my attitudes toward technology.

I am many things in the sociological sense of the word, like female, East Indian immigrant, mother, student, and all the other descriptions that could be used to shine a light on where I stand, but for the sake of this research, there is one that is most important: a believer in the kingdom of childhood. I am deeply concerned that children all over the world are forced to give up their childhood because of the lack of foresight of the adults who care for them. I am convinced that childhood experiences are important for the makings of a healthy adult. I am assured that it is the richness of those experiences that can sow seeds in the soul of a child that shapes the peace in the heart of an adult. Over the years, I have seen the convergence of technologies like television, computers, video games, and Nintendos not only erode childhood, but play a major role in what the child believes as “real”. Through this constant and vapid stimulation from the outside, the child is unable to accept those “seeds” of love, peace and meaning. Instead, like a tiny plant scorched by the 24-hour glare of the sun, the child withers in overexposure. What could have been good in small doses becomes toxic and impedes growth and the essence of childhood.

I am also a believer in the idea that for everything we get or take from the world, we give up something else. What we choose to take or give up is not a matter of win or lose, but one of priorities. And for a society, any society, its children should be a priority. A child needs freedom to explore, to find out, to learn, and to understand not just about the world
around her, but her place in the world. Children deserve to have their mind, heart, and soul awakened to the true nature of their being instead of this constant beating down from the adult world around them. It is a nightmare for people like me to hear about the utopic hype of individualized electronic schools like Horizon Instructional Systems that are based on Perelman’s vision (Kent & McNergney, 1999).

All this does not mean that I am technophobic, Luddite, or technostupid. I find many uses for my computer in both my professional and personal life. Yet, I want to be aware that children are not little adults, and that they have the right to be exposed to as many situations as possible so they can become people of their own choosing, as I have. I see its power in shaping us, our experiences, and our sense of reality, and it seems wrong to me to immerse our children in totally technological experiences, no matter how educational they are. As adults who are a significant part of a child’s life, I am also interested in the life of teachers. I am intrigued by the fact that children spend more of their waking time with their teachers and peers than their siblings and parents. I am aware and saddened by the low status of teachers, who are predominantly female, and convinced that that has something to do with it. I hope for an education for them that can give them the true power to understand the role they play in a child’s life and the place of technology in that world. I want to be cautious about how much computers are used in the classroom because I do believe that an unexamined technology-rich environment in schools does deskill and disempower teachers, one of the few human connections that children have today.

Overview of Educational Computing Courses

The average educational computing course taught in teacher education institutions today is more technical than pedagogical or philosophical. Most courses rely for content on “how-to” information and some actually rely completely on the teaching of one piece of software and the completion of projects based on that software (Todd, 1994). Some learning strategies and structures like cooperative learning (Cook and Cimikowski, 1995; Cashman & McCraw, 1994)) and problem solving are often an aspect of the course, but the emphasis is still mainly on teaching the technical aspects (Collier and McDevitt, 1995) of instructional
technology, or what would constitute computer literacy.

It is obvious that a variety of formats exist for the educational computing course. Project-based courses (Persichette, 1997), courses with emphasis on secondary (Brownell and Brownell, 1994) or social studies education (Flake and Molina, 1995), courses with theoretical approaches (Keizer and Wright, 1997) are all common. A major question that research in this field seems to focus on is how to improve the attitudes of preservice teachers toward computers. This is obvious from the numerous articles in the literature that report findings from studies conducted in educational computing courses on attitudes and attitude change (Wright and Zhang, 1995). Another popular focus is computer anxiety and how instruction can help preservice teachers overcome the anxiety and integrate technology in their teaching.

Although the educational technology course is still the uncontested medium to impart technology skills to preservice teachers, that area is saturated with questions about what to teach, when to teach, how to teach, how much to teach, how much theory, how much hands-on, how to design collaboration in the classroom, how to integrate technology into the projects, and so on. Some of the basic questions of what to teach seem to be led by the prevailing popular software in schools. Although colleges of education still seem to structure the course around the lecture and lab format, many are departing from that traditional model to hands-on training but with a solid conceptual base that is drawn out of group discussions and field training rather than lectures.

More than two million teachers will be recruited and hired by American schools in the next ten years. American schooling is also going through one of its most intensive reform movements. Included in that movement are the prime issues of school restructuring and technology. It is obvious that preservice teachers will play a major role in the future of educational computing since more than half the teachers who will be teaching ten years from now will be hired during the next decade (Darling-Hammond, 1996). Therefore, it is more important than ever for teachers to understand not just the technical, but also the social, economic, and political perspectives of computers in the classroom.

The shift in teaching from behavioristic to constructivistic styles also makes it imperative for teachers to have a good pedagogical knowledge of learning theories in order to
effectively incorporate technology in their classrooms. Also, it would be ideal to have this instruction precede their training in technology. Preservice teachers typically receive technology training now through one or two courses during their freshman and sophomore year, at least a year before their exposure to learning theories in methods classes.

The major hurdle to preservice teachers’ gaining a deep understanding of the different theory-based applications of technology integration seems to be time. Most educational institutions are forced to pack an educational computing course in one semester during the preservice teacher’s sophomore year when there has been no exposure to methods classes and learning theories. In addition, the course includes mastering a set of applications software through completing a range of projects. This situation leaves preservice teachers with ample hands-on computer knowledge and skills but no conceptual understanding of how to actually use the computer in the classroom with their students.

It is clear from a review of the literature and teacher education programs that educational computing is simply unidimensional. It isolates or abstracts one element of computing -- usually the technical component -- and presents it as the whole knowledge or the ecology of the computing context. The focus on information that the computer can offer is similar to what Bowers (1988) terms learning “how to use data as the basis of thinking.” This situation is particularly disturbing in the field of education. Although graduate education can boast of a variety of models in educational computing programs, undergraduate programs, especially the lone educational technology course that most preservice teachers enroll in, are very limited and often follow the computer science (with its emphasis in programming) model or the AV model with its emphasis on the machine itself. Willis (1991) lists seven models of educational computing programs: The computer science model, educational psychology model, programmed instruction, instructional design model, information center model, AV model, and the educational technology model. The model of educational technology, he states, needs to include 1) theories and models of instructional design, 2) principles of curriculum development 3) methods of technology diffusion, organizational change, and consultation, 4) research and professional knowledge base in educational technology and educational computing, 5) hardware-specific and software-specific user skills, 6) professional teaching and training skills, 7) social implications of technology, and 8) opportunities for internship
and practicum experiences.

The Research Framework

A review of the literature clearly points to constructivist pedagogy as an increasingly popular philosophical partner to the use of technology in the classroom. The use of concepts like situated and authentic learning, multiple perspectives and strategies like cooperative learning, project learning, and problem solving is proof of this trend. This research, therefore, undertook to examine the philosophical application of technology. If we were to choose social constructivism as the philosophy of learning, how would that influence instruction of ITTE? We used Elliott Eisner’s ideas of qualitative inquiry, educational connoisseurship and criticism (1991), to guide our inquiry on the compatibility of computers and social constructivism in the ecology of the classroom. Based on this inquiry, and led by a constructivist instructional design model, R2D2, (Willis, 1995) we designed and taught a course to preservice teachers in the Spring of 1999. This article is based on the experiences from designing and teaching that course.

The details of this research framework are included in the last part of this dissertation, which is an electronic resource that presents all the details of the design phases including dissemination.

The area of research for this study, which takes a macro approach, is the intersect between technology and social constructivism. It aims to go past a theoretical examination to a practice model. How can we describe social constructivist uses of technology? How can we teach these uses from a pedagogical foundation to preservice teachers in an educational computing program? What insights have we gained from the experience of defining, designing, developing, and disseminating such a course? What implications do these experiences and insights have for technology and teacher education, and indirectly, to the education of children?

Until recently, research in education was conducted predominantly through “doing” social science -- identifying questions, isolating and controlling variables, choosing established methodology, and conducting the research for results that will be repeated given
the same conditions and circumstances. Many in the field of educational research now agree that humans and the process of teaching and learning are much more complex, interrelated, unpredictable, and inseparable than can be explored by the restricting demands of quantitative research that has control, isolation, objectivity, reliability, and validity at its core (Eisner, 1997). This research, with its aim to study technology and social constructivism in the context of teacher education and schooling from theory to practice, does not adopt the social science approach. It is more artistic, interpretive, collaborative, and holistic than scientific.

**Vygotsky’s Philosophy of Social Constructivism, and Technology**

Theories of learning are becoming increasingly important in education, especially with the large-scale introduction of computers in the classroom. Many teachers who were trained to use computers let them sit idly in the back of the classroom or have students use them for simple drill-and-practice or educational games (Durham, Morrison, & Ross, 1995). Several others have suggested that teacher education needs to focus not just on computer training but a link between computers and how children learn (Morrison, Lowther, & DeMeulle, 1999).

An emerging philosophical foundation, both in education in general and in educational computing in particular, is social constructivism. In fact, social constructivism can in some ways be considered the savior of educational computing. When tall claims about computers in education failed on the programmed instruction, drill-and-practice, and tutorial platforms, computers needed a respectful, more philosophically current partner, and social constructivism was the answer. Qualitative research, interpretivism, constructivism, and critical theory were all gaining a stronghold in education in the 90s, and it was prudent to find a philosophical partner in the educational field that did not embrace the “bottom line” quite as overtly as the corporate field.

Social constructivists place primary emphasis on the socialization of the child and the importance of the social environment. Culture and language are two determining tools in the acquisition of knowledge and progress of learning. Much hesitation from those in education to adopt computers in the learning and teaching scene was swiftly wiped out because of this very compatible and respectable alliance. In fact, the 90s is admittedly one of the most
unquestioning decade in the adoption of computers as a “cognitive” partner for children in American public schools. The professional field, on the other hand, has provided a rich theoretical and philosophical basis for the field of educational technology. Several products do exist that were designed and created on these foundations.

