Volume 10, Number 2
ISSN: 1535-0975

JOURNAL OF LITERACY AND TECHNOLOGY
VOLUME 10, NUMBER 2: JUNE 2009

Table of Contents

Volume 10, Number 2
ISSN: 1535-0975

Wireless ESL: How second language students, instructors, and administrators envision our laptop classrooms

Dr. Meredith W. Zoetewey
Department of English, University of South Florida
4202 E Fowler Ave, CPR-107, Tampa, FL 33620-5550, USA
zoetewey@cas.usf.edu
813.974.0109

Volume 10, Number 2
ISSN: 1535-0975

Abstract

What are stakeholders' preferences for wireless English as a Second Language classrooms? This article presents the case of a laptop computer writing classroom for non-native speakers of English at a large, public research university. Participants included ESL students, instructors, and administrators connected to the classroom. Data came from official documents pertaining to the classroom, site observations, questionnaires, tape-recorded interviews and focus groups, and written reflections. The analysis of the data positions the wireless ESL classroom as a nexus where stakeholders' preferences are sometimes at odds and sometimes converge. Different aspects of the ESL classroom emerged as priorities for participants, including ownership of the laptops, availability of peripherals, classroom size and security, and furniture and furniture placement. This study promotes the consideration of L2 learners', instructors', and administrators' preferences, and provides the field with heuristics for outfitting and ordering wireless classrooms.

Keywords: Mobile, Wireless, Computer-Assisted Language Learning (CALL), Laptops

Volume 10, Number 2
ISSN: 1535-0975

A tide of wireless connectivity has washed over the landscape, covering Starbucks, parking lots, and classrooms alike. Writing programs of all stripes, always under pressure to keep up with cutting-edge professional contexts, may find themselves whip-lashed by the exceptionally rapid evolution of wireless technologies. The latest mobile gadgets have found their way into our scholarly discussions; laptops, phones, gaming systems, and handhelds are often imagined in the laps and hands of workers and students writing under trees (Drew, 2003; Mitchell, 2003; Strauss, 2003), at cafes, in cars (Gant & Kiesler, 2002), at construction sites (Gillette, 2001), and in dorm rooms (Olsen, 2001)—mostly spots other than the principal site of second language (L2) writing instruction: the classroom. These portrayals may speak to our need to escape cramped classrooms and windowless offices susceptible to a stream of visitors, invited and otherwise. Perhaps we just want refills, flowers, family, or Fido nearby as we work.

In his study of laptops and literacy practices at 10 K-12 public schools, Mark Warschauer (2006) makes several observations that are generalizable to the college campus, the site of the present study. Most relevant among them: daily laptop use influences each stage of the writing process, from prewriting to revision. Warschauer's work picks up where the wave of wired computer classroom scholarship that crested in the 1980s and 1990s (e.g. Britton & Glynn, 1989; Myers, 1993; Palmquist et al., 1998) leaves off. It is unique in that it focuses on linguistically diverse students, a high proportion of English language learners among them. Warschauer's study is especially distinct in that it pays particular attention to laptops, all too often eclipsed in the literature by their wireless cousin, the mobile phone. It does not, however, throw much light onto the landscape in which this wireless L2 writing instruction takes place. As Michael K.

Volume 10, Number 2
ISSN: 1535-0975

Legutke (2005) notes, the "significance of the room in which one learns a language has been almost completely ignored by mainstream educational linguistics" (p. 128).

One of the most wireless-friendly definitions of computer-assisted language learning (CALL) comes from Joy Egbert (2005): "CALL means learners learning language in any context with, through, and around computer technologies" (p. 4). The emphasis here is on a broad range of technologies operating in fluid contexts. But when wireless technologies and ESL instruction intersect in the literature, this breadth is usually lost as the emphasis shifts to almost exclusively to mobile phones, the most pervasive wireless technology[1], against ambiguated backgrounds (Taylor and Gitsaki, 2003; Aizawa and Kiernan, 2003; Levy and Kennedy, 2005; Thorton and Houser, 2001; Houser, Thorton, Yokoi, and Yasuda, 2001; McNicol, 2004; Thornton and Houser, 2004; Thorton and Houser, 2002; Kiernan and Aizawa, 2004; and Levy and Stockwell, 2006; Crystal, 2001). Perhaps we're left with only the fuzziest glimpses of the scenes of wireless L2 learning because these authors wish to include students and teachers operating the widest variety of contexts with the greatest variations in hardware. Foregoing detailed setting descriptions in favor of abstracted backgrounds might be (generously) interpreted as a gesture at inclusion—"wireless language instruction isn't site specific!" A less generous interpretation would cast such nearsightedness as an oversight.

A student learning language on the go against shifting backdrops, mobile device of some sort in hand—it's an appealing image. Mobile technology manufacturers have capitalized on the appeal of these ambiguous scenes of learning, conjuring up advertisements which suggest that

[1] As Manuel Castells et al. (2006) reported, wireless technology is the fastest growing communication technology in history. Penetration rates are highest in the European Union, with almost 86 mobile phones per 100 inhabitants in 2004. Australia and New Zealand follow with almost 82 phones. Hong Kong, Japan, and Korea averages 74 phones. The United States and Canada trail with 66 mobile phones per 100 inhabitants (p. 12).

with the "right" wireless technologies (usually the latest to emerge), the classroom (or the office) can be located anywhere, even spots formerly reserved for play. Some L2 instructors (e.g. Murray, 2005; Kluge, 2002) have internalized these messages. There's a sizeable discrepancy, however, between advertisements promising "anywhere" mobile computing and the actual practice of using wireless technologies to learn to write, especially in a second language. The "access anytime, anywhere" angle is a compelling sales pitch, but it is also a highly problematic rhetorical construction that naively positions all places as functionally equivalent for all writers.

This article embeds the laptop—the wireless technology with arguably the most obvious connection to second language writing instruction[2]—in the classroom space, the principle site of L2 instruction. How, I ask, do L2 students', instructors', and administrators' spatial priorities line up? My motivation for focusing on three groups of stakeholders connected to a new ESL wireless classroom at a large Midwestern university speaks to a desire to tease out the preferences of the classrooms' chief architects *and* occupants. This emphasis on stakeholders is borrowed from business ethics and management theory. Common to most understandings of stakeholder theory is the notion that a stakeholder is any person or group of people with interests "at stake" in relation to the workings of a business (Cragg & Greenbaum, 2002; Kaler, 2002; Langtry, 1994; Morris, 1997; Phillips, 2003). This philosophy demands responsiveness to those non-shareholders who are still affected by the outcomes of corporate decision-making. A stakeholder perspective necessitates a broad view of participants that includes more and less powerful players for the fullest possible perspective on the classroom. This approach lays the

[2] Mobile phones are becoming increasingly sophisticated communication tools that incorporate more and more textual and multimedia features (e.g. Internet access and text messaging), a phenomenon Henry Jenkins (2006) refers to as *convergence*. They are, however, primarily associated with oral communication whereas laptops are more definitely textual.

groundwork for users to become active contributors to the design process. Participatory design begins with a belief that all stakeholders have a right to influence their surroundings and/or the technologies they use (Ehn, 1992; Winner, 1995). Participatory design is a far cry from the abstraction of anywhere/anytime representations of wireless place. In a participatory framework, designers and non-designers dialogue about proposed designs in context. The designer is charged with "raising the level of awareness of his/her partners (client/users) in the discussion, and the solution will come out of the exchanges between the two" (Sanoff, 1990, p. 7). Experts contribute their expertise. Users come to the table with a wealth of lived experience. No single stakeholder group has enough perspective to arrive at the "right" design. Working in tandem, their collective insight has the potential to yield good classroom design. Classroom design happens at the intersection of people, architecture, things, and tools. We intuitively know that a classroom is more than its walls. So in heeding Michael K. Legutke's (2005) call to pay more attention to the "room in which one learns a language," this article takes more than the perimeter of the wireless ESL classroom into account, looking to participants to lead the way in determining topics of interest.

It begins with a description of the landscape on which stakeholder preferences converge and an overview of methodology before examining stakeholders' preferences themselves in detail. The findings, it could be argued, are germane to a range of wireless classroom situations rather than the exclusive purview of second language instruction. To keep L2 instruction foregrounded, 1) all participants studied are specifically L2 stakeholders[3]; and 2) their priorities

[3] As Deborah J. Bickford (2002) observes facility managers, finance, board of trustees, development, maintenance crews, alumni, technology staff, state legislators, disability directors, and architects also have a stake in most campus learning spaces. This study aims to give voice to those stakeholders with ESL-related priorities.

are viewed through the lens of one particular L2 assignment, the Interview Report Assignment. These priorities range from the overtly spatial—furniture, furniture arrangement, and room size, for example—to less obviously spatial concerns (e.g. peripherals) that still inform the character of the classroom. By allowing the stakeholders to determine which topics that fall under the rubric of wireless classroom design and the amount of attention paid to any given topic, the study relinquishes the "surgical strike" style focus that defines some of the discipline's best work. It's a risk for sure. And I was surprised over and over again by stakeholders' foci. No participants lost any sleep over furniture, for example, except me. Instructors talked passionately about projectors, barely a blip on my radar and of limited concern to the students. However, with this stakeholder-directed approach we gain a more nuanced understanding of which classroom features and staples matter most to stakeholder groups. The article closes with a map of (sometimes surprising) stakeholders' priorities. This map forms the basis of a series of heuristics. While this case study itself is not generalizable, these heuristics could act as a jumping off point for those at other institutions looking to emplace wireless with all L2 stakeholders' priorities in mind.

Studying the wireless landscape: Hatfield Hall room 124

English 101 international (ENG 101i)[4] is an introductory writing course for nonnative English-speaking undergraduate students that meets in Hatfield Hall room 124. Nine student participants—two females and seven males—who agreed to private interviews range in age from 17 – 24 years old. This homogeneity is offset by their diverse geographic origins: Taiwan (Heng

[4] The course name, the name of all locations, and the names of all participants have been changed. Participants' names are intended to preserve their gender and nationality as much as possible while protecting their anonymity.

and Chan), Hong Kong (Shen), the Ivory Coast (Johanna), Mexico (Rosa), Japan (Yoshi), Kuwait (Amir), Indonesia (Dian), and Ecuador (Enrique). In addition to this core of nine student participants, five students agreed to be observed in the context of their 101i class and to share anonymous written reflections on Hatfield Hall 124[1]. Eight 101i instructors—seven females (Monique, Mary, Jun, Gretchen, Emily, Jennifer, and Ling) and one male (Cheung)—participated in private interviews, filled out questionnaires, came together as a focus group, and shared written reflections. Only Mary, Jennifer, and Emily are native speakers of English. The three administrators are a departure from the other stakeholder groups in that George (English as a Second Language), Tom (Introductory Composition), and Margaret (Introductory Composition) are all native speakers between 45 and 54 years old. George, Margaret, and Tom drafted the university-funded grant that paid for Hatfield Hall 124. All English 101i instructors report directly to George.

Students self-select for 101i, though enrolling in some variation of introductory composition is compulsory. Like its mainstream counterpart, English 101, 101i meets a university-wide composition requirement and bears the same amount of credit. It also shares a rhetorical focus; students are required to write four essays, with each successive assignment building on the skills mastered in the previous assignment: a personal experience essay, an interview report essay, a literature review essay, and an argumentation essay. English 101i differs, however, in its targeted focus on language issues that are especially salient to international students. The majority of 101i instructors are themselves L2 speakers while the majority of 101 instructors are not. And while English 101 is held in a wired computer classroom at least once a week, 101i meets fulltime in a dedicated wireless classroom (see Figures 1 and 2).