An examination of Vygotsky’s ideas in light of technology and teacher education is relevant for many reasons. He introduced ideas like scaffolding and zone of proximal development that are widely used in the development of software and other technical resources. He was led in his work by a deep interest in children, especially disadvantaged children and children with special needs. Since a majority of preservice teachers who are enrolled in educational computing courses are elementary education teachers, Vygotsky’s philosophy would be a very relevant. Another factor that is encouraging in today’s school context of standardized testing and job training is Vygotsky’s emphasis on thinking instead of intelligence. He regarded thinking as the origin of knowledge building and sought ways to stimulate and enrich the thinking of children. Creativity, history, philosophy, and humanism all played a major role in his comprehensive research that was multidisciplinary in approach, artistic in its understanding, caring in its insight, and philosophical in its acceptance of the enigma of human learning. If he has been called the Mozart of psychology, Vygotsky earned every bit of that high and lofty title.

At the same time that Vygotsky was elaborating on the aspects of social learning, he emphasized individual needs and differences, and personal creativity. This combination of social learning and individual exploration for knowledge building inspired the vision of Vygotsky’s circle of knowledge in this research. Although he pointed out the significant role of tools in learning, he paid equal importance to the powerful ways in which they could influence us. And had he conducted his research in the environment of techno-plenty that is characteristic for children today, I’m convinced that he would advocate a humanistic approach where the overall growth of the child was more important than training to make a living.

Vygotsky also believed in the importance of intellectual stimulation for children from adult and human sources like parents and teachers and insists that human interaction through teachers, peers, and other adults is very critical to stimulating the development and learning of the learner. Children do need to talk with and listen to others for a healthy intellectual
development (Sutherland, 1992). The ways these teachers provide this interaction is very important too. They learn best at the threshold of development, and a hint, a probing question, or a strategy will help the most here.

Vygotsky says that conversation plays a crucial role in learning. He is bound to, as this research has, point out differences between human teachers as conduits of culture, history, and language, and electronic teachers as pedagogical tools. The most obvious reason is one of cultural subversion by technological tools like television and computers. The core of communication technology is commerce, economics, and power. The essence of humans can, of course, be deceptive or mean or ugly, but it just doesn’t have the power to subvert culture in ways as those described by Postman (1992), or create new environments for the human as described by McLuhan (1964).

It is important to consider the difference between the tools that Vygotsky describes and the tools that are used today. Vygotsky clearly says that adults such as parents and teachers and peers are the conduits for the tools of the culture, including language. These tools include cultural history, social context, and language. It is important, as we accept electronic forms as tools for conduits of culture, to consider the language of technology and the potential for technology to transmit cultural history. Much has been written about the gendered language of technology and the male hegemonic practices that accompany its use. Also, the values that technology transmits need to be examined to see if it’s appropriate developmentally for young children. Only uses of technology that connect can be accepted. Other isolating uses are against the grain of social constructivism.

Part of the intent in a course we created was to explore this dialectic and present it to preservice teachers so they can understand the dynamic interplay among culture, language and the thought process, and recognize their significant role in shaping the place of the computer in the classroom.

**Philosophy or Technology: Which Comes First?**

It is my belief that philosophy ought to always come first; even in a technology course. More than ever, there is a need today to rescue philosophy from its image of antiquity and
deliver it to the younger of the youngest, for a technological world truly severs the threads of philosophy that used to connect generations. And philosophy is really not all that grandiose and impractical as the sound of "epistemology." It is related to the simple questions of life: Who are we as humans? What is this world around us? Why are we here? How did we get here? Ask young children these questions and they'll astound you with the kind of "little philosophers" they can be. Also, whether we ask them these questions or not, they are just as naturally construing their own "philosophy" or beliefs about the world around them.

The wish to be led by philosophy in the design of this course became an ardent endeavor once I explored the ideas of Vygotsky and the ideology of technology. Vygotsky's emphasis on the social environment and everything (animate and inanimate) in it as cultural conduits of knowledge, his focus on thinking instead of intelligence, his leaning toward community and humanistic inquiry instead of pragmatic problem-solving helped me see the limitations of technology in fulfilling the ideals of social constructivism.

It is true that social constructivism and technology, especially computers, have a lot in common, especially in the playing out of learning concepts like scaffolding and designing instruction for the zone of proximal development. The potential of technology to enhance, amplify, and express these concepts is being thoroughly explored by many in instructional technology in teacher education (Collins, Brown, & Newman, 1989; Jonassen, 1996). Yet, there is much that hasn't been connected between the philosophy and the tool, especially in light of the ideology of the technology and the focus on community of the philosophy, that deserves examination. This research is a small step in that direction.

If we are to accept the prevailing notion that computers are a compatible tool for instruction in a social constructivist environment, then we have to uncritically accept the myths about technology, and by technology, I mean the convergence of technology—all of the machines that we use in our lives. This is necessary because we have a mindset about technology that is historically utopian, which places blinders on us when it comes to understanding the runaway nature of technology, especially computers. Much like the fabled Gingerbread Man, technology has us running behind it, but the myths that we believe in, including our belief that we control the technology, that it is neutral and free of bias or value, that it simply enriches our life and provides meaning and human connections, and that
somehow, it has made life easier, all help us smother and extinguish any doubts we may have.

We understood at the design phase of the project that we had to take a dialectic approach to presenting the curriculum because of our unique and one-sided approach to technology. It wasn't adequate to present the tenets of social constructivism and then apply it to computer use, or study the computer and then discuss ways in which we needed to use it in line with the philosophy. A meaningful approach called for examining one in light of the other, or exploring one while keeping the other within the range of vision. We could investigate and sift through computer use but it had to be in the context of social constructivism, or we could let loose the tenets of the philosophy but it had to be in the environment of technology.

Mumford called the computer an adjunct to the brain (1964) but not a substitute for it, and this is the essence with which we approached computer use in the classroom.

Since the computer is limited to handling only so much experience as can be abstracted in symbolic or numeral form, it is incapable of dealing directly, as organisms must, with the steady influx of concrete, unprogrammable experience. With respect to such experience, the computer is necessarily always out of date. The computer's lack of other human dimensions is of course no handicap to it as a labor-saving device, whether in astronomy or bookkeeping: but such creativity as the computer may simulate is always in the first place a contribution of the minds that formulate the program. ... Those who are so fascinated by the computer's lifelike feats—it plays chess! it writes "poetry"!—that they would turn it into the voice of omniscience, betray how little understanding they have of either themselves, their mechanical-electronic agents, or the potentialities of life. (p. 180:6)

**Soft Pedagogical Tools**

Once we chose a broad curriculum for the course at the end of the define stage, we looked for ways to design instruction that would best convey the ideas in the curriculum. Hard tools may have covered fragments of the curriculum, but fell short of addressing the entire course or even sections of the course. Hence we borrowed from Postman's ideas for holistic instruction and used soft pedagogical tools to help design classroom experiences, assignments, and overall instruction. Postman (1995) claims that definition, questioning, and metaphors are three of the most potent elements with which human language constructs a worldview. We added reflection as a partner to questioning, and adopted definition, questioning and reflection, and metaphors as our soft pedagogical tools.
Soft pedagogical tools are more like guiding philosophies than prescriptive methods. They are tools in the sense that they can shape and guide instruction and the planning of instruction, but they are flexible and pliant in this "leading" of instruction because of their broad application. The essence of soft pedagogical tools may be more apparent when we distinguish them with the harder ones in instructional design, like authoring programs and multimedia software. Programs like Authorware require a sophisticated level of technical expertise first, followed by creativity, tangible resources, and the breakdown of the entire lesson or unit before they can be fed piece-by-piece into the machine. Soft tools are more in line with Socratic dialogue. The teacher still needs sophistication and savvy, but in the areas of cooperative learning, a wide knowledge of the field, human interaction, interdisciplinary connections, and student nurturance.

Definition

Definition as a tool for design of instruction and classroom discussion is an innovative use of an old pedagogical act. As Postman says, most of us think of a definition of something as "the" definition of that something. Instead, he encourages teachers to arrive at definitions through a deep discussion of the origin of the definition, the purpose for which it was invented, alternative definitions, and the applications of definitions. Through this process of dissection and analysis of words and ideas, learners and teachers alike are able to see the nuances of knowledge construction. In a relatively new field like educational computing, where new terminology is the order of the day, this was an interesting and effective tool in meaning making.

Throughout the course, we took this approach and engaged in a deliberate definition and examination of definitions of not just computing words, but related words like curriculum, instruction, intelligence, and ability. We created definitions and compared them with existing ones or discussed existing definitions to see if they matched our perceptions. Dissecting definitions in small groups yielded a variety and depth of meaning than individual exercises.
Questioning and Reflection

If everything we know has its "origin in questions" then questioning can become a powerful intellectual tool to examine the curriculum in a course. The readings for a class take on deeper meaning when accompanied by thought-provoking questions. When students write their own questions to the readings and share them with the class, others in the group can get a good sense of their mental set and prior knowledge. Such activities also stir the initiative of students, and questioning as a habit can become very valuable to future teachers. It can also demonstrate the idea of multiple perspectives. Questioning can become a primary tool that encourages students to interact with the meaning of the lesson, readings, viewpoints, and arguments.

Questions are often a very safe and direct tool to goad students to think, and the nature of questions is very important. Questions can be long and can start by telling a short story, or simply be an interjection during a group discussion. The proof of a good question is in the depth of reflection that is needed to come up with a response. The more varied the response, the better the question.

Metaphor

Contrary to the popular opinion that metaphors are simply a poetic ornament, we used metaphors to convey meaning, to ask for meaning, to provide context, and to influence the construction of concepts. Metaphors are handy in synthesis and in rendering simple something that is confusing or disconnected to learners. As a pedagogical tool, the use of metaphors to teach is very effective in what is called the zo-ped or the zone of proximal development. For instance, we once asked the students in class for a metaphor for diversity. I first shared one that I had in mind, a symphony (which I later changed), and then requested them to come up with their own. As we shared our rich metaphors in class the following week, we also shared our mental frames. Examining metaphors that are common among words in every discipline is another way to create meaning in class. Educational computing is an extremely rich field for metaphors.
Vygotskian Principles-in-Action

Four steps emerged as a concrete progression in our theory into practice experience with Vygotskian principles. They involve the teacher’s efforts to:

1) understand the mental set of learners (prior knowledge)
2) hone the tools for curriculum presentation
3) encourage a community of discursive inquiry, and
4) transform social to personal knowledge through reflection and writing.