Volume 10, Number 2
ISSN: 1535-0975

Figure 1: Northwestern View of Hatfield Hall 124

All sections of 101i meet in HH 124 four or five days a week (at the instructor's discretion). Eleven rectangular Watson Desk Fusion tables (ten of the standard model and one A.D.A.-approved model), each measuring 24" x 54", have replaced the standard chairs with built in half desks that populate most classrooms on the first floor of Hatfield Hall. The rectangular tables are usually arranged into a square in the center of the room. Twenty one black resin (wheel-less) chairs are tucked neatly beneath the tables. In the corner of the room, a wheeled, lockable cart measuring 43"x 51"x 18" contains 20 wireless Gateway 450sb laptops. Between classes, the laptops are returned to the cart for a quick re-charge (see Figure 2). The new

Volume 10, Number 2
ISSN: 1535-0975

additions are surrounded by familiar staples of the traditional writing classroom: a blackboard, an overhead projector, a clock, and a lectern.

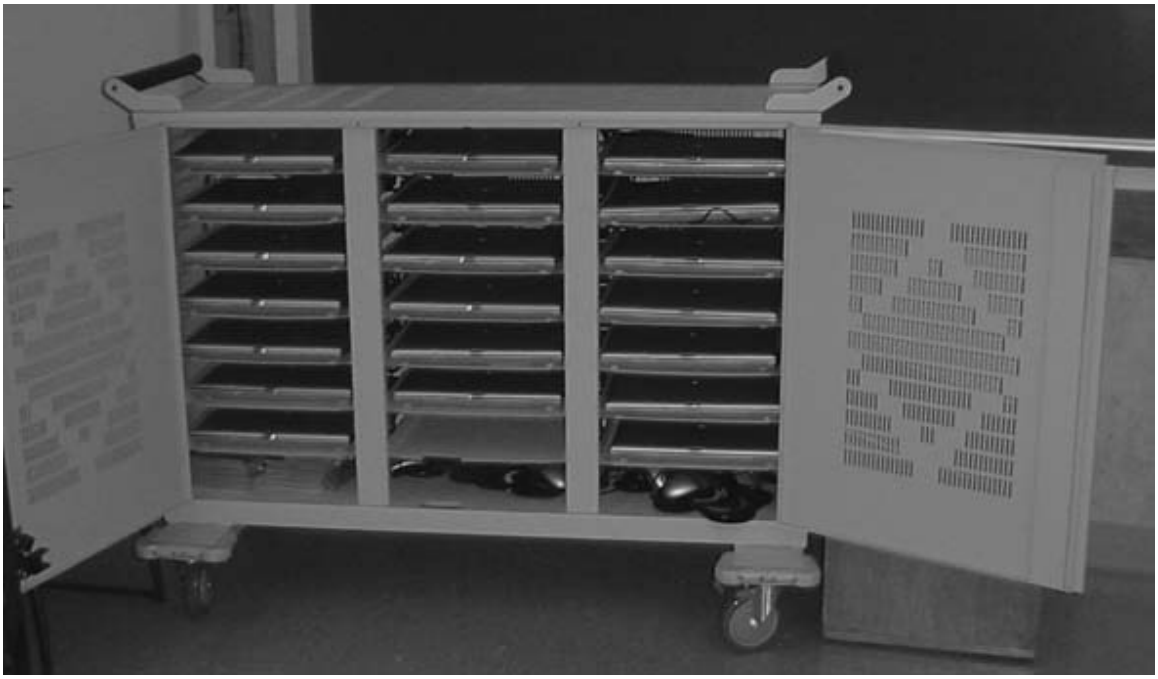

Figure 2: Gateway Laptop Cart

Data collected came from six primary sources: texts that informed decision making about the site (e.g. grant proposals, budgetary reports, policy documents), site observations, pre-interview and pre-focus group questionnaires from participants; student, instructor, and administrator one-on-one interviews; an instructor focus group; and instructors' and students' written reflections about HH 124. In total, over 50 documents were analyzed, roughly 38 hours of observations were conducted, and almost 17 hours were spent interviewing groups and individuals over the course of eighteen months. Questions posed to participants fit into three basic categories: general observations about the classroom itself (e.g. If another instructor found

Volume 10, Number 2
ISSN: 1535-0975

out that you were teaching in a wireless classroom and wanted to know what it was like, how would you describe the experience?); about outfitting the classroom (e.g. Is HH 124 "done"? Are there any changes you'd like to see?); and ordering the classroom (e.g. Where do you most like to sit?). Direct questions—i.e. "Do you like rolling chairs for wireless classrooms?"—were avoided in an effort to suss out stakeholders' priorities as well as their preferences for the space.

Case studies (Stake, 2005) lend themselves to composition research in general (Kirsch & Sullivan, 1992 and Lauer and Asher, 1988) and L2 research in particular (Weigle and Nelson, 2004; Dodigovic, 2005; and Canagarajah, 1993). This qualitative, descriptive approach is suited for initial inquiries into new areas of study and the study of whole environments; the wireless ESL classroom falls into both categories. It has also proven itself as an especially effective methodology for capturing the diversity of L2 writers and their contexts (Geertz, 1983; and Casanave, 1995 and 2003, for example). If, as Richard Kern (2006) suggests, "the complexity of the issues involved in technology and language learning is pushing us to look beyond grossly decontextualized measures of effectiveness to understand effectiveness in terms of the specifics of what people do with computers, how they do it, and what it means to them" (p. 189), then case studies are a particularly good choice for CALL research. Though other institutions establishing wireless ESL classrooms may or not bear a resemblance to this research site, this case study does identify nodal points at which stakeholders' preferences may intersect or diverge on other campuses. Acknowledging these overlaps and discrepancies is a first step towards opening up a dialog that could lead to profitable negotiations.

Findings: Visions of our wireless L2 classroom

ENG 101i students spend the majority of the semester building their writing skills and their vocabulary as they research and write about a personally resonant topic (e.g. making American friends, securing financial aid as an international student, daycare in the US and abroad). For the Interview Report Assignment[5], the third of four sequenced essays required for the course observed, students speak with an expert on their chosen topics. In preparation for their interviews, students are encouraged to seek out a knowledgeable source, confirm their selection with the instructor, formally request the interviewee's participation, write open-ended questions, and secure recording equipment if possible for later transcription. The report that results from this encounter is born from recordings (hopefully) and notes (mandatorily). After reviewing their notes and/or recordings several times, students are asked to focus their report around a main idea rather than attempt to present a complete portrait of the participant. Students who are unable to meet with their interviewees face-to-face are permitted to replace in person meetings with emails or phone calls.

The types of online research tasks that precede the interview are among the most common uses of laptops (Warschauer, 2006). Because these students don't own these laptops[6] and their circulation is limited to the classroom itself, they are unable to use these particular computers to complete these tasks outside of class time. For pre-interview research, this doesn't pose much in the way of hardship since students can user their own technology or the university's computer labs. Students cannot bring HH 124 laptops along to interviews with experts to take notes. They cannot install transcription software, such as Dragon

[5] Adapted from Leki, I. (1998). *Academic writing: Exploring processes and strategies, Second edition.* New York: Cambridge University Press.
[6] Most don't own a laptop period, though they do own desktops.

NaturallySpeaking (even at their own cost), to help them analyze their conversations post-interview. Laptop ownership, it seems, has the potential to influence this course's learning outcomes.

Nancy Sullivan and Ellen Pratt (1996) were among the first to compare a traditional face-to-face classroom of ESL students with a computer-assisted classroom of ESL learners to better understand the effects of regular computer use on foreign language learning outcomes. Though they found no difference among the groups of students in terms of attitudes towards writing with computers or writing apprehension, they did detect an improvement in writing quality in the computer-assisted classroom. Their findings have been borne out over and over again by others studying the benefits of using computers for conferences with ESL students (Skinner and Austin, 1999); to facilitate collaboration (Sotillo, 2002); and for grammar instruction (Yuan, 2003). Given these advantages, designers tasked with the responsibility of setting up a wireless classroom for second language learners likely find themselves facing the twin hurdles of access and ownership early on. Will the cost of laptops (the initial investment and upkeep) be absorbed by the institution, or should it be the responsibility of stakeholders[7]? University-wide ownership initiatives—requiring students to purchase laptops as a condition of enrollment[8]—give rise to a bramble of thorny questions: If stakeholders pay for their own computers, will the cost be folded in tuition for students? Financed? If the school pays for the laptops, will stakeholders be permitted to remove them from the classroom? Will they care to remove them from the classroom? Who is financially responsible if machines break through use or negligence? Yet

[7] In either case, it can be argued that students are on the hook. Whether they pay Best Buy or pay more for tuition and fees, students seem more likely to shoulder the bulk of the cost.
[8] Such as the requirement for all incoming students at University of North Carolina at Chapel Hill and Rose-Hulman Institute of Technology and for some majors at the University of Florida and Georgia Tech

despite these concerns, instructors and administrators are united by the desire to own the technology (see Table 1).

ISSN: 1535-0975

Table 1: Stakeholder Groups' Preferences for Laptop Ownership

Participants' Preferences	**Count**	**Proportion of Stakeholder Group**
Students		
University-owned laptops	6	.67
Individually-owned laptops	3	.33
No preference stated	0	0
Instructors		
University-owned laptops	0	0
Individually-owned laptops	8	1
No preferences stated	0	0
Administrators		
University-owned laptops	0	0
Individually-owned laptops	3	1
No preferences stated	0	0
All Participants' Preferences Combined		**Proportion of All Participants**
University-owned laptops	6	.3
Individually-owned laptops	14	.7
No preference stated	0	0

The 101i instructors and administrators are very much in touch with the benefits of ownership (though no ownership initiative is in place): less class time spent distributing, setting up, and re-shelving cart-bound laptops, no caster-clad but ultimately stationary cart chained to the front of the room. And while the students, like instructors and administrators all own at least one non-mandated (mostly wired) computer, they ultimately come down on the other side of the fence. The few students that own laptops aren't rushing to bring them to this class or any other,

thanks to heavy machines and heavier course loads that would require them to bear the load for excessively long periods. Most students are content to use the laptops provided in HH 124 during classtime—relatively stripped down models—and to duck into the 59 (wired) computer labs spread across campus as the need arises. Like the rows of tables and chairs bolted down in these computers labs, the furniture in HH 124 resists infinite reordering.

Ruth Mirtz (2004) argues that classroom furniture staples—desks, chairs, tables, projectors, chalkboards—all have a strong resting inertia (p. 14) The castor-clad laptop cart in HH 124 that is chained to the wall, for example, strongly resists reordering. By disrupting that inertia (or the tendency of objects at rest to stay at rest), instructors and students can manipulate the furniture to establish, maintain, or challenge control (p. 19). Many of these instructors exerted their power by opting for arrangements that supported their ability to closely monitor students' screens.

Table 2: Stakeholder Groups' Preferences for Furniture Arrangement

Participants' Preferences	**Count**	**Proportion**
Students	**Count**	**Proportion of Stakeholder Group**
Unobstructed view	4	.44
Visible display	2	.22
Private display	6	.67
Flexible	0	0
No preference stated	3	.33
Instructors	**Count**	**Proportion of Stakeholder Group**
Unobstructed view	7	.88
Visible display	6	.75
Private display	0	0
Flexible	7	.88
No preference stated	0	0
Administrators	**Count**	**Proportion of Stakeholder Group**

Unobstructed view	3	1
Visible display	3	1
Private display	0	0
Flexible	3	3
No preference stated	0	0
All Participants' Preferences	**Count**	**Proportion of All Participants**
Unobstructed view	14	.7
Visible display	11	.55
Private display	3	.3
Flexible	10	.5
No preference stated	3	.15

Cliff Kuang (2009) connects the evolution of popular arrangements for office space with changing attitudes towards work. Early 20th century Taylorism, characterized by its emphasis on efficiency and oversight, favored an open environment for low-level workers monitored by higher-ups in private offices. The 1960s brought a more European approach that favored socialist values. Management was no longer sequestered, and arrangements were dictated by function: designers' desks formed pinwheels to aid collaboration while clerks were more likely to be stationed side-by-side for their more solitary work. Cube farms propagated in the 1980s as middle management swelled and these workers' in-between status merited more than unprotected desks on the office savanna and less than private vistas from which to do their work. According to Kuang, we currently favor a moderated approach to office design that allows for more sociability than a cube farm and less privacy than individualized offices. Popular moveable, semi-enclosed pods suggest personal space but lack actual privacy. Kuang's observations in the workplace lead me to ask: What does the current, favored configuration in HH 124 suggest about stakeholders' attitudes towards their work?