In retrospect, what makes these steps exceptional is their potential to engage unique human processes like thinking and reflection, conversation, interaction, community building, enjoyment of human skills like writing and engaging in the art, and most of all, a deep, kind, and valid construal of reality based on questioning and understanding.

Understand the Mental Model of Learners

If teachers could know what a student brings to class in the form of perceptions, beliefs, biases, and interests, the art of teaching would be only half as challenging. Trying to understand the mental model of the student is an ongoing task throughout the course, but one that is most important the first weeks of class. Szabo (1998) states that education is about knowing and ways of knowing, and that the mammalian eye can receive information at the rate of 10 billion bits per second. Yet, we are selective in our perception; we cull and discard some, and we allow others to build principles or ideas that help us make sense of the world. These are mental models, which are fluid constructs that explain how things work or exist in the form they do. The important point is that Szabo argues that we create and build these mental models over long periods of time through activities such as “reading and through interacting with people and things and ideas and facts.”

But why explore and understand the individual mental models of learners when the classroom is really a group construction? This question presents another dialectic. It seems to me that for instruction to be effective and meaningful, teachers need to be engaged in a never-ending ring of experiences that go from personal or individual to social or group learning. One is indeed ineffective without the other. We can have no personal knowledge without
connecting and engaging with those around us; and there can be no meaningful collective that
doesn’t revolve around personal knowledge. Individualized instruction is just as important as
group or cooperative learning experiences, and all learners, including the teachers, ought to
engage in this see-saw for effective instruction. Thayer-Bacon (1996), provides the best
explanation that can reinforce the importance of both personal and social knowledge in the
classroom where knowledge could be “socially constructed by embedded, embodied people
who are in relation with each other.”

Given that we are social beings contingently placed in this world, affecting each other
from the beginning, it is easy to understand that we need each other in order to be
better thinkers. The idea that one person, all by himself, could claim to find Truths,
Facts, or know the Answers, begins to sound absurd. Nobody enters this world
without a history, already begun before the birth of that child. Nobody is able to
develop thoughts, or a language to express one’s thoughts, without having contact
with others. And nobody can come into contact with others without being affected by
them. How can we think we find solutions all by ourselves? Such an idea begins to
sound very arrogant to say the least. Solutions to problems, or truths are something
that emerge and evolve, just as we do, for we participate in their development. No one
of us can ever hope to find truth, because of the sure fallibility of individual human
knowledge, due to it’s contingency, but all of us together, as communities of
knowers, can work together, share with each other what each of us understands
individually, and collectively help to create theories of knowledge, for the next
generation of knowers to contribute to. With such a model, knowledge takes on a fluid
image, always being redescribed as it changes and develops; the qualities of the
theories are dependent on the ability of the people to relate to each other and share their
insights. (p. 26)

With that in mind, we engaged in group activities the first few weeks of class that
would establish rapport among all of us: the three instructors and the ten students and gave us
all an idea of our mental models. Here, the teacher is no exception too. I shared as freely about
my perceptions, biases, and experiences and I would have liked students to. So did the other
two instructors. Sharing the real mental models that we function from is a tremendous act of
risk-taking, and everyone in a group situation needs to be assured of a safe environment
before such exchanges and dialogue can take place. I elaborate on how we attempted to
establish just that environment in the section on encouraging a community of discursive
inquiry.

From questions about their pet peeves about education, the reasons for taking this
course, attitudes about weather, study habits, professional goals, when and how they decided
to become teachers, how many hours of class and work they were juggling simultaneously, to writing reflective journals on their first impressions of the content and philosophy of the course, questioning revealed to us rich information about their mental models. We began to get some useful idea, however hazy, of where they’ve been and where they’d like to go. The knowledge that a female student was somewhat apprehensive about computer use or that a male student had more technical knowledge about computers than any, or all, of the instructors put together helped us considerably in designing both group and individual instruction. Also, these attempts to ask and understand prevented us from imagining hurdles when there were none, or setting up roadblocks to learning through our ignorance of the learning “dams.’ For instance, even though a differently-structured or unstructured class is welcome to students, we were of the opinion that the philosophy itself may be too hard to understand for the students. But, as the following sample of their reflections show, they had a good grasp of the principles by the second week of class. For the first ungraded assignment, we invited participants to engage in cognitive play and mix fact and fiction through writing a journal based on a conversation with an imaginary friend about the course that they were enrolled in.

“Yeah, I am taking this Sec Ed 302 class this semester. I am not sure exactly what I think about it yet. It is different from any other class I have experienced at Iowa State. It is a really small class, so we have really good discussions. I really like that because it brings topics into perspective instead of seeming so broad. I have a chance to give my opinion and to listen to what my peers think on the same topic. I think this is allowing me to become a better learner because I am really developing my listening skills and I am also taking into consideration what other people think. I realize that a lot of people think and learn differently, but each person possesses great qualities to share with me. I especially feel this is good for me to experience as a future teacher. We are going to be trying different things and practicing different learning styles, so I will have a chance to understand other people. Next week, we are going into the computer room and I am a little worried. I really like the face-to-face interaction I have with my peers. I feel a lot closer to them. I don’t want computers to ruin that connection. So, I am still a little weary about the class because I don’t know what to expect. After a few more weeks, I should be able to tell you a little bit more. I am excited about the
class, excited to learn, and excited to work with the people in my class. I'll talk to you later!"

"To be honest, I was very skeptical about 302 when I registered for it. I am not the biggest computer fan and I really had problems with 201. I really don't know why I registered for the class. Maybe I wanted the challenge, maybe I just knew that I would have to eventually use computers so I had better learn them now, or maybe I just didn't want the 8 am classes that came with my other option (COM SCI). I am very impressed with the class so far. I really think that I will enjoy it. I feel that after just two weeks, I have really gotten to know the people in the class very well and I am sure that we will only become closer as the weeks go on. I can see that most of us are very willing to share what they have to say, and although we may not always agree, we always respect each other's opinions. I think one thing that I am noticing is that even those who may have a more introverted tendency are speaking up in class. This is very encouraging because all of us, as future teachers, will have to speak in front of a class daily. I am also noticing how open ended much of the discussion is. For example, with the food last week... Many of us had different views of how that tied into education, but yet all of our answers seemed to work and we could also build on each other's answers. I think that this will be a very positive aspect to the class. That is, the fact that all of us can answer with unique answers, yet build our ideas from what others say. I have always admired my education classes because of the openness and the size that allow for class discussion. This is definitely true in 302 and even more so, because we are so small and intimate. I think that I now have a much more positive outlook on this class than I did two weeks ago."

"I am pretending to tell my sister about Sec Ed 302. Here goes: Hi Veronica! This semester I am attending a class called Secondary Education 302. It is a course that focuses on how technology can be used in classrooms. So far it has been very interesting. It is a very constructivist classroom. This means that the students talk as often, if not more than the professor. All 10 of the students in the class are allowed to make a point whenever they feel, and are not intimidated by the others. This class is so much different from the usual lecture. I don't enjoy sitting in a lecture hall with 300 other students simply taking notes, feeling like you would be holding the class back by asking questions. I love the way the students learn from each other's experiences. I feel that this course will help me understand computers a little
more. Also, I will hopefully learn how to integrate computers into the classroom in a way that will encourage learning. It is going to be an interesting class because there are no exams or quizzes, which I really like because I don't do so well when that is the only thing I am graded on, a.k.a. the lectures where you only have four exams. This course may be sort of difficult for one reason only, the fact that I only have it one day a week. I am worried that it will be too easy to forget about assignments without a reminder. Although for the last assignment, I received an email to remind me, which I was quite glad for. Anyway, that is all I can really think of to tell you of my new class. See you later.

Phone conversation:

Jo: Hi Mom. You aren't going to believe this class I'm taking this semester!

Mom: Hi, honey. Why?

J: It's being taught by several grad students. It's about learning how to use technology to teach in ways we've never used it before.

M: Sounds interesting...tell me more.

J: Well, the other night Muktha, she's the head teacher, had pre-made sandwich plates for some of us and the rest of us had to get our own food. She related this to curriculum. I really liked it. Of course, any time you use food, it's going to get people's attention.

M: What are you going to do for the rest of the semester?

J: Well it sounds kind of vague and unstructured. I think some people go into teaching because they ARE so structured. I could tell that some of us were confused and a little frustrated about the vagueness of what exactly we are doing and why.

Just a second Mom, I have another call...

J: Mom, are you still there?

M: Yes.

J: Sorry, that was Jill. Anyway, about SECED 302. From what I understand, we are going to talk to teachers in our expected areas and find out what works, what doesn't, what I could develop or modify with technology to make it better...but, I'm not sure.

M: That sounds like something that we had a meeting on the other day.

J: I think that this is going to be a loosely structured class with everyone kind of having a different lane we're in on the same interstate highway. Does that make sense? We are
each going to work on something that is relevant to our particular area, but are all using technology to improve teaching.

M: Well, it sounds like you are going to have a chance to use all of that creativity. Good luck!

J: Thanks, Mom, bye!

"Andy, you have to hear about this class I am taking on Wednesday nights. SecEd 302 is about combining technology and the classroom. Talk about a interesting class, and one that I should get a good grade in. This class has around 10 people in it and 302 is set up so that it feels like a discussion session. I like the feel of it since it allows people to voice their opinions in the group and it allows you to learn the other peoples names. So far the class is OK. Since it is only on Wednesday nights we have only had two classes, but the two classes where great. It is a wonderful class to have at the end of the day since you can relax, and let the personal nature of the class calm your hectic mind. The grading in the class seems easy. Like I said before, I think I am going to get a good grade out of 302. I will have to study, and do the work, but I should get a sort of easy A or B. The grades are different than in other classes since we are going to talk about what the criteria for the assignments will be during the next class period. The people in 302 are great. The girls all seem real friendly and nice. There is a nice feeling in the room since, so far, every one has gotten along nicely. I usually sit next to Bethany since we are normally the first two there. The other girls are Samantha, Sara, Katie, Kathy, and Laura. So over all this class seems like it is going to be a real blast and I look forward to going each week. Have fun Andy and talk to you later."

A conversation about computers....

Z: Tomorrow I have to go to English 460, Math, and my night class.

Nick: what is your night class?

Z: My night class is Secondary Ed 302, a class that is required for my educational computing minor.