Volume 10, Number 2
ISSN: 1535-0975

Most instructors default to leaving tables in a large square mirroring the perimeter of the room with about two feet of space between the walls and the tables to accommodate students and their chairs, thankful to be free of sightline obscuring, weighty desktops (see Figures 1 and 2). Instructors, unlike their students, possess the agency to move more than just their bodies, but they are typically hesitant to spend class time re/arranging furniture or bodies even if they do appreciate flexibility in the abstract. This default arrangement is favored by instructors primarily because it supports surveillance. Instructor Jennifer, like many of her colleagues, feels compelled to "monitor students' progress during group lessons" (Reflection, 15). Most instructors take a few laps around the square during class, looking over students' shoulders. Jennifer, in an effort to more consistently observe students' screens, describes "turning the classroom around" by pushing the tables out to the walls (Focus group, 103-106). This setup requires students to sit on the inside of the square and face the walls while the instructor, stationed in the center of the room, discourages students from deviating from sanctioned programs and content.

Students interviewed do play. But the nature and value of the play described isn't as straightforward as some might suspect. Daniel Anderson et al. (2002) note that students working on wireless laptops are especially susceptible to "outside distractions," such as instant messaging. Of course, they add, students in traditional classrooms have always had their own diversions. Wireless classes open up new options for stealth procrastination: reading the online version of the school newspaper is much less conspicuous than reading the paper copy in class. But, others have argued, even the most seemingly off-task exchanges can be valuable if they help maintain collegial relationships that can contribute to the success of classroom activities (see Rouzie, 2001). Recognizing the tension between what she finds important and her students

Volume 10, Number 2
ISSN: 1535-0975

priorities, Melissa Meeks (2004) has an uniquely nuanced understanding of play in the wireless classroom. “Off-task laptop use” she writes, “is…only a problem if it impedes work; it is not a clear sign that the student is bad and the teacher is worse. Not being on-task is not the same as being off-task, and I think the distinctions are harder to make in wireless spaces, especially if we use the lenses that work well in pen and paper classrooms.” Several of these students acknowledge using the laptops to take short breaks from class work by checking email, chatting with unenrolled friends, and playing games while pretending to take notes. Some, though, rely on the laptops to help fill in the gaps when they aren’t following the conversation because they have encountered unfamiliar vocabulary or concepts, using (strictly speaking) unsanctioned software and websites to aid each other and themselves in the drafting and revision process.

For example, the Interview Report assignment incorporates a process approach that emphasizes prewriting, drafting, rewriting. During the initial stages of the Interview Report, the instructor comments on the first draft during conferences. At stage 2, students comment on each others’ second drafts in class. For stage 3, the final, revised draft is due to the instructor. The students observed compensated for deficits in vocabulary during the first stage of the assignment with the help of online dictionaries and thesauruses. They also looked to each other. Student Shen describes his use of an instant messaging service to confer with co-present classmates about the task at hand even though this program is technically off-limits (Interview, 5-17). During the second, peer review stage of the Interview Report Assignment, students opted to swap their drafts electronically. This electronic exchange opened the door to alternate methods of feedback (e.g. Track Changes in MS Word). Students integrated commenting features with “scaffolding tools” such as spelling and grammar checkers, bibliographic software. Though the choice to

swap drafts electronically was initially driven by the challenges of navigating tables and bodies in the 21' by 21' square room, this means of exchange opened up pedagogical opportunities.

The size of the room was viewed as unremarkable or adequate by most students and instructors, as crowded by a handful of instructors, and as politically advantageous by administrators (see Table 3).

Table 3: Stakeholder Groups' Preferences for Room Size

Participants' Preferences	**Count**	**Proportion of Stakeholder Group**
Students		
Room size		
Too big	0	0
Too small	0	0
Adequate/appropriate	5	.56
No preference stated	4	.44
Instructors		
Too big	0	0
Too small	2	.25
Adequate/appropriate	2	.25
No preference stated	4	.5
Administrators		
Too big	0	0
Too small	0	0
Adequate/appropriate	3	1
No preference stated	0	0
All Participants' Preferences	**Count**	**Proportion of All Participants**
Too big	0	0
Too small	2	.1
Adequate/appropriate	10	.5
No preference stated	8	.4

Administrators purposively selected and outfitted this smaller space because the university supports a one-to-one student computer ratio across disciplines. Stocking the cart with 20

laptops—rather than 24-27, the number of students Space Management and Scheduling determined could comfortably fit into HH 124 before the ENGL 101i redo—keeps enrollment low. Larger class enrollments are among the challenges English as a Foreign Language teachers and administrators face (see Leki, 2001). Smaller spaces, however, will only accommodate particular types of furniture. The details of the pieces themselves don't register nearly as much with the participants in this study as their configurability (see Table 4).

Table 4: Stakeholder Groups' Preferences for Furniture

Participants' Preferences	**Count**	**Proportion of Stakeholder Group**
Students		
Desks	2	.22
Tables	0	0
Task chairs with casters	0	0
No preferences stated	7	.78
Instructors		
Desks	1	.13
Tables	2	.25
Task chairs with casters	0	0
No preferences stated	5	.63
Administrators		
Desks	0	0
Tables	3	1
Task chairs with casters	0	0
No preferences stated	0	0
All Participants' Preferences	**Count**	**Proportion of All Participants**
Desks	3	.15
Tables	5	.25
Task chairs with casters	0	0
No preferences stated	12	.6

Possibly because students and instructors have historically had so little control over classroom furniture selection, they are relatively tight-lipped about this topic. A few student voices express a preference for a conventional staple: a desk on which to write. A few instructors favored desks. But most student and instructor stakeholders didn't weigh in on the topic at all. A connection between furniture and learning has been established in other disciplines. When traditional desks were replaced by tables and lightweight chairs in college accounting courses, both student interaction and engagement improved (Cornell and Martin, 1999). As part of their curricular overhaul, the Massachusetts Institute of Technology's Department of Aeronautics and Astronautics remodeled their studios, labs, and project rooms to aid their graduates in the often bumpy transition from college to work (Cornell, 2002). The College of Professional Studies at the University of Wisconsin–Stevens Point replaced their multi-hued plastic tablet chairs with tables and upholstered chairs (among other significant improvements). Upgrades resulted in an extended repertoire of classroom activities among teachers and a heightened sense of empowerment reported by students (North, 2002). Though tight-lipped about furniture, HH 124 stakeholders did voice opinions about selected peripherals (see Table 5).

Table 5: Stakeholders' Preferences for Peripherals

Participants' Preferences	**Count**	**Proportion of Stakeholder Group**
Students		
LCD projector	0	0
Printer	2	.22
AC adaptors/outlets	0	0
Docking stations	0	0
External Mice	5	.56
External, full size keyboard	0	0

Microphones	0	0
Webcam	0	0
Soundcard	0	0
No preferences stated	7	.78
Instructors		
LCD projector	7	.88
Printer	4	.5
AC adaptors/outlets	0	0
Docking stations	0	0
External Mice	1	.13
External, full size keyboard	1	.13
Microphones	0	0
Webcam	0	0
Soundcard	0	0
No preferences stated	0	0
Administrators		
LCD projector	2	.67
Printer	1	.33
AC adaptors/outlets	1	.33
Docking stations	0	0
External Mice	0	0
External, full size keyboard	0	0
Microphones	0	0
Webcam	0	0
Soundcard	0	0
No preferences stated	0	0
All Participants' Preferences	**Count**	**Proportion of All Participants**
LCD projector	9	.45
Printer	7	.35
AC adaptors/outlets	1	.05
Docking stations	0	0
External Mice	6	.3
External, full size keyboard	1	.05
Microphones	0	0
Webcam	0	0
Soundcard	0	0
No preferences stated	7	.35

The grant that ultimately funded HH 124 makes no provision for peripherals and shortages have not gone unnoticed by any group. This absence weighs particularly heavy on the minds of almost every instructor interviewed. Without a mounted liquid crystal display (LCD) projector in Hatfield Hall 124 projector, opportunities to explore the visual components of the Interview Report assignment are limited[9]. L2 students, operating in multiple contexts (some in which red signifies "prosperity" and others in which it means "stop") are under special duress to cultivate visual literacies in their increasingly multimodal worlds. A mobile LCD projector is currently available but deemed insufficient by instructors because it is shared by the entire Department of English and its 200+ members, set up procedures are time consuming, and it is not especially user friendly. Instructors have developed mostly unsatisfying workarounds for dealing with the absence of a permanent projector (e.g. an old-fashioned overhead projector with transparencies and handouts). Conflicting accounts explaining its absence circulate among the instructors. These explanations range from there not being enough space to accommodate the built-in projector, to its absence being an oversight on the part of the administration. Administrator George clears up the mystery; a built-in projector was simply too expensive (interview, 88-92).

The contents and organization of the Interview Report are largely open in that the assignment gives students free reign to craft any type of document they see fit. The lack of assorted peripherals in HH 124, however, does not encourage genre experimentation or multimedia content. These students seem content to stick to a conservative format: 750-1000 words, double spaced, downloadable MS Word documents housed on stripped-down Web pages

[9] Even Microsoft Word documents are designed.

Volume 10, Number 2
ISSN: 1535-0975

for the instructor's consumption. Paula Winke & Senta Goertler (2008) identify a mismatch between foreign language students' personal use of websites and multimedia materials and how L2 instructors (fail to) incorporate these texts into the classroom. Their argument suggests that if students are consuming and constructing online texts like podcasts, blogs, and wikis in their daily lives, instructors can tap into this enthusiasm by integrating Web 2.0 technologies into assignments (see Sykes et al. 2008). Here multimedia tools—microphones, webcams, digital cameras, etc.—are in short supply in HH 124 but not especially missed by participants.

Other peripherals—mice, A/C adaptors, docking stations with external monitors—get short shrift from participants. Students observed regularly plugging their own ancillary mice into laptops offered no opinion on their use during interviews. Only one instructor, a male with larger hands, stated he would appreciate an external mouse and full size keyboard. Most backburned the issue. A/C adapters to plug into the classroom's sporadically-placed, scant four outlets (eight plugs total), it seems, are not missed by any stakeholder group.

Some answers, more questions: Finding common ground in a wireless world

From the participants studied here, it can be said that L2 stakeholders' priorities for this wireless classroom form a cobweb of connections (see Figure 3).

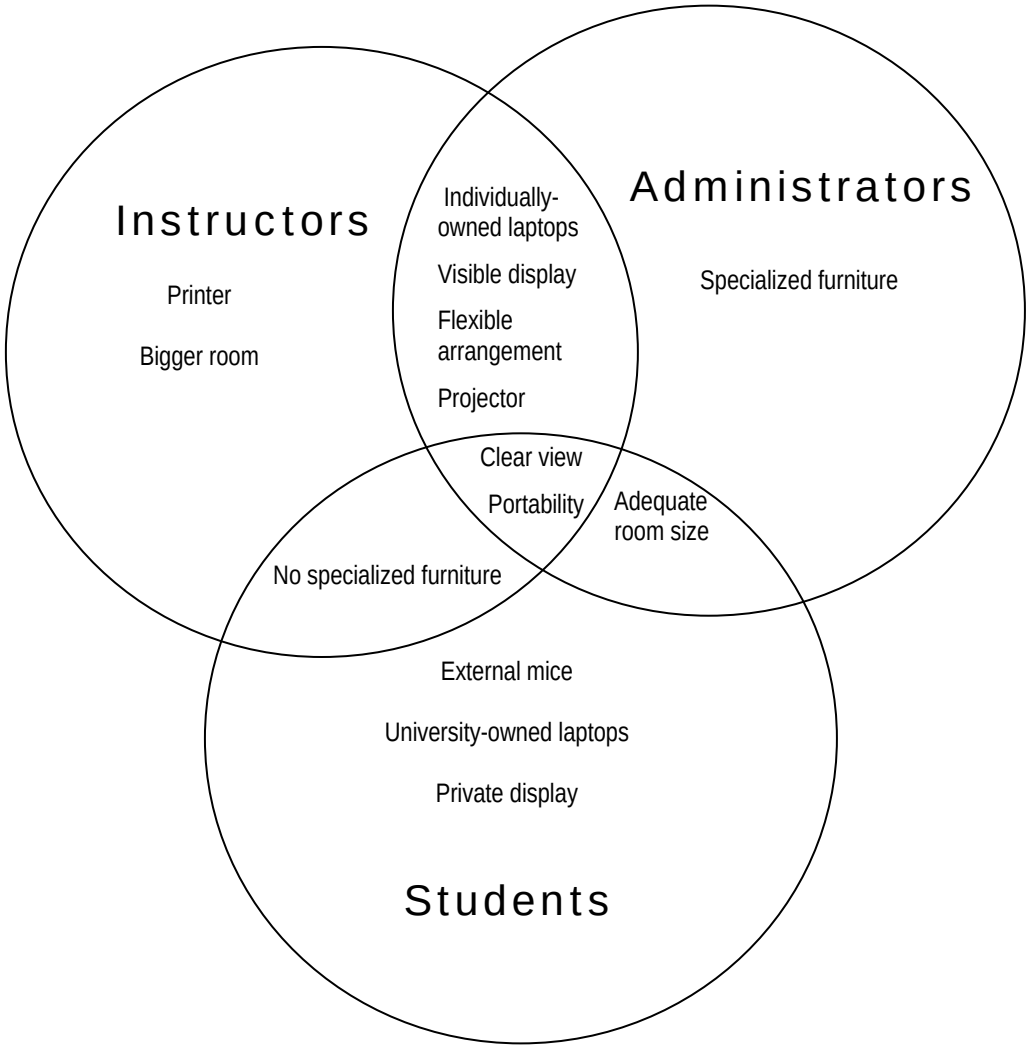

Figure 3: Stakeholders' Preferences for HH 124

The almost universal preference for unobstructed views of peers, students, displays, and so on suggests that three minutes spent reconfiguring furniture at the beginning of class might be time well spent. Instructors and administrators find common ground when expressing their preference for laptop ownership initiatives, visible displays that support surveillance, the

Volume 10, Number 2
ISSN: 1535-0975

acquisition of a projector, and flexible furniture arrangements. Administrators and students agree that the room is appropriately sized, but they come to this conclusion for very different reasons.

Disagreement between stakeholder groups often represents differing priorities rather than an intractable locking of horns. It's not that students oppose the installation of a built-in LCD projector, per se; the LCD projector doesn't appear on their radar. Some instructors strike out on their own when they reject HH 124 as too small or call for a printer. Administrators' emphasis on specialized furniture sets them apart. Students veer off from instructors and administrators when expressing their dislike of mandated laptop ownership and their desire for private displays and use external mice. These findings imply that acquiring expensive, featherweight laptops, specialty chairs, and budget-busting peripherals beyond the printer and projector might not be the best use of funds in the wireless ESL classroom. It also suggests that outfitting a wireless ESL classroom might not be as cost-prohibitive as it seems on first glance.

Can competing stakeholder desires be mediated or resolved? What are the implications of (not) doing so? Pigeonholing outliers and the less powerful participants in the name of coherence seems unreasonable at best, unethical at worst. The design for the "best" wireless ESL classroom may be the one that most openly recognizes and attempts to account for competing stakeholder perspectives within and across groups. Establishing more transparent, inclusive procedures for wireless classroom design would allow users to shape their environment instead of just reacting to it. It could also shore up relations between stakeholder groups. Instructors who argue HH 124 is too small for their liking might revise their position if administrators openly acknowledged the classroom's size as a purposeful tactic for limiting enrollments.

A participatory approach to design—deviating from a top-down model and decentralizing control over the process—requires lived experience to join up with expertise to inform decision-making. Michael K. Legutke (2005) suggests that L2 students should be encouraged to "co-construct the learning environment" by writing their own texts and incorporating texts they have gathered themselves into the curricula (p. 144). This article extends Lugutke's proposition to include the physical space of the learning environment. Including L2 students in design processes that fundamentally alter the scene of their education is a significant redistribution of power.

So this article closes not with the last word on ESL laptop classroom design but with heuristics for outfitting (Table 6) and ordering (Table 7) wireless ESL classrooms.

Table 6: Heuristic for Outfitting Wireless ESL Classrooms

Node	Questions
Ownership	• Who will pay for the laptops? If the school pays for the laptops: o Will students be able to remove them from the classroom? o Who pays if the machines break? o How many models will be available? If the stakeholders pay for their own laptops: o How will they pay for them? Will this cost be folded into tuition (for students)? Subsidized by employers (for instructors)? o Will suppliers work with representatives from the school to determine pre-approved models? Which representatives? Are alternative models acceptable? o Will stakeholders have to bring laptops with them to every class? • Will there be back-ups available to replace malfunctioning machines?
Furniture	• Is the furniture common in school settings (e.g. desks)? What are the dis/advantages of maintaining the status quo? • Is there furniture common in workplace settings (e.g. ergonomic chairs with casters)? What are the dis/advantages of making the classroom look like an office?

ISSN: 1535-0975

	• Is the furniture common in homes (e.g. comfortable, oversized chairs)? What are the dis/advantages of making the classroom look like a home?
Security	• Are there security measures in place for university-owned laptops? Are there check-out procedures? A lockable cart? Lockable room? Who gets keys? Who decides who gets keys? • What happens if equipment goes missing? Will it be replaced? Who is responsible for the loss?
Peripherals	Printers and paper
	• Is there a printer? If there is a printer: o How will its presence affect the distribution of information? The collection of assignments? o Will its presence disrupt the class? o Who will pay for maintenance? Replenish the paper supply? o Will a surplus of paper invite or hinder mobility? If there is no printer: o How will its absence affect the distribution of information? The collection of assignments? o Is there a viable, alternative paper supply? o Will electronic documents invite or hinder mobility?
	Projection
	• Is there an LCD projector? Is it mobile or permanent? If it is mobile: o Is it shared? By who? o Is it easy to hook up? o Where is it stored? • Is there an overhead projector? Who stocks it with transparencies? Do transparencies contrast sharply with the professionalism of other productions? What is the effect of this contrast? • Does the absence of an LCD projector inhibit participants?
	Adaptors vs. batteries
	• Are there AC adaptors available, or do stakeholders need to rely on batteries? If AC adaptors are provided: o Are there enough outlets to accommodate them? o Do they pose a tripping hazard? If laptops run on battery power only: o *Cart-bound laptops*: Is there enough charge time between uses to

ISSN: 1535-0975

	recharge cart-bound laptops? o *Laptops*: Can stakeholders be counted on to bring their own laptops to class fully-charged?
	Multimedia tools
	• Are there webcams? • Are there microphones? • Are the laptops equipped with soundcards? • Are the video cameras?

ISSN: 1535-0975

Table 7: Heuristic for Ordering Wireless ESL Classrooms

Node	Questions
Arranging people	• Is the place large enough to support a large-scale reordering of people? If not, are small-scale reorderings possible? • Can participants sit far away from each other? Close to each other? • Are sightlines impeded by the arrangement of people? • How do stakeholders' positions reflect or deflect their power?
Arranging furniture	• Is the place large enough to support a large-scale reordering of furniture? If not, are small-scale reorderings possible? • Does the arrangement create paths for movement? Impede it? • Are sightlines impeded by the arrangement of furniture? • Does the arrangement follow an academic model? What are the dis/advantages of adhering to it? • Does the arrangement follow a work-world model? What are the benefits of adhering to this model? Deviating from it? • How hard is the furniture to move? How much class time is devoted to re/arranging furniture? Does the furniture have to be returned to a default state at the end of class? • Does the configuration of furniture support play? Curb it? Is it valuable or valueless? • Does the configuration of furniture support surveillance? Curb it? What are the dis/advantages of this surveillance?
Arranging technologies	• Is the place large enough to support a large-scale reordering of technologies? If not, are small-scale reorderings possible? • How much class time will be devoted to checking-out, booting-up, and returning university-owned laptops to the cart? • How hard is the technology to move? How much class time is devoted to re/arranging technology? Does the technology have to be returned to a default state at the end of class? • Where are laptops stored? Does storage block access to certain zones (e.g. near the windows) or resources (e.g. the blackboard)? Is it im/mobile? Easily accessible? • Are sightlines impeded by the arrangement of technologies?

Volume 10, Number 2
ISSN: 1535-0975

Chosen nodal points are based on local participants' preferences. In other contexts, they will likely require redefinition. These heuristics are purposefully broad to inspire those at other institutions to emplace wireless technologies with L2 stakeholders in mind.

References

Aizawa, K., & Kiernan, P. (2003, September). *Cell phones in task-based learning: Are cell phones useful language learning tools?* Paper presented at the EUROCALL 2003 Conference, University of Limerick, Ireland.

Anderson, D., Brown, R. S., Taylor, T., & Wymer, K. (2002). Integrating laptops into campus learning: Theoretical, administrative and instructional fields of play. *Kairos, 7*(1). http://kairos.technorhetoric.net/7.1/binder.html?response/CCI/index.html

Bickford, D. J. (2002). Navigating the white waters of collaborative work in shaping learning environments. *New Directions for Teaching and Learning*. 92, 43-52.

Britton, B.K., & Glynn, S.M. (1989). Computer writing environments: Theory, research, and design. Hillsdale: Lawrence Erlbaum Associates.

Canagarajah, A. S. (1993). Comments on Anne Raime's "Out of the woods: Emerging traditions in the teaching of writing": Up the garden path: Second language writing approaches, local knowledge, and pluralism. *TESOL Quarterly, 27*(2), 301-306.

Casanave, C.P. (1995). Local interactions: Constructing contexts for composing in a graduate sociology program. In G. Braine & D. Belcher (Eds.), *Academic writing in a second language: Essays on research and pedagogy* (pp. 83-110). Norwood, NJ: Ablex.

Casanave, C. P. (2003). Looking ahead to more sociopolitically-oriented case study research in L2 writing scholarship (but should it be called "post-process"?). *Journal of Second Language Writing*, 12, 85-102.

Castells, M., Fernández-Ardèvol, M., Qiu, J.L., and Sey, A. (2006). Mobile communication and society: A global perspective. Cambridge: MIT Press.

Chinnery, G. (2006). Going to the MALL: Mobile assisted language learning (emerging technologies). *Language, Learning, & Technology*, 10(1), 9-16.

Cornell, P. (2002). The impact of changes in teaching and learning on furniture and the learning environment. *New Directions for Teaching and Learning*. 92, 33-42.

Cornell, P., & Martin, S. (1999). "Replacing desks with tables: The impact on classroom behavior." Paper presented at Learning Environments Symposium, Virginia Polytechnic Institute and State University, Dec.1999.

Cragg, W. & Greenbaum, A. (2002). Reasoning about responsibilities: mining company managers on what stakeholders are owed. *Journal of business Ethics, 39*(3), 319-335.

Crystal, D. (2001). Language and the internet. Cambridge: Cambridge University Press.

Dodigovic, M. (2005). Vocabulary profiling with electronic corpora: A case study in computer assisted needs analysis. *Computer Assisted Language Learning*, 18(5), 443-455.

Drew, W. (2003). Wireless networks: New meaning to ubiquitous computing. *The Journal of Academic Librarianship*, *29*(2), 102-101.

Egbert, J.L. (2005). Conducting research on CALL. In J.L. Egbert & G.M. Petrie (Eds.), *CALL research perspectives* (pp. 3-8). Mahwah, NJ: Lawrence Erlbaum.

Ehn, P. (1992). Scandinavian design: on participation and skill. In Paul Adler & Terry Winograd (Eds.), *Usability: turning technologies into tools* (pp. 96-132). Oxford: Oxford University Press.

Gant, D., & Kiesler, S. (2002). Blurring the boundaries: Cell phones, mobility, and the line between work and life. In B. Brown, N. Green & R. Harper (Eds.), *Wireless world: social and interactional aspects of the mobile age* (pp. 121-131). London: Springer.