Nick: Do you do programming or what in your educational computing classes?

Z: I am required to take a basic programming class, but this class is more about what the role of the computer in the classroom is and how I can make the best use of technology with my students.
Nick: So you just listen to a lecture for three hours?

Z: No, which is good because I wouldn't sit still that long. Our class is really small so we spend a lot of our time discussing different topics. The first class we spent talking about what we expected and why we took the class. We also did some basic ice breaker activities which helped us become more comfortable with each other; something that will be very important in such a small class.

Nick: Do you learn things that you will be able to use when you are a teacher?

Z: Yes, that is the thing that I like the best about the class so far. We have done many activities that I could use with my students. The different word problems, reading slips of paper out loud in unison so that we had a better understanding of what total chaos is like, and different discussion prompts. I like that I will be able to use what I am learning in this class in my classroom, as opposed to spending a lot of time just listening to how things should theoretically work in the classroom.

Nick: What kind of projects will you be doing? Writing a lot of papers?

Z: No, the assignments are set up so that they will be useful for us in the future, too. Part of our grade are journal writings, part is a software evaluation, part is a presentation, and a large part is a final project relating to how we will use computers in the classroom. I was a little nervous when I didn't know what the assignments would be, but now I am not too concerned. I feel much better when I have some sort of concrete grading system to look at. I will admit that I have a tendency to become a little bit too concerned about the grade I receive in classes.

Nick: yeah, I know. I get to listen to that all of the time! What is your favorite thing that you have done?

Z: We got to eat sandwiches last time, which was nice, but I think that the discussions that we have are my favorite part. Everyone listens really well, and has very different things to add so it is interesting to understand where everyone is coming from. I am also looking forward to seeing everyone's presentations. I think that they will be much better than lectures.

Nick: That sounds like an interesting class.

Z: Yes, I think that it will be. I am sure that you will get to hear all about it, but right now I should probably email my homework in!
"How well do you like Sec Ed 302? It is the most unique class that I have taken since Design 134.

What do you like? I can speak my mind and I am free to comment on anything that I don't feel is right or wrong. They encourage me to have opinion.

What have you liked the best so far? That we are getting to know everyone and get comfortable before we have to do assignments with people that we do not even know.

What would you change? I would have a little more activity, it gets hard sitting there at night and even talking after a while.

How is it different from your other class? I am important and not some number and we will have something to take with us when we leave.

What do you want from this class? To know more about computers and also get to know some of my fellow classmates and to have fun."

**Honing the Tools for Curriculum Presentation**

Before our understanding of Vygotsky’s philosophy, it was easy for us to think of things like computers, software, and designed programs as tools. How could we create this lesson in Authorware? What video clips to use for this theme? Which software for which goal? What graphics would go with the section on multiple perspectives? Vygotsky, however, envisioned everybody and everything around the learner—peers, parents, teachers, the community, the art, the signs, the symbols, artifacts of the times, and nature— as tools that convey knowledge. Yet, from everything that is presented, the learner selects and chooses based on the mental models that we discussed earlier. Once we had some idea of the prior knowledge and mental models of the students, it was easier to let go of this fixation on technological tools and design instruction that was more open in its approach, immensely more flexible than a pre-designed program, and powerful in its potential to draw ideas and arguments out of students that become the basis of knowledge negotiation.

We tried many tools as conduits for the curriculum: videos, the Internet, readings both lengthy and pithy from textbooks, magazines, and newspapers; hands-on activities, and unusual sensory experiences like candlelit readings and discussions. We tried them in combination with group discussions, and followed by individual reflection and journal
writing. My observation is that I could anticipate deep insights and meaningful learning when I paid attention to the four Vygotskian principles: designing instruction with tools that were appropriate and based on the students' mental models, preparing ahead to encourage a community of discursive inquiry in the class, and completing the circle through some personal reflective action like writing. Let me illustrate with an example.

Early on in the semester, we threw out the difficult and connected issues of technology and philosophy. Students began to show a good understanding of the constructivist or "emerging" philosophy as we called it, but were thoroughly confused by the prospect of combining the two. I had personally, through my experiences and research, concluded that constructivist uses of the computer were on the other side of the spectrum of the prevalent sentiment that technology ought to lead school reform, or the popular immersion of the learner in authoring programs like HyperStudio, multimedia explorations, creation of web pages, indiscriminate abandonment of learners on the Net, or skilled operation of technology. Yet, I had no intention of inflicting my judgments on their nascent explorations. I decided to present a strong view of this polarity through a set of readings they could read before class and engage in a dialogue in class that would be based on some of their questions. I followed that with lengthy questions that probed to tell me about their understanding of the philosophy, their personal affiliation to either of the philosophies, what the goals of schooling ought to be, the identification of the particular philosophy espoused by the writers (Snider and Postman), and a broad discussion of these issues. I was unprepared for the quality in the responses, their ability to draw on personal experiences and connect them to a pedagogical philosophy, and mostly, their identification of Postman as the constructivist, and the arguments leading to it.

**Should Technology Lead the Quest for Better Schools?**

**Yes:** James H. Snider, from "Education Wars; The Battle Over Information-Age Technology," The Futurist (May-June 1996)

**No:** Neil Postman, from "Virtual Students, Digital Classroom," The Nation (October 9, 1995)

"I like the ideas presented in the emerging way of teaching. For example, this approach focuses on what students can generate and demonstrate. I think this is important because the students aren't asked to just repeat answers back, but to have a deeper understanding to produce long-term learning. I truly value the viewpoint of students, whether
I agree or disagree with them. I believe that each student has something special to offer to the discussion, so from this aspect I am very much for the constructivist classroom. I think it is also important for me as a teacher to provide a variety of hands-on teaching techniques, but I believe that the students have to have some background information. I wouldn't get rid of the textbooks in classrooms, but I would definitely look for information in other sources and use manipulative materials more often. I learn better in groups, so I also like this aspect of the emerging classroom. Although, I feel that I need to recognize that not all students work well in groups. I believe the work needs to be split up between groups and working alone, so that all students can benefit."

"In general I believe in the more constructivist way of learning. Although, I support this method, in all of my life philosophies I strongly believe that it is vital to not be too one-sided on any issue. In anything I believe or practice, I try to have a balance. Therefore, I also believe that some of the traditional components to a classroom are important. I think that classrooms must focus on student experience and hands-on knowledge, but facts have always had their place in the core curriculum. Students need time when they work alone, so that their knowledge can be assessed and so that they can develop their own unique thinking skills. But, cooperative learning is important because students are given the opportunity to build their knowledge from other students' knowledge and also allowed to improve their social skills. Constructivist thinking promotes long-term understanding and skills as a process of living, but sometimes, a classroom environment does not permit for a project or skill to be carried out to its fullest extent because time does not permit.

When I was in my elementary and secondary schools, I probably would have said that school is a preparation for living. Throughout my life, I learned that I was going to college to take classes to learn how to be a teacher. Little did I know that not only would my classes teach me how to be an effective teacher through instruction, but also teach me about how to live an effective life. I have learned so much from other people, my professors and my experiences that will make me a better teacher and have given me the insight to lead a more fulfilling life. I have learned that the little things, including grades (which used to my life or death), do not matter so much. I have learned that my effort, who I know and how I have touched another life is what the important skills are. This is what I want to portray to my
students. I want them to know that grades and how much money they will make is not the end all, be all, but rather the people and professional skills that they have learned.”

“I feel that the emerging way of teaching is much better than the dominant many aspects, but there is always need for the dominant way in the classroom. I have always been and probably always will be for more group work. Although I am not for assignments done in groups for someone always gets gypped. I feel that the facilitator role is a difficult one to take on, but once the students get used to the idea of learning for themselves, I think they will become more constructive. I also feel that there are times when the teacher should be in front of the classroom teaching in the dominant style. I am caught in the middle of this issue.”

“I think that as a teacher it is crucial that I realize that every student enters my classroom with his/her own ideas, beliefs, and values. These ideas, beliefs, and values have all affect how a student looks at the world. The constructivists value students as people who are independent thinkers with original ideas about the world. I believe that students are "blank slates" to some extent in certain content areas, but I do not believe that it is my place as a teacher to dictate exactly what should be learned in that particular area. I know that as a student I remember and utilize the information that I learned through hands-on experimentation the best. This is not limited to physical sciences, but involves any course that allowed me to experiment, to search for information that was applicable to my life, and to make my own mistakes. I am not a great poet, but I have a much greater appreciation for the work that goes into creating a powerful piece of poetry after creating some poems on my own. I believe that most students learn more when they have the opportunity to do things for themselves.”

“I believe that when given the opportunity to learn things in such a discovery fashion, that they will also come up with questions about the material that is being studied. I believe that teachers should value these questions highly because it shows that the student is thinking about the subject and/or trying to apply what he/she is learning. I believe that as a teacher it is important to try and understand the students' points of view. Not every student is going to think just like I do and if I present in a manner that demands they look at things just like me I will be getting through to only a very small number of students. Also, if I listen to their questions and attempt to understand their points of view I will know what skills or content areas need to be worked on in upcoming lessons.”
“Assessment should come in different forms, not only through testing. Each student has different test taking abilities and, once again, I think that using tests alone would only benefit a very small number of students. I believe to truly understand where students are at with a concept, whether they understand or not, many different forms of assessment need to be used including observation.”

“In a completely constructivist classroom the curriculum is presented from whole to part. In a traditional classroom curriculum is presented in the opposite manner, from part to whole. I believe that it is necessary to use a combination of the two different forms. With some concepts I believe students need a certain amount of background knowledge to understand the larger concepts. For example, as an English teacher I would not assign my students to attempt to write a sonnet without first working with iambic pentameter or set rhyme schemes. I would start by teaching the basic information first. With other things I believe that it is better to teach from whole to part. When working with a story in a literature class I would want my students to read or listen to the entire short story first. I would not expect them to understand if I only presented one small piece at a time.”

“I believe that students are in school to learn to make a life. Education goes beyond teaching students the skills and knowledge to get a job or make a career in our world. What about the basic skills that some students don’t have a chance to learn at home? As an elementary teacher, I will be a role model or a second mother for many children. So, this is why my role focuses on teaching my students how to make a life. They need to learn the social skills that will help them in whatever they choose to do with their life. The simple lessons in life like sharing, working with other people, playing fair, listening, and putting things back where they belong are especially important for elementary students.