Geertz, C. (1983). *Local knowledge: Further essays in interpretive anthropology*. New York: Basic Books.

Gillette, D. (2001). Metaphorical confusion and spatial mapping in an age of ubiquitous computing. *Technical Communication, 48*(1), 42-48.

Houser, C., Thorton, P., Yokoi, S., & Yasuda, T. (2001). Learning on the move: Vocabulary study via mobile phone email. *ICCE 2001 Proceedings*, 1560-1565.

Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. New York: New York University Press.

Kaler, J. (2002). Morality and strategy in stakeholder identification. *Journal of business Ethics, 39*(1/2), 91-99.

Kern, R. (2006). Perspectives on technology in learning and teaching languages. *TESOL Quarterly*, 40(1), 183-210.

Kiernan, P. J. & Aizawa, K. (2004). Cell phones in task based learning: Are cell phones useful language learning tools? *ReCALL*, 16(1), 71-84.

Kirsch, G. & Sullivan, P.A (Eds.) (1993). *Methods and methodology in composition research.* Carbondale: Southern Illinois UP.

Kluge, D. (2002). Tomorrow's CALL: The future in our Hands. In P. Lewis (Ed.), *The changing face of CALL: A Japanese perspective* (pp. 245-267). Lisse: Swets & Zeitlinger.

Kuang, C. (2009, March 23). Evolution of office spaces reflects changing attitudes toward work. Wired Magazine, 17(04). Retrieved April 11, 2009, from http://www.wired.com/culture/design/magazine/17-04/pl_design.

Langtry, B. (1994). Stakeholders and the moral responsibilities of business. *Business Ethics Quarterly, 4*(4), 431-433.

Lauer, J. & Asher, J.W. (1988). *Composition research: Empirical designs*. New York: Oxford UP.

Legutke, M. K. (2005). Redesigning the foreign language classroom. In C. Davison (Ed.), *Information Technology and Innovation in Language Education* (pp. 127-148). Hong Kong: Hong Kong University Press.

Leki, I. (2001). Material, educational, and ideological challenges of teaching EFL writing at the turn of the century. *International Journal of English Studies,* 1, 197–209.

Levy, M. & Kennedy, C. (2005). Learning Italian via mobile SMS. IN A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile technologies for teaching and learning* (pp. 76-83). London: Kogan Page/Taylor & Francis.

Levy, M. & Stockwell, G. (2006). CALL dimensions: Options and issues in computer-assisted language learning. Mahwah: Lawrence Erlbaum Associates.

McNicol, T. (2004). Language e-learning on the move. *Japan Media Review*. http://www.ojr.org/japan/wireless/1080854640.php

Meeks, M. G. (2004). Wireless laptop classrooms: Sketching social and material spaces. *Kairos, 9*(1). http://english.ttu.edu/Kairos/9.1/coverweb/meeks/index.html

Mitchell, W. J. (2003). What cyberspace does to real space: Where will we live when we can live anywhere? *Topic Magazine, Winter*(3), 34-41.

Morris, S. (1997). Internal effects of stakeholder management devices. *Journal of business Ethics, 16*(4), 413-424.

Murray, D. E. (2005). New frontiers in technology and teaching. In C. Davison (Ed.), *Information Technology and Innovation in Language Education* (pp. 25-44). Hong Kong: Hong Kong University Press.

Myers, L. (1993). Approaches to computer writing classrooms: Learning from practical experience. Albany: State U of New York P.

North, J. D. (2002). Put your money where your mouth is: A case study. *New Directions for Teaching and Learning*. 92, 73-80.

Olsen, F. (2001). Electronic dorm gives Maryland students an entrepreneurial environment. *The Chronicle of Higher Education, 47*(18), A32.

Palmquist, M., Kiefer, K., Hartvigsen, J. & Goodlew, B. (1998). Transitions: Teaching writing in computer-supported and traditional classrooms. Norwood, NJ: Ablex.

Phillips, R. (2003). Stakeholder legitimacy. *Business Ethics Quarterly, 13*(1), 25-41.

Rouzie, A. (2001). Conversation and carrying-on: Play, conflict, and serio-ludic discourse in synchronous computer conferencing. *CCC, 53*(2), 251-299.

Sanoff, H. (1990). Participatory design in focus. In Henry Sanoff (Ed.), *Participatory design: theory & techniques* (pp. 5-20). Raleigh: H. Sanoff.

Skinner, B. & Austin, R. (1999). Computer conferencing—does it motivate EFL students?, *ELT Journal.* 53(3), pp. 270–277

Sotillo, S.M. (2002). Constructivist and collaborative learning in a wireless environment. *TESOL Journal.* 11(3), pp. 16–20.

Stake, R. (2005). Qualitative case studies. In N.K. Denzin, & Y.S. Lincoln (Eds.), *The Sage handbook of qualitative research* (3rd ed., pp. 443-466). Thousand Oaks, CA: Sage Publications.

Strauss, H. (2003). Wireless classrooms: Evolution or extinction? *Syllabus, 17,* 41-42.

Sullivan, N. & Pratt, E. (1996). A comparative study of two ESL writing environments: A computer-assisted classroom and a traditional oral classroom. *System*, 29(4), 491-501.

Sykes, J., Oskoz, A. & Thorne, S. (2008). Web 2.0, synthetic immersive environments, and mobile resources for language education. *CALICO Journal, 25*(3), 528-546.

Taylor, R.P., & Gitsaki, C. (2003). Teaching WELL in a computerless classroom. *Computer Assisted Language Learning*, 16(4), 275-294.

Thorne, S., & Payne, J.S. (2005). Evolutionary Trajectories, Internet-mediated Expression, and Language Education. *Calico Journal, 22(3),* 371-397.

Thorton, P. & Houser, C. (2001). Learning on the move: Foreign language vocabulary via SMS. *ED-Media 2001 Proceedings* (pp. 1846-1847). Norfolk: Association for the Advancement of Computing in Education.

Thorton, P. & Houser, C. (2002). M-learning: Learning in transit. In P. Lewis (Ed.), *The changing face of CALL: A Japanese perspective* (pp. 229-243). Lisse: Swets & Zeitlinger.

Thorton, P. & Houser, C. (2004). Using mobile phones in education. *Proceedings of the 2nd IEEE International Workshop on Wireless and Mobile Technologies in Education,* 3-10.

Thorton, P. & Houser, C. (2005). Using mobile phones in education. *Journal of Computer Assisted Learning*, 21, 217-228.

Thorton P., Houser, C., Nakata, H., Kluge, D. & Nishio, Y. (2003). Ubiquitous learning opportunities. *Kinjo Gakuin University Humanities Research Journal*, 7, 25-37.

Warschauer, M. (2006) Laptops and literacy: Learning in the wireless classroom. New York: Teachers College Press.

Weigle, S.C., & Nelson, G.L. (2004). Novice tutors and their ESL tutees: Three case studies of tutor roles and perceptions of tutorial success. *Journal of Second Language Writing*, 13, 203-225.

Winke, Paula, & Goertler, Senta. (2008). Did we forget someone? Students' computer access and literacy for CALL. *CALICO Journal*, 25(3), 482-509.

Winner, L. (1995). Citizen virtues in a technological order. In Edward Barrett (Ed.), *Text, Control, and Hypertext* (pp. 65-84). Bloomington: Indiana University Press.

Yuan, Y. (2003). The use of chat rooms in an ESL setting. *Computers and Composition*. 20, pp. 194-206.

Journal of Literacy and Technology
Volume 10, Number 2
ISSN: 1535-0975

What Students, Professors, and IT Staff Had to Say About the Laptop Program at a Four-Year Hispanic Serving Institution

First Author: Angelina I. T. Kiser, Ph.D.
Assistant Professor
University of the Incarnate Word
CPO #27
4301 Broadway
San Antonio, TX 78209
210-829-3176
akiser@uiwtx.edu

Second Author: Annette Craven, Ph.D.
Associate Professor
University of the Incarnate Word
CPO #141
4301 Broadway
San Antonio, TX 78209
210-805-3564
craven@uiwtx.edu

Volume 10, Number 2
ISSN: 1535-0975

Introduction

As technology continues to expand and change in our world, institutions of higher education must be able to incorporate that technology into their programs in order for graduates from all disciplines to be well prepared to enter the workforce. The process must be ongoing with the support of students, professors, technology staff, and administration in order for it to be successful. Any technology initiative must also be aligned with the mission, goals, and objectives of the college or university.

Technology literacy is now a necessity for students from all college majors. Therefore, it is essential that all students understand its importance and how it relates to their fields of study. By initiating a laptop program, the university in this study has given every student an equal opportunity to learn the essentials of technology. It has certainly been a daunting task to ensure that the program is utilized by professors so that student learning is enhanced. Additionally, students share in that responsibility so that they have a part in the learning process. Lastly, the information technology (IT) staff has the responsibility of providing training and support services to both professors and students.

These three groups, students, professors, and IT staff, must work toward a program that produces technology literate students who are well-prepared to utilize their technology skills. Each group shares equally in ensuring the success of the program. It is important, therefore, to ascertain the concerns of each of those groups. It is only after gathering that valuable information that the program can continue to successfully progress. Technology is an evolving paradigm, and colleges and universities must constantly strive to provide the best available technology resources to their students so that those students are well equipped with sufficient skills to make

Volume 10, Number 2
ISSN: 1535-0975

them successful. To understand what changes may be necessary within a college or university environment, it is a critical component of the continuous improvement process to get the perspectives of students and staff so that the IT personnel are able to adequately respond to their needs and policymakers can plan for the future.

The purpose of this study was to examine the impact on learning and teaching processes of a laptop program that evolved over a 10-year period from the initial discussions in September, 1999 through full implementation, evaluation and improvement at a private, faith-based, postsecondary Hispanic Serving Institution (HSI) in south central Texas. During fall 2008, the University of the Incarnate Word (UIW) students, professors, and technical staff were interviewed to ascertain their perspectives of the laptop program and its related challenges. The researchers are full-time faculty in the university's school of business and the study was guided by the following research questions:

1. What are the key components of the institution's laptop program?
2. What are the IT personnel functions? What challenges do they face? How has the role of the IT personnel changed since the laptop program was implemented in 2001?
3. What challenges do students perceive as part of the laptop program?
4. What challenges do professors perceive as part of the laptop program?

This study is significant because of its emphasis on providing technology access, training and development to a student population that is predominantly minority, first-generation college students. More than 50% of the student body relies on financial aid to pay for their college education, and at the time the laptop program was first considered, most students had only limited prior access to computer resources. Core computer literacy courses were essential to

Volume 10, Number 2
ISSN: 1535-0975

close the gap between the *a priori* level of technology skill of an incoming freshman student and the *a posteriori* level of technology skill of a graduating senior. Students in the school of business of the UIW are now graduating with nationally normed technology exam scores of 90% or higher.

Review of the Literature

Technology should enhance both the learning and the teaching environments. The Winona State University at Rochester campus implemented a laptop program and found that the mere accessibility to laptops was not enough to support and transform pedagogy (McVay, Snyder, & Graetz, 2005). Previous studies have shown that the attitudes of both students and professors greatly impact the success of a technology program (Al-Khaldi & Al-Jabri, 1998; Liaw, 2002). The perceptions of university students are vital to the issues surrounding laptop initiatives (Cutshall, Changchit, & Elwood, 2006). As college and university campuses across the United States implement laptop programs, each should take steps to ensure the success of the program to both students and professors.

Utilizing laptop computers in an academic classroom has shown to have a positive impact on educational outcomes (Finn & Inman, 2004; Varvel and Thurston, 2002). Integrating technology into the classroom involves four major components: (a) the students, (b) the professor, (c) course content, and (d) the technology tools (McKeachie, 2002). Students and professors must work together to transform the traditional classroom into one that utilizes technology to positively impact the learning process. The use of that technology must have a clear academic purpose (Mereba, 2003). Technology should not be used simply because it is

Volume 10, Number 2
ISSN: 1535-0975

available. If students do not make the connection between the technology and the curriculum, a disconnect occurs that disrupts the learning progression. Using technology for the purpose of learning should not merely promote learning, but it should create learning productivity (Mereba, 2003).