“I believe that children go to school not only to learn to make a living, but to learn to live a life. Learning to live a life includes learning to make a living, but does not merely concentrate on that aspect of life. I personally believe that living a life also means learning to appreciate and interact with the world around us and learning to interact with the people who are in this world with us. I do not believe that a life that is only centered around being rich would be very fulfilling. In my own life I know that I value my relationships, and experiences much more than the money in my bank account. I believe that I would be cheating my students
out of a good education if I only concentrated on the monetary aspect of life. I believe that Postman's arguments fit with my own very well for a number of reasons. First, Postman points out how many different things in our world provide us with information, books, billboards, newspapers etc."

"I think Postman's arguments fit my beliefs. Postman states, "... whose vision of children's need, and the needs of society, go beyond thinking of school mainly as a place for the convenient distribution of information." I feel this statement shows that he doesn't just believe in providing the information to students, but also the skills that will enable them to make a living. One of the examples in Postman's article describes the task of teaching children how to behave in groups. This goes back to my belief of the basic social skills that elementary children need in school. For example, when I was a peer mentor working in groups was very important. The first graders learned to listen to each other and respect their peers. Lessons like these will be the kind that students will always carry with them.

Postman also describes on page sixteen the importance of learning social values. He goes on to talk about Fulghum's All I Really Need to Know I Learned in Kindergarten and the lessons and values the schools teach. Some of the lessons are what I was talking about earlier. A few include: share everything, don't hit people, and clean up your own mess. I think these are important lessons that will be stressed each day of school. They are the basics that teach students how to be civilized people and how to make a life. One important idea Postman shares is very dear to my heart. Postman explains, "I do not say, of course, that schools can solve the problems of poverty, alienation, and family disintegration. but schools can respond to them." I feel an important part of learning to make a life is to have people to share experiences with and people who are willing to support you in good and bad times. As a teacher, I want to support my students and respond to their needs to let them know they are important.

Postman would have use for the constructivist principles of teaching. He would use the idea of having students construct their own knowledge through experiences. He believes children learn through life experiences and social lessons rather than just getting fed full of knowledge. He also believes in group learning, so students can feed off of each other. This fits with the ideas of giving students a chance to be interactive in the classroom. Postman
definitely feels that classrooms should focus on life skills. This idea fits the goal of education to allow children to learn how to make a life. It should be thought of as a process for living, not just as preparation for the future."

"I think that Postman agrees with this when he states "People who have no clear idea of what they mean by information or why they should want so much of it are nonetheless prepared to live in an Information Age..." In this statement, Postman implies that an abundance of knowledge that we don't know how to use is obsolete. He implies that we must know WHAT to do with the information if it is to be of any use to us. Postman also claims that the classroom is intended to "tame the ego, to connect individuals with others, to evaluate the value and necessity of group cohesion." This statement is a great support to students learning to live through the schools. These skills are vital in enhancing students social skills that are useful in life. Postman also argues that computers have the capability to promote individual problem-solving skills rather than work in groups to solve problems. Group problem-solving is essential to real world, life-long skills. Postman also argues that technology focuses on learning "subjects" and not so much on learning life-long valuable "social values." These values are ones that will help students in all their encounters in the real world.

Actually, from what I gained from the Postman article, he is in favor of the constructivist style of teaching. He is always putting down those who think students should be at school for a certain number hours, for a certain number of days... From what I pointed out in my previous argument, he is in favor of skills that will promote student social skills and not just loads of information. He also believes that students need to work in collaborative groups, not just individually as working on a computer would promote. All of these arguments seem to be in alignment with a constructivist approach to the classroom. Yes, I do think that Postman could use the constructivist approach in his classroom."

"I think there should be more technology in schools. I don't want a classroom filled with computers, students, and no teachers. I want a classroom that has all three of these that will work together in a constructivist way to make the learning process more in-tune with the real world. Computers are used in almost every job there is. I don't think you really can put 'making a living' and 'making a life' in two separate categories. This is because they are so
intertwined. If you want to have a life full of children and pets, you need to know how to
make a living or else you will run out of money. If you want to live, you need to know how to
cook, and how to work a computer. They are needed in many jobs. And if you really want to
stay alive, you need to eat. I guess you could hire a cook if you make enough money, or
maybe go out every night. I would have to say that I agree more with Snider than I do Postman. I know that you all told me that Postman doesn’t want to completely exclude
computers, but that is what I got from the reading.

I agree with his point about letting the people chose. If a student has a choice of what
they will learn, they will take things more seriously. I know that since I get to choose which
classes I take, and my major, I am taking things much more seriously than I did in high
school. I don’t think this is because I am more mature now, or any other excuse, I thinks its
because I really feel like I am responsible for it since I chose it. I also feel strongly that
teachers often have to teach to the middle. If they teach to the children who are far ahead, the
others will get lost. If they teach to the slower students, the others will get bored. It’s a
loophole that is hard to work through. One thing I don’t agree with is the idea that he wants to
get rid of so many teachers, and only have 'the best' teaching. This idea is not at all a good
idea. First of all, children need a teacher. They need some one to be there, whether they are a
facilitator, or what.

Putting Snider and Constructivist in the same sentence is sort of hard because of the
one thing that he does that I really don’t like. He wants to rid the world of about 74/75 of the
teachers right now. That, I feel, doesn’t go along with the constructivist at all. Constructivist
has a teacher, and A LOT of communication. There could be good communication with
computers, but with only 1/75 of the teachers out there, there could hardly be any personal
communication. I would try to find a middle ground where there were still as many teachers, and
personal communication, (email and face to face) and computers."

"James H. Snider's opinion just about put me through the roof in several parts of his
essay. His view of having the "star teachers" of the nation teach every child is absurd.
"Information Age education requires far fewer teacher to achieve the same or better results." RESULTs? Results, but no PERSONalization. No smiles, no 'student of the month,' no one on one CONTACT. When is the last time this guy was in a classroom? Does he want
kindergartners believing that Teacher is a screen?? "There could be national evaluations for courses..." So what, we'll have our children learn to be cookie cutter copies NATIONALLY????? Again, absurd. Snider keeps going back to the printing press - the printing press was truly a great invention, as are computers, but it didn't take teachers out of the classroom!

Snider's comment "...this in turn will lead students and parents to take education more seriously than they do now." Where does this man live? WHO is he talking about?? From two parent families to single parent working moms, I haven't met anyone who isn't concerned about their children's education. "labor intensive schools as fostering a one-size-fits-all system regardless of a student's individual difference in motivation, knowledge, learning style, and ability." Has Snider heard of Talented and Gifted, magnet schools, "at-risk," special ed, inclusion? This was the part that really threw me:"...the new balance of social relations, including different modes of interaction and increased contact with people of different ages and locales, will be more reflective of the real world..." WOW!! If children are interacting with virtual classrooms, strangers, people from anywhere, HOW WILL PARENTS KNOW WHO IS INFLUENCING THEIR CHILDREN IN A VIRTUAL CLASSROOM?

On the other hand, I loved the essay by Neil Postman. I thought that his wit and humor were just what was needed after all of that hot air in the first essay! I loved how he used "Little Eva" and her quest to do algebra when she couldn't sleep and how he tore the whole ludicrous idea apart. I agreed with him questioning the idea of a child so young being "bored with the world." The whole problem would not lie within the teaching structure of school, but a completely different concept of over-exposure to too much information. "Is virtual reality a new form of therapy?" I hope not. Is leaving this world to go to a "make-believe" one very different than dreaming when you sleep, or taking drugs to escape life? That is a very scary question to me. The bottom line is that children need to have interaction with human beings they can see in real life. With so many single parent families, where parents need to work to keep afloat, children need the guidance, the discipline, and social graces and contact to learn in the classroom. I agree with Neil Postman's essay wholeheartedly, he had so many good points I think the entire piece is now high-lighted!"

"To get the "big picture" it would be necessary to start with all of the information, and
then sort the information into smaller pieces. I also believe that students should be given the opportunity to work both in a group and individually. I personally dread working in group situations. I enjoy working with people and part of the reason that I want to teach is so I can interact with many different people. I do not always enjoy cooperative learning because I have worked in many groups with people who were not willing to put in the time or effort to earn a good grade. In one of my high school classes, my teacher paired the student with the highest grade with the student with the lowest grade. I ended up in a group with a student who refused to do anything. I put in hours of hard work to earn a good grade and that student benefited from my hard work. I think that as a teacher I need to be very careful that I do not allow this to happen. I will use cooperative learning in some situations as I believe it fosters good interpersonal skills, but I also want to allow my students to work alone at times."

"I believe that all of these different forms are valuable because they are a part of our world and are created by different people within it. Utilizing these different sources forces us to go out and interact with the world and other people, and it also helps us to understand different points of view. Second, part of living a life is interacting with people and Postman mentions that teaching children how to behave in group situations is a "traditional task of teaching." I believe that working in groups fosters interpersonal skills that are crucial in the working world, but also in fostering other personal relationships. Third, Postman discusses the importance of "making civilized people." School helps students acquire very basic manners. Students learn not to hit one another, and to respect other peoples' property. Skills that are necessary when working with people in all situations. Even things as common as buying groceries and speaking with a neighbor require those skills.

Finally, Postman points out that part of being a teacher is responding to the different problems and needs that students have. I have always been very lucky and have a very stable and loving family environment. I have watched many of my friends struggle to deal with parents divorces, unexpected pregnancies, and problems with in classes. Every person deals with different things in their lives and school should be a stable, safe environment where students can feel free to talk about their problems and seek answers to them. If schools ignore this and only think about what is important to help a student eventually get a job, the school will ultimately fail. Not every student can get through problems like that on their own and will
spend more time working on dealing with a situation at home than on completing a basic accounting course."

"I believe that Postman would strongly agree with the constructivist point of view. In his article he stresses how important it is for a teacher to "respond" to student needs and problems. The constructivists believe that a teacher should be an interactive member of the classroom. If a teacher is interactive he/she will be able to respond as Postman feels is necessary. Another point of constructivism that fits well with Postman's arguments is the idea that students need to be able to participate in "hands-on" activities. Postman wrote about the child who was "bored with the real world," and he seemed shocked that a child could be bored with so many different things surrounding him/her.