As new technology emerges, there must be personnel who can provide support in training and infrastructure. The changing landscape in information technology has seen the advent of restructuring within IT departments, an increased demand for training and technical support for students, professors and staff, as well as training for IT personnel. A study by Johnson (2001) to explore challenges facing academic technology departments indicated that 74% of the respondents stated that there had been some sort of restructuring or reorganization of their department. The trend continued as was indicated in a study by Pike (2004), which reported that 77% of the respondents saw a significant change in their responsibilities within the technology units. As technology changes, so do the roles and responsibilities of those involved, which include students, professors, staff, and IT personnel. To remain updated with these changes, IT personnel must provide necessary hardware and software support along with maintaining an infrastructure that allows the technology to be used as it was intended and with the utmost efficiency.

Context of the Study

UIW is located in San Antonio, Texas. It was founded by the Sisters of Charity of the Incarnate Word in 1881 and was one of the first institutions chartered by the State of Texas in 1909. It has evolved from a K-12 environment to a university providing degrees at the

Volume 10, Number 2
ISSN: 1535-0975

bachelors, masters and Ph.D. level. Use and availability of technology within the UIW programs has evolved with the growth of the institution. At UIW, the four-year HSI examined in this study, students may be enrolled in one of three delivery forums: (a) traditional campus programs, (b) adult completion programs, and (c) virtual university programs. Several disciplines are offered in all three delivery systems, including business, education, and nursing programs. Programs are offered at both the undergraduate and graduate levels in all three delivery systems, though not in all disciplines. Main campus students may either commute or live in residence halls on campus, and many of the students are first-generation college students. The focus of this study was strictly on students, professors, and IT staff from the main campus where the laptop program was originally initiated.

In September, 1999 the university charted a different course by hiring its first ever Chief Information Officer (CIO). One of the first initiatives the CIO began was discussion of becoming a laptop university. An advisory council was created and the top three concerns of employers—communication, critical thinking, and technological competence—were addressed in terms of how enhanced technology support could contribute to improved learning outcomes in these areas while also making our students more competitive in the global marketplace. Three universities using ThinkpadU at the time were researched—Concordia University, Minnesota; Greenville College, Illinois; and West Virginia Wesleyan College. The advisory council felt the best approach would be full implementation which would allow for full cultural change and help avoid a digital divide. Five implementation considerations were discussed:

1. Support—planning and project; management; infrastructure; help desk; training; impact on students and faculty; service maintenance; and asset management.

2. Faculty Development—training and support both in and out of the classroom and with research initiatives.
3. Teaching & Learning Integration—productivity tools, internet access, instructional delivery, communication, curriculum integration, and collaborative research.
4. Hardware & Software Standardization—configuration, classroom integration, and refresh plan.
5. Financial Implications—financial aid for students and insurance considerations for faculty issued equipment.

A sixth consideration emerged once the laptop program was put into place. As students progressed through their degree program, it was important that the curriculum for the majors incorporate advancing use of technology. A good way to assess student achievement of technology performance objectives is to choose and use a psychological model of learning as a basis for measurement (Arreola & Aleamoni, 2000). Three professors in the school of business (Craven, Caldwell & Tiggeman, 2001) created a matrix of levels of business student computer literacy by utilizing the stages of Bloom's Taxonomy as follows:

Cognitive Level	Computer Literacy
Knowledge	Demonstrate recall of hardware components, program functions and commands, and basic computer utilities
Comprehension	Identify appropriate program or function for assigned task. Prepare a word processing document or spreadsheet or database. Acquire information using internets & intranets. Demonstrate understanding of how and why programs are useful with respect to subject matter.
Application	Apply technology to develop discipline-specific reports, presentations and spreadsheets.
Analysis	Perform the functions of analysis, classification, investigation, exploration and recognition of discipline-specific material through the use of technology.
Synthesis	Use technology to plan, organize, integrate, design and build discipline-specific products such as business plans.

Evaluation	Assess and evaluate information as a result of the application, analysis and synthesis of information gained via the use of technology.

By assessing learning outcomes using instruments and techniques that addressed each of these levels, business professors were able to determine the impact of student technology access and utilization over time.

The laptop program officially began in 2001, with UIW becoming the first IBM ThinkpadU in Texas; the campus is now fully networked and wireless. The university decided that every undergraduate student would come to the school with a laptop or purchase one from UIW. The first year of the program, freshmen were not required to have laptops. If students did not purchase their laptops from the university, they had to apply for a waiver, which allowed them to bring in their own laptops. Eventually, the waiver requirement was dropped because of the vast amount of paperwork. However, unless students have wireless connections of their own, they must visit the Help Desk on campus to get connected to the UIW wireless network.

The decision to allow students the option to purchase their laptops from other sources than the university was one of the first major challenges. Opening the door to the possibility of multiple brands of laptops meant IT had to consider the implications of service and faculty had to consider the implications of a variety of software packages (Word vs. WordPerfect, for example). There were, and continue to be, many advantages to purchasing the laptop from the university. Technology Support Services loads the computer with software and updates that support the curriculum and assists with both software and hardware issues that students may encounter. Those students who choose to bring their own laptop from another vendor also

Volume 10, Number 2
ISSN: 1535-0975

receive Help Desk support; however, that support is limited to university provided services (wireless access, Blackboard Course Management System issues, and email support).

According to the UIW website (http://www.uiw.edu, 2008), the school's Technology Division is divided into five units that are responsible for the delivery of all technology as well as related services to the students, faculty, and other employees. Infrastructure Support offers network computing and telephone services. Technology Support Services manages all campus computer labs and provides technical support through a Help Desk. Instructional Technology's main support is training of faculty, students, and staff. Information Management Services plans, creates, and manages database environments to enable effective, productive, and secure use of information resources. Lastly, Institutional Research gathers and maintains data that can then be transformed to useful decision-making tools.

Method

Qualitative methods were used to gather data for this study. According to Patton (2002), qualitative methods are utilized to ascertain what people do, think, know and feel by observing, interviewing, and analyzing documents. Qualitative methods are appropriate when researchers seek to understand the depth of participant responses rather than a broad overview of responses from multiple participants. Qualitative research is not intended to be generalized, and the literature review revealed no other comparable studies appropriate for use in this research.

The researchers (faculty in the UIW School of Business) sought to understand how business students enrolled in a core curriculum computer literacy course, business faculty and university IT personnel perceived the laptop program at UIW and what challenges they faced. Focus group interviews are well-suited for groups of people who share a common experience and

have knowledge of the phenomenon under study (Kelly, 2003, p. 50). Therefore, separate focus groups were held with 12 students and 4 technology personnel, and email communication and phone interviews were employed with 7 faculty members. These methods allowed the researchers to ask for clarification and additional information when necessary. Institutional Review Board permission was obtained, participation was voluntary, and all identifying information for the participants was kept confidential. This was not a blind study.

The participants in this study were chosen based on purposive sampling. The researchers selected the criteria; those intensely involved with the laptop program; and then stratified the sample into students, professors, and IT staff. The three homogenous subgroups provided depth and detail with regards to their roles and challenges with UIW's laptop program. The students from the Computer Literacy class were business majors who had been at UIW for at least two semesters, the professors were from the various business disciplines and used the laptops to varying degrees, and the four IT staff consisted of the CIO and staff from infrastructure support and technical support services.

Students (n=12) and faculty (n=7) were asked to address the positive and negative aspects of the laptop program, while the technology personnel (n=4) were asked what challenges they faced in their roles within the Technology Division. Once the data were collected, the researchers used qualitative coding techniques to determine the common themes that emerged from each group.

Results

Student Group

It was discovered in a study conducted by Demb, Erickson, and Hawkins-Wilding (2004) that hardware configuration choices and price were both factors for laptop initiatives. Eight of the 12 students who participated in the focus group at UIW felt that purchasing their laptops from the university was better than purchasing them off campus. One student stated, "You can roll the cost of the laptop into your tuition and then it might be covered if you have financial aid." Another echoed that same thought, "When you get the laptop through the university they just include it in your tuition." However, those students who did not purchase their laptops from UIW felt that the lower price off campus justified not having the technical support. A sophomore student said, "I paid a lot less for my laptop off campus and I haven't had any problems with software or hardware support. I just bought the extended warranty when I bought it."

While the cost of buying a laptop from the university is more than buying one off campus, the hardware and software support that comes with the university laptop is a great help to students. The support includes hardware warranties and free software upgrades. For example, when UIW moved from Microsoft Office 2003 to Microsoft Office 2007, students with university laptops were given free upgrades that were loaded by IT personnel. A student declared, "Getting a laptop, here at the University, helps out when something is wrong with it, they help you fix it at the Help Desk." Consequently, students must decide between the higher price for more technical support and the lower price that comes with less technical support.

Another challenge that the student focus group voiced concern about was the rate of connectivity and response time. The students felt that at certain times during the day, the system was too slow to accomplish the tasks they were working on during class. Comments included, "There is slow internet connection here at UIW.", "Sometimes in the dorms, the internet

connection is out." and "The system is too SLOW." They felt that the system needed upgrading in order to handle the large volume of users. The university has consistently increased its bandwidth to handle the increase in system usage. However, many students may not realize that the way the system is being used ultimately affects its efficiency. For example, some students who participated in the study stated that they had seen other students downloading and watching television shows or movies during class time. This type of system usage puts a major strain on the system and causes it to run much slower. Therefore, if those students were using the laptops for their intended use, the system would run as it was intended.

The most pervasive concern for students in this focus group was the lack of laptop use by their professors. Students felt that if they were required to have laptops, then professors should be required to integrate them into the curriculum. One student commented, "There are even some teachers who don't even allow you to bring your laptop into the class." This concern was echoed by several other students in the study. One student stated, "It seems many professors are still mostly against the use of a computer in class, especially with access to the wireless internet." Unfortunately, whether or not laptops will be used or even allowed in the classroom is the most common theme for both students and professors. Students want professors to utilize the laptops in class, while professors are becoming frustrated that the students bring them to class and then check email, play games, etc. The focus group did, however, acknowledge that how students use the laptops in class could be distracting to other students as well as the professors. All the same, students want them to be used if they are going to be a requirement.

Faculty Group

For many faculty members, moving to a laptop environment is a paradigm shift as they move from a teacher-focused environment to a learner-focused environment (Hall & Elliott, 2003). Student-centered instruction changes the role of the instructor and empowers the students as they explore, experiment, and discover on their own (Brown, 2008). Integrating the laptop into the classroom changes how instruction takes place. No longer do the instructors simply supply information to the students through lectures and notes. The students take on more responsibility for their own learning since they now must seek out additional information via online sources from the internet.

The greatest obstacle to higher education's use of the Internet is apparently faculty and staff development (Ma & Runyon, 2004). This challenge was present at UIW for some of the faculty who took part in this study. While some people are very comfortable with new technologies and are able to quickly master a software package, others do not fall into that category and instead seem to struggle with incorporating technology into their classrooms.

The most prevalent challenge, voiced by five of the seven faculty members, was keeping students from accessing the web, checking, email, playing games, etc., while instruction was being delivered. Numerous statements were made, including, "One big con of the laptop is keeping students on the lecture/classroom activity.", "Students misuse the laptop during class, surfing rather than note taking." and "I have seen students emailing and surfing the web while I am trying to teach." Classroom management can become a greater issue for university and college professors when technology is introduced into their educational settings. While new technologies allow college and university professors the opportunities to change their traditional organizational and instructional practices (Ouzts & Palombo), those same technologies may also

Volume 10, Number 2
ISSN: 1535-0975

present the professors with new challenges in maintaining a classroom in which the students remain focused on the lesson that is being presented. For example, at Duke University where faculty control the use of laptops in class, some faculty members banned their use because they just could not control what the students were doing with the laptops during class (Chanen, 2007).