He also writes about how many different sources of information that exist including books and billboards. Constructivism stresses student use of primary sources, and Postman would find this a good use of a student's time. In his article Postman also stresses the importance of "making civilized people." One way of helping students develop good social skills is through group work (or cooperative learning). This is something that is stressed in constructivism. Postman, however, might also give students some time to work on individual activities because he says that "groups do no learn, individuals do." Postman's beliefs, overall, reflect many of the main ideas behind constructivism."

Encourage a Community of Discursive Inquiry

As the semester started, I was committed to creating and encouraging a community of inquiry in the academic sense of the word, but I had very little idea of the tremendous opportunities and insights that its practice would reveal to us. A week-long workshop on cooperative learning based on Johnson's group learning theory provided many good ideas to get started and a hint of things to come, but the playing field was still different when it came down to the real and "messy" issues of the classroom.

There were some very obvious assets for a building of group rapport in the class. The small size of the class was a very obvious factor in its success. We started with ten students, and two dropped the class to transfer and to take care of personal commitments. Although I was lead instructor, there were two other instructors who were involved in all but one class
throughout the semester. The classes were either in the computer lab (the room originally allotted for the course) or in a small micro teaching classroom. All of the group activities were carried on exclusively in the micro teaching room for the first few weeks of class. The format was almost always a circle with plenty of eye contact and face-to-face exchange. Also, I made sure that there was always something to drink or snack since it was an evening course from 6 to 9 p.m.

To our surprise, the group came together quicker than we expected. This is obvious from the journal excerpts I have used in the previous section. They seemed to connect well, and look forward to the class. They were respectful to one another's opinions, even when they were different from their own, but yet, they were a vocal group very eager to articulate their different viewpoints and ideas. There were a few quiet ones at the beginning of the semester, but that changed a few weeks into class. We agreed that everyone felt free to express their opinions, and seemed to enjoy their participation in the issues discussed in class. As they mentioned at the end of the semester, the participants felt they had a voice in the direction of the course.

It was very obvious that they felt it was a safe environment to express themselves, and gradually but quickly, this sharing and connection began to include many ramblings and deviations that presented a dilemma for me. I was actively involved and spent hours preparing for broad issues and themes for class, but I was definitely not into controlling the conversation. But what should I do when the conversation was more social than intellectual? Or when the exchange was more about a personal peeve or observation only remotely related to the curriculum? What if the rambling explanations of one person seemed to bore others in the course?

Although I was uncomfortable at first, mostly because of this stereotype in my mind about what is "acceptable" and "useful" classroom dialogue, I allowed for most ramblings and discovered that students often connected to the curriculum and the subject matter, to their peers, and to the instructors, through such ramblings or discursions. In fact, the tendency of the class to engage in a sort of discursive inquiry came in handy to make some difficult connections in a particularly difficult lesson on cultural and historical perspectives in technology. For this lesson, we watched a clip from the movie "The Gods Must Be Crazy"
which is about tribal people who live in the Kalahari Desert plains of southern Africa. I chose this clip from the first ten minutes of the movie because it shows so powerfully and simply, the cultural and social influence of a nondescript technological item like a Coke bottle. First, the Kalahari people, who have never seen anything as artificial as a bottle consider it a gift from the Gods (since it was tossed out of a plane flying overhead) and are charmed by it. They find multiple and deeply imaginative uses for the bottle. In fact, they find a way to use the bottle and improve the way in which they were doing almost everything else. Then feelings of envy, jealousy, competition, and aggression creep in until one of the children in this peaceful community gets hurt. Then the leader of the group decides that the Gods must be crazy to have given them that gift and leaves to return the bottle to the Gods.

Despite a weary part in the semester, the class discussion following the movie clip was lively, enthusiastic, and poignant. Students split into two groups and discussed the following questions before they shared their views with the other group.

1) Why did the Kalahari people construe the bottle as a gift from the Gods?
2) These people have never seen a bottle or glass before, and are charmed by the gift. They find multiple uses for it as we saw. If they were familiar with glass or bottles, do you think they would have been just as imaginative and resourceful?
3) Is it possible that we are less sensitive to the different ways in which we can use our resources because we have too much of them? Familiarity breeds contempt? What do you think?
4) Despite finding many uses for the bottle, the people start to fight, and feelings of envy, anger, jealousy, and greed are suddenly part of the culture. I think that it’s because there was only one of the bottle. Do you think that the solution is to make more bottles available to them? What is the problem with that?
5) Regardless of all our interpretations and analyses, the leader of the tribe decides that the Gods must be crazy to give them such a gift and plans to return it to the Gods by throwing it off the top of a mountain. What would your group decide and why?
6) Did their leader save them or deprive them?

Another tool that I used in this lesson included a two-page handout on American values that is normal staple for foreign student orientation in most American universities. The
handout is titled “The Values Americans Live By” and is adapted from L. Robert Kohl’s writings. One of the values termed materialism/acquisitiveness explained that material goods are seen as the just rewards of hard work—evidence of “God’s favor” with the result that Americans are seen as caring more for things than people or relationships. I invited the students to consider the values that were listed in light of the cultural influences we had observed in the movie and to asked if they felt strongly about any one. Many strongly attacked and rejected the 6th value, self-help, which said “Americans take pride in own accomplishments, not in name, with the result that respect is given for achievements, not accident of birth.” Not only did they vocally pooh-pooh the idea, but provided many incidents from their childhood that had made an impression on them about their place in this world through the “accident of birth.” The following are excerpts from their reflective writing, which they completed after class.

“I believe that we no longer view the innovations in technology as gifts. We believe that technology must provide us with innovations in a timely manner, or that the researchers have failed us. Most people no longer take notice when a new computer is released, or a faster modem becomes available. Technology has just become a staple in our everyday lives, and it is something that we take for granted.

I believe that American society, in particular, does believe that these technological innovations are fruits of our labor, even if we are not directly involved in many of these innovations. As a society we are very eager to take credit for technological innovations that are created in our country, even if they are created by people with whom we might not otherwise associate. I think that this stems from our desire to see ourselves as the leading nation, technologically and otherwise.

If the people in the movie had seen bottles and glass before they would not have been so quick to think of many different uses for it. Once something becomes a staple in a culture (or even just something that is very familiar), people have a tendency to push it aside and concentrate more on the new things that are being found. After an item has become known for being good for one particular thing, in this case holding beverages, we no longer feel the need to search for another way to use it. I don’t believe that this is necessarily because familiarity breeds contempt, but rather because familiarity breeds contentment. I believe that
becoming overly content or used to something can be dangerous. It can cause us to ignore things that are important, like other uses for common items. I think that in a society that has so much, we lose our ability to think in a creative manner.

I do not believe that the solution to the problem would be to make more bottles available, I believe that would merely cause the people of the tribe to want to own the most bottles, and the jealousy would continue. I believe that their leader really did save the tribe from breaking away from one another over jealousy concerning the bottle. I believe that the people will ultimately realize this, too, but not until they realize that the harsh feeling stemmed from the possession of this new item.

I can see some truth in all of the "values" that are presented on that worksheet, but I believe that it is dangerous to generalize about an entire society like that. Every individual has different talents and difficulties, every individual participates very differently in society.

It is important as a teacher never to make generalizations about students in the classroom. Assuming a student is less able because he/she is a of a lower socioeconomic status would just cause a student to have lower a lower self image. It is my job as an educator to celebrate the differences that students bring into the classroom, and help every student learn that he/she is a worthwhile individual.”

“The movie, “The Gods Must Be Crazy”, really got me thinking about life in general. I started thinking about how everything has changed since growing up. The technology has taken over society today. When I was little, technology wasn’t such a big part of life. Now, everywhere you look there is technology. I understand that technology is a natural progression, but sometimes I feel it goes too far and tries to replace the natural wonders of the world. I think just like the tribal people started taking the Coca Cola bottle for granted, we also tend to take many things for granted. After seeing this movie, I looked around and realized that I take a lot of things for granted instead of thinking what it would be like without that. I believe that everything we have, we have for a reason, but I also believe that people need to stop and think about these things and how they benefit us.

With regard to the movie, I believe that the leader saved the people. They might have felt deprived, but before the bottle there was no violence or crime before the bottle fell from the sky. The bottle didn’t enhance society because the people had ways of doing things
before. But, I think eventually the tribal people will have to progress with society. Just as we had ways of doing things before, but technology has moved in and society has progressed. It isn’t a bad thing, but I hope that people really take the time to be thankful for everything instead of taking things for granted.

Some of the values that Americans are supposed to live by that are on that sheet are really crazy. It is funny to read some of them because they are a little off base. I think the one that hits close to home is number six, self-help. We had a big discussion about this in class which I think was on target with how my home town was. Most people were respected for their name, not their individual accomplishments. If you were a teacher or coach’s kid, then you were automatically above the rest. Also, people were judged by their older siblings. If my sister was good in speech, then I was supposed to be good in speech. I couldn’t accomplish my own goals, but instead I had to do what my sister had done. I think even a lot of teachers in our school compared students to his or her family. For example, the teacher doesn’t want this class next semester because the Smith boy is in that class. This is exactly how my town and school was. I think the biggest part of being judged by the family name comes from being from a small town. From what I have heard, this is a lot more common coming from a town where everybody knows everybody else. That is one reason I like Iowa State so much. It is big, so you are judged for your own person, not name. I take pride in my accomplishments here and I’m not judged before I even walk into the classroom.”

“Personally, I disagree with the #13 statement that Americans feel that material goods are the product of God’s favor. I guess some people probably do feel that way, but I don’t. If you want to get biblical for a moment, God says, "...to be the greatest in heaven, you must be the least and lowliest on earth." We don’t need to have the "look at me!" "see what I have now!" attitude, even though that is what our society projects. It’s hard to keep in perspective that we have something much greater to look forward to when we’re done running the rat race here on earth. In the video "the gods must be crazy," I thought it was sad that the people in the group became so violent towards each other when they each felt that the Coke bottle was their own personal gift from the gods and they now could not live without it. I thought it was interesting the number of uses that they came up with to use the Coke bottle. I guess if they had seen one before as something to hold liquid they may not have jumped at all of the creative
solutions of using it as they did. Of course, even if they had known what the original purpose of the bottle was for, if that was the hardest substance available to them I think they still would have had creative ideas for it.

In the bush people's world there was nothing harder than bone or wood to them before the bottle dropped from the sky. To give everyone bottles would not have solved much, if someone's had broken there still would be jealousy and greed. Also, if everyone had a bottle, would they all live in harmony as they once had before they knew they bottles existed? Would they all work together as one happy family, or would they now be consumed with their new possessions so much that they place their family on the back burner? Isn't that what our culture is like for some, Most?, people these days? The leader of the group did them a favor, I feel, by taking the bottle to get rid of it. They had once been happy and contented with what they had. I think this video clip we watched also could be a case for littering. What a thoughtless thing to do for that pilot in the first place! If he had held on to the Coke bottle, none of this would have happened!"

PS- I loved listening to how they talked with their clicking sounds!!

"I feel that the people thought it was a gift from the Gods simply because they believed that everything they had came from the Gods anyway. Also because it fell from the sky. I feel that this statement is entirely true (materialism/acquisitiveness). I think that people today feel they need to work hard to get what they have, and if you have more than someone else, you are somehow better. They care about their $80 Tommy jeans more than they do about their best friend. I have had personal experience with this one. I borrowed my friend's jeans once because I had spilled on mine earlier that day and couldn't go home to get new ones. She then decided that she wanted to wear them so I had to change back into the stained one when we went out to a movie. It's proof that people don't care as much about others..."

"It seems to me that our class, overall, agreed on what we said. I did like Samantha's analogy on shoes. This analogy was in regard to the question as to whether familiarity breeds contempt and to whether or not we are sensitive to ways that we can use what we have. Samantha stated that shoes are a good way to look at this question. We have so many types of shoes. Not only do we have tennis shoes, sandals, high heels, etc, but there is also cross-training shoes, running shoes, soccer shoes and a multitude of other shoes for exercise. This
is so true. Our society seems to find it hard to use something for more than its specified purpose or anything especially creative, at least.

I could also use my experience in building a VEISHEA float to respond to this question. In our float we cannot use anything to represent itself. For example, we could not use Legos as Legos on our computer built out of Legos. Instead we used bathroom tile, cut lines in it and spray painted. We also used a garage door opener to operate our elevator. Our float, as well as the rest of the floats, used innovative construction.

For as much as our class likes to disagree, I am surprised that both groups said that the leader saved them by throwing out the bottle. Does this mean that we think technology is taking over our society? None of us seemed to voice that. In my opinion, people have come to rely on technology too much. I do not believe that technology is a bad thing, I just don’t think that the world will end (figuratively) if we had to do without spell check and the Internet.”

The Values Americans Live By

Value 5: Individualism, Independence, and Privacy. This value states that people are seen as individuals, rather than members of a group. There is the saying “There is no ‘I’ in team.” So often when people are part of a group effort, they still try to take the credit or do all of the work. In these instances there is little evidence of group cohesion. Americans do love their independence. They love to believe that they are in control of their life and that no one can make them do anything. This is evident when looking at families. So many young men and women are waiting to get married until they are out of school for a few, even ten or more years. (Our class is the minority). These people who wait usually are not waiting because they cannot find a mate, they are often waiting because they want to develop a career and develop themselves. They want to “know who they are” and be one hundred percent sure that they have accomplished anything that they need to and that they are not giving up anything for marriage and family. Some may consider this selfish, but I consider this honest. I admire these people for wanting to be themselves and to have accomplishments before they commit to family. These people realize that they may not be able to accomplish everything they want while raising a family and are willing to wait, so as not to jeopardize a family bond.”

“I had never seen the movie “The Gods Must Be Crazy.” It was really dramatic how the Coke bottle changed their lives. It shows that not all technology enhances our lives. The
movie is a good example of the downfall of American society. The more things that got introduced, the more fighting and violence that goes on. Jealousy is a huge violence starter. The violence keeps occurring at younger and younger ages. An example is the shootings in a high school outside Denver.

I want to comment on valuing time and the achievement of goals depends on productive use of time with the result that efficiency and progress often at expense of interpersonal relationships. This is true. Children this day and age would rather sit in front of a TV than outside playing. "Time is money" is becoming the unofficial motto of the U.S. When we went to the Bahamas this March they had such a carefree attitude. Seven O' clock meant anywhere from seven to seven-thirty."

Transform Social to Personal Knowledge

At the end of the semester, as I compared journals and assignments for quality and insight, it slowly dawned on me that the most reflective writing came from classroom experiences that went through all the four stages of the Vygotskian knowledge cycle mentioned earlier. Somehow, the group dialogue engaged students in ideas and concepts much more than a reading, an isolated media activity, or an written exam. An initial reading that could pull students into the topic, often assigned as class reading, seemed to be the best way to get started. A short video clip or scenario to accompany the first step usually served as the best introduction in class. When this was followed by a group activity, students were able to participate better and articulate their ideas while learning from the ideas of others. Yet, it was the last step of either writing a journal or expressing themselves in some form or the other, as they did for their final projects, that their knowledge seemed to grow from the social back to personal or individual knowledge. As this cycle continued into other areas of the curriculum, the recursive spiral seemed to deepen with their comfort with each other, their own ideas, and the ideas of others in the class. It was this process that seemed to help students to move to a higher level in the zone of proximal development that Vygotsky (1978) talks about. What I noticed most about the writings of students is that they were creating their own frames in the absence of a prescriptive model presented by the teacher or a text. Through this process of examining various perspectives, articulating their own, participating in a safe
environment with a community of caring, and reflecting on the content, students and instructors alike come to multiple understandings.

After reading a scenario in class about computer anxiety, students split into two groups and discussed the idea of computer anxiety and fear, and the reasons for the stress attributed to working with computers. The also listed ideas to cope with this stress on a chart and finished the lesson with a personal journal that helped them tie in their personal experiences with what they learned in the group. The following are excerpts from that journal.

Technology anxiety...

“What can we do about it? I think that the younger people can start using technology the better. As you use it more and more the comfort level grows, on the average. Granted, frustrations can mount when human error comes into play with not saving your work and having a power surge.

When does it happen? These days for me, it happens when I am not paying attention enough and hit the wrong button and it takes a few minutes to figure out what I did wrong. Microsoft Excel is a big one on this for me. I never seem to be able to construct a simple graph without feeling the urge to can the whole thing. I guess that goes along with the fact that I don’t like writing things out prior to doing it on the computer, because I feel that if you can’t start from scratch on the computer, what’s the point?

How can we fix it? I think that the little helper guy on Microsoft is annoying beyond belief, but he really does help when I get stuck. I guess having more helper things like him would be good for me. I think that requiring business people to attend workshops and seminars on technology would help also. Not “this is how you do Power Point” but this speed of modem will give you this amount of time to access items on the Internet. Also my dad is really interested in being online because all of his buddies are online and the problems he has come from relying on my mom to fix the computer when it freezes for whatever reason or something won’t print because the cartridge is low. How a person can go along relying on others to fix the fixable things with technology is beyond me.

Kids who are involved with using technology, everything from playing with those play computers to surfing the web, will have a distinct advantage both in and out of school with being comfortable with technology. I think the more people come in contact with it, the
better off things will be.

I thought that doing the posters in class last week was interesting because even though we all should be more familiar with technology we all have our own anxieties. It's interesting to hear others' views."

"Reflections on how/why people are afraid of technology.

People don't like things that they don't understand. People are forced to be around computers, so they have to deal with something that few people understand in its entirety. i.e. people probably don't know a whole lot about chemical engineering, but don't have to deal with it on a daily basis, so it doesn't bother them as much.

Computers are imperfect. sometimes even people that are 'computer experts' have troubles with their computers. They were created by humans that are imperfect. People that don't completely understand computers may have a tendency to blame themselves when a problem happens. Computers are a powerful thing. It really puts the power in the hands of the many. This could be a problem for some people.

As we said in class, people think that they can actually 'break' their computer just by typing something in wrong."

"I think that there are many reasons why people are frustrated with computers. We went over many of them in class the last week. I would really agree with the group that discussed nontechnical stresses. These are stresses that really hurt me. I am a perfectionist and do not like to have something go wrong on me. I get so frustrated, as does everyone, when I am using a computer and something goes wrong. I also do not like to admit that I do not know how to do something. There are so many things on a computer that I do not know how to use that I just pretend they do not exist and then there is no issue that I do not know how to use them.

I also would like to expand on what my group said as far as there being a difference between stresses for those who like computers and those who do not like computers. The stresses for those who do not like computers are similar to that of anyone who does not like to do geometry or physics. They are stresses about not understanding a subject. The stresses related to those who love to use computers are similar to my stresses, even though I do not like computers. The stresses root from a vast knowledge base and then that knowledge base
being wrong or incomplete.

One thing that I would like to add about the stresses on a computer is the simple stresses about finding a computer. I always have a piece of paper in front of me. If I need to write a paper, I could write it on paper no matter where I am. I do not have to leave where I am and try to find an open computer lab. I get frustrated when Lago computer labs are full or closed. Although computers are wonderful tools, I often think that it would be much easier to just use a piece of paper that only I can mess up.”

“I think that the largest problem, that prevents people from using technology, is fear. People do not like to deal with things that are out of the ordinary for them, and computer technology is something that many people have not had the opportunity to work with.

The news is filled with stories about stalking that has happened over the internet, computer viruses, and the Y2K bug. It is easy to look at these problems merely as the product of a world that is becoming entirely too technologically based, and decide to avoid computer technology for that reason.

I believe that people also have a fear of feeling less intelligent than the technology. Computers are capable of solving immense equations, finding information on nearly any subject, and communicating with other computers, but these things do not happen without human involvement. My grandparents, for example, have an outdated IBM and refuse to get internet access. They are afraid that people will be able to access their personal information more quickly, or that viruses will start to haunt their system. Experience working with the internet could help to calm these fears. When ordering products over the internet many times the information is more confidential than it is over the phone, but that isn’t something that a person would know without ordering something with a secure connection.