The use of technology in the classroom may not always be an easy transition for college professors. A professor stated, “I still don’t have a lot of time to investigate new discipline-specific software packages that would help me update my courses.” Learning new software can be a daunting task, and since in some cases it is specific to a particular course, there may not be on-campus training. Therefore, the professor must find training elsewhere or learn by himself/herself. This leads into another concern for professors. Training in, learning and practicing new software is quite time consuming. A professor commented, “I need to have more training, but I don’t have any time.” There are already so many demands on the professors, it becomes difficult to find the time to learn the software so that they become comfortable enough with it that they are willing to integrate it into their curriculum. The fact that technology is constantly changing makes this an even greater challenge.

It is vital that the IT infrastructure of a laptop university be able to support everyone’s needs. Technical and infrastructure support was the third major theme that professors thought was a challenge to using laptops in the classroom. As one professor stated, “Power supply is an issue. The students bring their own extension cords and then I have cables snaked across the room.” Three other professors also made comments concerning the lack of enough electrical outlets for the student laptops.

Volume 10, Number 2
ISSN: 1535-0975

The system must also perform fast enough so that valuable class time is not taken from the professors. Professors, like students, expressed concern for the high response time for connectivity. For example, one respondent indicated, “I no longer give online quizzes. It takes up too much class time.” Another professor, although very pleased with the end results, indicated that due to the amount of time it took for technical support to load the discipline-specific software, she fell two weeks behind schedule. These types of situations may discourage professors from using valuable technology tools in their classrooms.

Technology Division Group

At the center of any technology initiative is the IT department. This is certainly the case at UIW where the IT department has undergone tremendous growth and transformation in order to effectively and efficiently deal with system issues that revolve around the use of the laptops on campus. Although different from students’ and professors’ challenges, the IT personnel have challenges that can and do affect the entire university. As one member of the IT focus group stated, “We try to stay ahead and not just play catch up.”

One area of concern, which is a factor wherever there is Internet availability, is that of security. When students purchase university laptops, they come with firewall and anti-virus software. However, when the students purchase laptops from somewhere other than UIW, the firewall and anti-virus software often expires after a short period of time. The focus group of IT personnel stated that one of the ongoing problems with laptops not purchased from the university is that students let the firewall and anti-virus software lapse on their laptops, yet they are still connected to and using the UIW wireless network. These same students then bring their laptops to the UIW Help Desk in need of assistance.

Volume 10, Number 2
ISSN: 1535-0975

On the other hand, there is the challenge of ongoing support. Students can inundate the Help Desk with laptop problems, but as one IT staff member stated, “Some students will not bring in their laptops for maintenance or repair because they do not want the IT personnel to see what is actually on the laptops.” The students then have infected laptops, and they share resources with others, which may lead to the virus being copied from one laptop to another.

The delivery and product supply chain can definitely be a problem for the IT department. There have been times when either entire laptops or parts did not arrive in time for the beginning of the semester. Consequently, students did not receive the laptops in time for their classes. When this delay in arrival occurs, the IT training personnel get behind schedule for laptop orientation and training for new students. The problem creates a chain reaction that takes even more time to correct.

As the laptop program has evolved, the IT staff has become concerned with the storage and disposal of old equipment and data. Some students exchange their laptops and do not want to keep their old ones. The focus group members stated that it is not as easy as simply placing the old equipment into a dumpster. There are Environmental Protection Agency regulations that require special disposal authorizations. Therefore, UIW has to pay a third party to properly dispose of the old equipment. Measures must also be taken to ensure that data that is stored on the laptops is properly deleted. Obviously, this has become a greater concern as the laptop program gets older and continues to grow.

Lastly, a challenge that is faced not only by technology personnel at UIW, but everywhere that technology is used, is the fact that it is always changing. There are increases in services, and demand always seems to be ahead of capacity. As one respondent stated, “We try

Volume 10, Number 2
ISSN: 1535-0975

to stay ahead and not just play catch up." The UIW technology staff has to constantly look to the future and plan well enough in advance so that it does not fall behind the next new wave of technology. The university must also ensure that the technology meets the needs of the professors and students so that the best possible teaching and learning can take place. As Mereba (2003) stated, "One thing certain is the constancy of change brought by technology that is pushing higher education in the direction of new frontiers."

Discussion

In the 2001 study by Craven, Caldwell and Tiggeman, ***Best Practice Recommendations*** were noted to have evolved as a result of the UIW School of Business experiences with technology in the classroom:

1. Computer literacy should be evaluated early in the student's educational career.
2. Technology should be incorporated into every business class environment.
3. Technology should be available to faculty and students in more than one form and more than one location.
4. Technology training and tutoring should be available to faculty and students throughout the academic year.
5. A supportive technology infrastructure for both hardware and software needs should be available on a 24x7 basis.

The results of this study confirm these recommendations and give us good reason to stay the course in our pursuit of access to cutting edge technology for our faculty, staff and students. Creating a technology-enhanced environment that meets the needs of students is paramount in today's global world. As educators, professors must continue to integrate technology into their

Volume 10, Number 2
ISSN: 1535-0975

curriculum and ensure that the integration is meaningful to the students.-Students and professors, those most involved in using the laptops, provide valuable information to the IT staff and university personnel who will ultimately make future technology decisions. As the university progresses toward future technology initiatives, this type of study could be utilized to again ascertain the concerns of the end users.

If everyone involved with the laptop program can see the benefits and be able to effectively and efficiently use technology, learning will be more beneficial, and students will be much better prepared to enter the workforce. However, it is not just the professors' responsibility to properly use technology. Students must take responsibility by staying on task in the classroom and properly using the wireless network they are using. Better decisions can be made system users when everyone is well informed and adequate training is provided.

The laptop program at UIW has been through many changes. For example, the IT department has changed the laptop model from IBM to Gateway to Dell since the program's inception in 2001 and continues to explore the best model for the best price for the university population. While this may seem to some to be a problem, the changes were actually to make the program better as the most reliable vendors were sought out. A problem initially, the changes eventually made the program run more smoothly. This is only part of the role of the IT department. The staff seeks to make sure that the system remains secure, that enhancements are made to ensure that it can handle the growing number of users, and personnel remain up-to-date on new technologies.

Although not without its problems, the laptop initiative at UIW has also had a positive impact on both students and professors. During this study, the students related to the researchers

Volume 10, Number 2
ISSN: 1535-0975

that they were grateful for having the laptop and the advantages it has for them. One student commented, “The ability to take notes in a typed format allows for neater notes as well as quicker as I type much faster than I write.” Other students expressed that the laptops gave them more opportunities to learn. Some statements included, “Current software packages are being utilized,” and “The laptop is a good source for communication. I also like doing research during class.” The professors made similar statements such as, “I can easily communicate with my students via Cardinal Mail and Blackboard.”, “I can give online tests that are instantly graded and provide instant feedback to my students.”, and “I can engage the students with creative lessons.”

Some results of the study were expected while others were not. For example, the issue of students using the laptop for non-academic purposes was not a revelation. Also, the extent of the problem and the fact that some professors were no longer allowing laptops in the classroom were definitely unanticipated; however, this has forced faculty to consider whether the use of laptops in the classroom is appropriate for all disciplines and courses. While employer feedback now demonstrates increased satisfaction in technology skills of recent graduates, an unfortunate piece of employer feedback is the perceived diminished oral and written communication skills of those same recent graduates.

The university laptop initiative was intended to change the classroom environment to incorporate more technology and give students more access to information while in the classroom. However, for some, the classroom management issue became a problem to which some professors did not seek a viable solution other than to ban the laptops in their classes. A study of the Winona State University laptop program found that merely having a laptop initiative

Volume 10, Number 2
ISSN: 1535-0975

did not directly lead its professors to integrate the technology into their curriculum (McVay, Snyder, & Graetz, 2005). Liaw (2002) also stated that, "No matter how capable the technology, its effective implementation depends upon users having positive attitudes towards the technology." The case of Duke University, mentioned previously, is a good example of professors developing negative attitudes toward laptops and eventually banning their use in the classroom (Chanen, 2007). Professors at Chicago-Kent College of Law and Stetson University College of Law have also experienced the problems with students using their laptops for non-academic purposes such as gambling and some have banned their use in the classroom (Chanen, 2007).

In any event, continuous improvement of technology programs in university settings includes the responsibility to question whether existing technologies are appropriate. Are laptops the answer? Is it time to transition to I Phones for communication among faculty, staff and students? Is it time to transition to the I Touch to preserve security in university intranet systems but allow portability of multiple applications which are discipline specific? Has the Amazon Kindle become the textbook of the future? Or, have we yet to see a palm-sized mechanism that combines all of these features while providing safe, secure transmission of data and synchronous communication capabilities? Only time will tell as we strive to continuously improve the way faculty teach and the way students learn.

Volume 10, Number 2
ISSN: 1535-0975

Conclusions

Each of the three groups in this study provided valuable feedback concerning the challenges they face in their specific roles. The following list is a summary of the challenges that emerged from students, faculty, and IT staff.

Students:
1. Costs associated with purchasing the laptops.
2. Poor connectivity and response time.
3. Professors do not utilize the laptops in class.

Faculty:
1. Difficulty in keeping the students from using the laptops for personal use during class.
2. Lack of time to learn the new software programs.
3. Slow connectivity and response time.

IT Staff:
1. Security issues.
2. Ongoing support.
3. Delivery and product supply chain.
4. Storage and disposal of old equipment.

Limitations

This particular study was conducted with professors from the School of Business at UIW and students who were taking the computer literacy course. Therefore, it might be beneficial to include a greater range of both professors and students. Professors from other departments might have some additional insights as to how they integrate the laptops into their curriculum and the challenges they have faced in creating effective teaching and learning with the use of laptops.

Although the curriculum for the computer literacy class encompasses only Microsoft Office application, the students in that class may have already had technology knowledge that others may not have possessed.

The sample size, while small, included a representative sample of the laptop program stakeholders. Common themes emerged as the data were collected and analyzed, and the researchers found that as the discussions continued, the same concerns continually emerged. While the focus on students enrolled in computer literacy is a consistent focus with the 2001 study by Craven, Caldwell and Tiggeman, including additional students from outside the School of Business into the focus groups could bring some added information to the discussion. Although there was only four IT staff who participated in the study, they represented different departments within the technology sector of the UIW campus, and they each brought thoughts from the personnel in their respective departments.

Implications for Future Research

It is always important for the different groups involved in an initiative to know how each group is dealing with issues that arise. Consequently, future research into the areas of concern for this particular laptop initiative could include talking to professors, students and IT staff about ways to improve the initiative as well as educating each group about how to most effectively make use of the laptops. Experimental studies could be conducted comparing the learning outcomes of course sections that utilize technology in the classroom and those that do not. Furthermore, additional research that utilized quantitative methods could be employed. A technology satisfaction, frequency of use and level of use survey would allow the university to

Volume 10, Number 2
ISSN: 1535-0975

obtain a wider range of information and to use that information to make improvements to the laptop program. If the results of that survey are then distributed to each group involved, those groups can work together to help resolve the issues that each group faces.

From the results of this study, it is clear that a major problem facing the integration of laptops into the university classroom setting is being able to manage what students are actually doing with their laptops. A future study could include a more in-depth look at how professors are dealing with the problem so that students and professors can have positive outcomes with the use of laptops. Any new technology will have both advantages and disadvantages, and it is important to discover how to best use that technology and not dismiss it because of a disadvantage. Professors who have successfully implemented laptops in their classroom environments could provide insights into the methods they employ. Students could be another rich source of information. Since they have been exposed to numerous learning environments, they could offer their ideas regarding the use of laptops in the classroom.

References

Al-Khaldi, M. A., & Al-Jabri, I. M. (1998). The relationship of attitudes to computer utilization: New evidence from a developing nation. *Computers in Human Behavior, 14*(1), 23-42.

Arreola, R. A., & Aleamoni, L. M. (2000). *Assessing Student Learning Outcomes*, Center for Educational Development and Assessment, Workshop Resource Document.

Brown, J. (2008). Student-centered instruction: Involving students in their own education. *Music Educator's Journal, 94*(5), 30-35.