The only thing that can calm the fears that keep some people from experiencing technology is to provide people with exposure to the technology. After awhile they will realize that every computer freezes up at times, that every computer can be difficult at times. People must learn to look at the advantages that technology offers us, and start to learn about the machines that they are so afraid of. Concentrating on the negative will only cause their fears to grow. Once people have worked with computers more, they will become more comfortable knowing that they are capable of working with the technology, and realize that
technology has so much to offer.”

“I think that everyone has stress related to technology. If you are trying new software, or just messing around on the computer. I think that a lot of the reason is that the computer will do something no matter what you want it to do. If you do the wrong thing, the computer doesn’t know it was the wrong thing and will give you an answer anyway.

I think that it is really intimidating to sit down at a computer when you do not know how to use it. You really can not break them, but if you do not know how to properly use them, it can be stressful. I would recommend that people just sit down and mess around with the computer. That is how I taught myself the basic Hyper Studio program. I also taught myself how to play the piano.

I think that once you get use to technology that there is the stress to keep updated and on top of it. I knew how to use computers when I came to Iowa State University, but I did not know how to use the internet or even access it. I think that if you mess around with it you will learn, just like when you are starting out.

I think that the best thing to do is to take a deep breath and start again. I think that the more accessible the computer becomes, the less stress it will be when starting out. I think that how you deal with it is unique for everyone, the main thing is to have fun and remember that they are not suppose to be stressful.”

“I feel that the biggest reason people have anxiety about using computers is that they are afraid they will break it as soon as they touch it. One way to cure this anxiety is to send an instruction manual the thickness of the yellow pages in Minneapolis, MN to everyone, or else provide some free classes. These classes could be at a public library or at a public school.

Another thing I feel really bothers people about computers is the fact that they do break as soon as anyone touches them. Computers crash, software isn't compatible, there are viruses and bugs, computers freeze, and so on and so forth. There really isn’t much you can do with these problems but make sure people know to save their work often, and be careful what computer disks you put into your computer. I guess the biggest thing to do to make people comfortable with anything, biking, swimming, walking, or using computers, is to get the people in front of a computer, and learning how to use them.”
Conclusions

Pedagogy is not just a fancy word for teaching. It is the holistic process that transforms both the teacher and the taught. It has a communicative role because it helps connect people to content, people to people, and therefore, people to the world. It has a critical role as it illuminates and unveils. It has a political role since it has the potential to show the connection between voice and power. It is social as it can hold a mirror up to us and the society we live in. Most of all, it is deeply humanistic since it offers us an opportunity to look inside ourselves and understand ourselves in the context of the world around us, and therefore shape and be shaped by the world. Pedagogy, like Aladdin's Lamp, is truly a dialectic magic that teachers hold in their hand, but one that can only be released by learners. In our experience, letting instruction be lead by Vygotsky's principles and priorities released some of that magic in the classroom.

Technology in a social constructivist classroom often takes a different turn than the philosophy, especially a meta-medium like the computer. The very structure of a computer lab impedes group building and easy flow of conversation. Both students and instructors in the course preferred the smaller desks-and-chairs only classroom for group work and we used the computer lab only when we had to be in front of the computer. At times when we had to engage in group activities in the lab, students often found a rare piece of carpet space in the aisles and sat on the floor before they started their discussions. The noise and hum of the machines also drowned our voices and diluted the meaning in our messages. Although these are minor structural factors, the point I am trying to make is that it would have been impossible to really encourage the kind of discursive inquiry in the classroom community that we did, had it not been for the option to use another smaller room nearby.

Computers in the classroom is at a choice point in history. Many proponents of technology even agree that social and ethical consideration are having a hard time keeping up with revolutionary and rapid developments in technology. In fact, Spinello (1995) argues that technology often moves faster than ethics, leaving a lag that poses some serious perils for us. The implications of this peril, however, are taken much more seriously in the business sector than in the field of education. This is a sad commentary on how much we are overlooking, although unconsciously, that is related to the welfare of our children.
Most of the arguments for computers in education center around a shift from the Industrial to the Information Age. It is this emphasis that gives us a clue about the nature of the culture that computers will bring with them to the classroom. Alvin Toffler coined the term information age in his book “Third Wave.” It is obvious that the shift happened in the spirit of competition and commerce rather than education, but the acceptance of this so-called Information culture is uncritical and unquestioning.

We are supposed to have shifted from the Industrial to the Information Age in 1991, when the U.S. spending for Industrial Age capital goods was exceeded for the first time in history by the spending for information technology (Trilling & Hood, 1999). This shift happened through corporate spending, not educational reform. Another factor that accentuates the risk of excessive technology use in classrooms is the fact that information in the corporate world is the most valuable commercial resource (Spinello, 1995) that organizations “collect, analyze, synthesize, and evaluate information before their rivals” in order to have a competitive advantage. We need to bear in mind that teachers are already powerless, and that technology’s vendors exert power over their heavily dependent users. Many argue that the suppliers of hardware, software, and technological expertise also possess a good deal of control over the host organization (Gentile, M. & Sviokla, J. 1991).

Most arguments for computers in the classroom center around easy access to information and the preparation of children for the adult work world. Is technical preparation enough for them to fully participate in the work world? Will mere technical exposure simply give them a one-sided picture that leaves out the truth about the specific cultures that technology strengthens and those that it weakens? As Bowers argues, this culture strengthens some orientations through communication and weakens some others by not communicating them.

The cultural orientations that are strengthened generally relate to the technological consumer domain of society: attitudes toward technological innovation, the progressive nature of change, measurement and planning as sources of authority, a conceptual hierarchy that places abstract-theoretical thought at the highest, a competitive-remissive form of individualism, and the definition of human needs in terms of what can be supplied by a commodity culture. The cultural orientations that are weakened in the classroom include the forms of authority and skills associated with the oral traditions: folk arts and technologies, substantive traditions of the community (excluding, of course, high school athletics), and fine arts, and the values related to what Wendell Berry (1970) referred to as care, competence, and frugality in the use of...
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Computing in Education.


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GENERAL CONCLUSIONS

I used to start stories for my children with “Once upon a time, there lived . . .” I don’t do that very much anymore. There is a certain path that a story would take when I started it that way, mostly a familiar path. But it was definitely a great prompt to get started. With fear and trepidation, I dropped the “Once upon a time” when I undertook this research and chose Eisner’s interpretation of qualitative holistic research. Throughout the process of the research, I was forced to rethink and reconsider some very established research concepts like truth, rigor, analysis, proof, and style. Almost all of our perceptions of how these concepts would be operationalized come from the quantitative paradigm and empirical research.

In many ways, this is a different story in a different voice, with many flaws. I have tried to understand and analyze with my heart and soul as much as my head, and accept any comments that may carry over concerns from the ways in which we have been conditioned to think about research.

The two papers and the electronic teaching materials are just the beginning of what I have understood through this research. I intend to explore the ideas from them in more detail and depth in the future. Many more themes like assessment and gender in relation to constructivism and technology have just started to unfold. The two papers included in this dissertation express ideas and conclusions in two major areas that were my focus throughout the research—the relationship between social constructivism and technology, and the design of instruction. The general conclusion in the first paper is that a technical or how-to focus in the design of instruction leads to the omission of the “why” of education, which is relevant for holistic education. The general conclusion in the second paper is that social constructivism as a guiding theory can express Vygotskian principles in practice through the use of simple traditional pedagogical practices like questioning, definition, and use of metaphor. Also, technology and social constructivism can at times pull in opposite directions. The conclusions are in agreement with Vygotsky’s emphasis on humans in the social context as the most significant tools for learning.

My daughter is nine this year and has picked up snatches of sewing techniques through quick and hurried lessons (if one can call it that) from a busy mother. A few years back, I went from designing and creating almost all of the clothes for my family to making
clothes on occasion not because I got tired of sewing, but because it was much more expensive to make clothes from "scratch" than to just buy them from the local superstores. I convinced myself that my daughter would have very little need for such an obsolete skill. But now I wonder if I could be wrong.

My daughter and I recently spent hours trying to find an outfit that she had only in her mind. Store after store, and fitting room after fitting room, she said that they were either too "fancy" or too "ordinary." And then, with just a slight twinkle in her eye, she beggingly asked, "Mom, why don't we go to the fabric store and get some fabric, and you make me a summer dress?" Despite a busy week, I couldn't say "no" mostly because of the lessons I had learned from my mother. After ten minutes of feeling the fabric throughout the store, she chose a couple that she had to have. I stayed up that night and carefully cut the fabric and lining to put together a simple and elegant summer dress that was just right for her. Of course, I was exhausted when it came time to sew the buttons on, but it didn't matter. She wore them the next day with safety pins just as I had during my childhood many, many times.

Computers are bound to change education in dramatic ways. Similar to the availability of inexpensive standardized clothing, computers and the Internet are likely to provide all kinds of information that can help education. And just like standardized clothing, that kind of information-led education will have its place, and its limits. And despite all the technology in the world, teachers will often need to resort to teaching from "scratch" by engaging in traditional practices like questioning, definition, and use of metaphor. There is a strong need today to explore the role of technology in education including its limitations. This exploration needs to be carried out with the collaboration of both inservice and preservice teachers. Only than can we have a truly holistic and balanced technology education for preservice teachers.

One student remarked at the end of the course, "I learned through this course that I can design instruction just as well with technology as without it." I think what she meant was that she would carry the power of her teaching in herself first, and then through her tools.
APPENDIX A: ELECTRONIC TEACHING MATERIALS

"Theory into practice: Social constructivism and technology in education" uses hypertext to present detailed descriptions of what was included in the course -- the major themes and worldviews and the instructional strategies to cover them, details of activities, assignments, journals, interviews, and interactions. Also, it includes information on the design and development of the course.

The files were originally created in Claris Homepage and are all in hypertext markup language format that can viewed with any web browser like Netscape. A web browser is the only software that is needed to access these files, and any computer that can run a web browser can open the files. The accompanying disk can be used in both Macintosh and PCs. Please follow the directions to access the files:

• Insert accompanying diskette in your floppy drive
• Open your web browser (Netscape, Explorer)
• Under “File” choose “Open page”
• Find floppy drive and diskette
• Open folder titled “Web Resource TIP”
• Open file titled “Page_1.htm” to begin
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