Chanen, J. (2007). Profs Kibosh students' laptops. *ABA Journal, 93*(11), 16-16.

Craven, A., Caldwell, R. & Tiggeman, T. (2001). *Technology Across the BBA, MBA, and MAA Curriculum*, The Proceedings: Selected Readings From the Society for Advancement of Management International Management Conference, 2001, pp. 449-458.

Cutshall, R., Changchit, C., & Elwood, S. (2006). Campus Laptops: What logistical and technical factors are perceived critica? *Educational Technology & Society 9*(3), 112-121.

Demb, A., Erickson, D., & Hawkins-Wilding, S. (2004). The laptop alternative: Student reactions and strategic implications. *Computers & Education, 43*(1), 383-401.

Finn, S., & Inman, J. (2004). Digital unity and digital divide: Surveying alumni to study the effects of a campus laptop initiative. *Journal of Research on Technology in Education, 36*(3), 297-317.

Hall, M., & Elliott K. M. (2003). Diffusion of technology into the teaching process: strategies to encourage faculty members to embrace the laptop environment. *Journal*

of Education for Business, 78(6), 301-307.

Kelly, B. T., (2003). Focus group interviews. In F. K Stage & K. Manning (Eds.), *Research in the College Context* (pp. 49-62). New York: Brunner-Routledge.

Liaw, S. (2002). An internet survey for perceptions of computers and the world wide web: Relationship, prediction and difference. *Computers in Human Behavior, 18*(1), 17-35.

Ma, Y., & Runyon, L. R. (2004). Academic synergy in the age of technology – A new instructional paradigm, *Journal of Education for Business, 79*(6), 367-371.

McKeachie, W. (2002). *Teaching Tips*. Boston: Houghton Mifflin.

McVay, G. J., Snyder, K. D., & Graetz, K. A. (2005). Evolution of a laptop university: A case study. *British Journal of Educational Technology, 36*(3), 513-524.

Mereba, T. (2003). Managing transformation: Aligning technology initiatives with instructional priorities. *Tech Trends, 47*(3), 42-44.

Ouzts, D. T., & Palombo, M. J. (2004). A study of perceptions of college professors. *Tech Trends 48*(5), 17-22, 82.

Patton, M. O. (2002). *Qualitative evaluation and research methods.* Newbury Park, CA: Sage Publications.

Pike, M. J. (2004). The trend to restructure media services reporting lines: Results of a study, *College & University Media Review, 10*(2), 11-42.

Varvel Jr., V. E., & Thurston, C. (2002). Perceptions of a wireless network. *Journal of Research on Technology in Education, 34*(4), 487-501.

Journal of Literacy and Technology
Volume 10, Number 2
ISSN: 1535-0975

Should Four-Year Olds Use Computers to Develop Emergent Literacy Skills?: A Study of the Waterford Early Reading Program

Heidi J. Stevenson, Ph.D.
Benerd School of Education
University of the Pacific
3601 Pacific Avenue
Stockton, CA 95211
hstevenson@pacific.edu

Rachelle Kisst Hackett
Benerd School of Education
University of the Pacific
3601 Pacific Avenue
Stockton, CA 95211
rhackett@pacific.edu

Volume 10, Number 2
ISSN: 1535-0975

Children's performance in regards to early literacy is seen as foundational and essential for later academic success (Kamil, Mosenthal, Pearson, & Barr, 2000; Snow, Burns, & Griffin, 1998). In fact, there is evidence to suggest that children who are unable to acquire emergent literacy skills, as understood by Clay (1967), may remain at-risk throughout their future schooling (Shaywitz, 2004). Knowing the importance of developing early literacy, and the growing pressure on the early childhood education community to be accountable for addressing this imperative, the question becomes, "How can we support students in developing emergent literacy?"

A number of factors have been commonly identified in the literature as contributing to early literacy development. Elliott and Olliff (2008, p. 551) state, "A child's knowledge of the alphabet is the single best predictor of first-year reading success (Adams, 1990) and the most powerful predictor of later reading success (Honig, 2001)." In addition to alphabetic knowledge, the National Early Literacy Panel has recognized phonological and phonemic awareness, print knowledge, oral language development, and invented spelling as predictors of future literacy success (Strickland & Shannan, 2004). Furthermore, it is understood that a student's ability to learn how to read is highly influenced by interactions with well-trained teachers and informed parents (Wood, Bruner, & Ross, 1976).

Some preschoolers come from homes with engaged adults and rich literacy environments, already knowing about reading and writing (e.g. Sulzby, 1985), while many others, have extremely limited exposure to literacy. Early childhood educators may have difficulties therefore, in attempting to compensate for home environments which do not foster emergent literacy, and differentiating reading instruction in an effort to meet the needs of all students (e.g.

Dooley, 1993**).** While currently under researched (Kamil & Lane, 1998; Tracey & Young, 2007), a technologically-focused approach to differentiating instruction, such as employing an Integrated Learning System (ILS), may prove effective in developing emergent literacy.

For the purposes of this study ILS is defined as a computer management system that assesses students and places them in an individualized sequence of lessons appropriate to their learning level (Becker, 1992; Maddux & Willis, 1992). There are a variety of ILSs that focus directly on emergent literacy skills such as phonological awareness, alphabetical principles, word identification, and basic concepts of print. The present study will focus on a particular ILS, Waterford Early Reading Program Level 1 (WERP-1). WERP-1 software assists in developing the above-mentioned skills through stories, songs, and rhymes.

Regardless of WERP-1's worthy objectives, there is controversy concerning the effectiveness of ILSs in general and WERP-1 in particular. Sherry (1990) suggests that while ILSs are popular with students, teachers and administrators, "these perceptions were usually based on gut feelings rather than on any hard data" (p.119, as cited in Paterson, Henry, O'Quin, Ceprano, & Blue, 2003). In regards to WERP-1, evidence from one published study, and at least two unpublished evaluations, show that WERP-1 computer usage (controlling for initial skills) is strongly related to emergent literacy outcomes (Hecht & Close, 2002). Paterson, et al. (2003), however, found that WERP-1 had no effect on students' emergent literacy.

As one can see, there is contradictory evidence regarding WERP-1, a program which entails a great investment of curricular time and money. According to a *District Administrator* survey, projected current year district expenditures on technology for the 2006–2007 school year

Volume 10, Number 2
ISSN: 1535-0975

were $4.32 billion (Dyrli, 2007). Moreover, technological resources are often oversold to schools and underused by teachers (Cuban, 2001).

With the current state of our economy, President Obama's focus on improving early childhood education, and the need to educate an increasing number of English Learners (EL), it is important for early childhood programs to consider the best way to allocate their limited dollars and instructional time. This study with its focus on the impact of WERP-1 on pre-kindergarten students and on educators' perceptions of WERP-1 can inform practitioners, decision makers, and the academic community. Specifically, the present study investigates (1) What are the effects of WERP-1 on the early reading development of these pre-kindergarten students? and (2) What are teachers' and site principals' attitudes toward using WERP-1?

Methods

Site Selection Criteria

Participants were drawn from twelve classes at six preschool sites in the same school district. All sites included preK classrooms with students who possessed relatively low test scores, and used Houghton Mifflin's Pre-K text, "Where Bright Futures Begin!" There were morning and afternoon classes at the six sites with approximately 20 students per class. The three treatment sites each had two computers equipped with WERP-1 software, and employed teachers who were interested in using WERP-1 and willing to fully participate in all components of the study.

Additional site selection criteria included: 1) there were no other language arts supplemental curricula (in addition to the Houghton Mifflin) being utilized and 2) the student

populations of the schools chosen were similar in socio economic status 3) analysis confirmed that the sites were similar in regards to ELs, and students with Individualized Educational Programs (IEPs).

Participants

Given that students were not randomly assigned to classes, the research design was based on a quasi-experimental design (QED). Therefore, the term "comparison" rather than "control" will be used for the classes who did not receive the treatment (WERP-1).

Descriptive statistics are provided in Table 1 for each condition with respect to gender, English language proficiency status, and age. Chi square analyses suggest the groups were not significantly different with respect to gender [$\chi^2(1,N=198)= .062$, $p=.803$, 2-tailed] nor language proficiency status [$\chi^2(1,N=197)= .009$, $p=.924$, 2-tailed]. T-tests for independent samples suggest the groups were not significantly different with respect to age [t (196)= -1.64, $p=. 103$, 2-tailed] nor receptive vocabulary skills (as measured by the Peabody Picture Vocabulary Test-III (PPVT)) [t (196)= -0.19, $p=.853$, 2-tailed]. The groups also did not differ with respect to receipt of special education services (as indicated by having IEPs) nor grade retention status.

One hundred ninety-eight students (86 Treatment and 112 Comparison) were included in the final sample. All participants were eligible to enroll in kindergarten the following year (i.e., turning five years of age by December 2) and 57% were Limited English Proficient (LEP). Table 1 displays demographic information in regards to gender, English language proficiency status, and age for the treatment and comparison groups.

Table 1

Summary of Participant Characteristics by Condition

Participant Characteristic	Treatment (n=86)		Comparison (n=112)	
	N	%	n	%
Gender				
Male	43	50	54	48
Female	43	50	58	52
English Language Proficiency Status				
Unknown	*0*	*(0)*	*1*	*(<1)*
Non-LEP	37	43	47	42
LEP	49	57	64	58
	M	SD	M	SD
Age (as of December 2, when child must be 5 to enter a public kindergarten class in the same state)	5.47	.31	5.48	.28
Receptive vocabulary skills (as measured by the PPVT-III standard scores in Fall)	70.98	18.26	75.35	18.85

Fidelity. To ensure fidelity, student usage reports, detailing minutes of use, were printed through the WERP-1 software program and faxed weekly to the director. Only students who had WERP-1 usage times of over 1000 minutes were included in the final analysis.

Teacher characteristics. There were seven teachers who participated in the study. All teachers were females and had a minimum of an Associate of Arts degree. Five of the teachers were Caucasian while one was African American and two were Asian American.

The teachers had varying degrees of education. One teacher had an Associate of Arts degree and 30 years teaching experience. Six teachers possessed Bachelors Degrees, had one to two years experience, and all but one was in her first year of working for the school district. Of those who had Bachelors degrees, three possessed teaching credentials, and one was in the process of completing the apprenticeship (student teaching) portion of receiving her credential.

Curricula

The School District used the Houghton Mifflin Pre-K text, "Where Bright Futures Begin!" as their primary curriculum and supplemented treatment students' language arts instruction with WERP-1. The only portion of the WERP-1 curriculum that treatment teachers were required to implement was the software portion.

Comparison and treatment curriculum. All school sites used Pre-K, "Where Bright Futures Begin!" According to the marketer's website, "This program [Houghton Mifflin's 'Where Bright Futures Begin!'] is a scientifically research-based 'hands-on, minds-on' curriculum that aligns with key critical pre-kindergarten learning goals. Alive with colorful images and rich literature, this comprehensive, integrated program provides children with the foundational skills they need to succeed as lifelong learners" (http://www.eduplace.com/marketing/prek/).

Supplemental treatment curriculum. WERP-1 addresses reading readiness and emergent literacy skills in an interactive, engaging computer-based environment for twelve-minute

Volume 10, Number 2
ISSN: 1535-0975

sessions five times per week. The program aspires to build phonological awareness and vocabulary; increase the recognition of letter names, sounds, and symbols; master basic print concepts; and provide students with experience in oral and written language through stories, songs, and rhymes.

Implementation

From October through May, each child used the WERP-1 software for twelve minutes per day five days a week. All treatment classrooms were equipped with two computers installed solely with WERP-1 software. Beginning in the morning a student's name and picture (chosen randomly by the WERP-1 software) would appear on each computer. At that point, the teacher would request that these two students begin completing WERP-1 activities at the computers. When a student's twelve-minute WERP-1 session elapsed, a picture of the next student would appear and the WERP-1 user would alert the next student verbally that it was his or her turn on the computer. The next student finds the computer that displays his or her picture, puts on the headphones, engages the mouse, and begins the WERP-1 activities for the next twelve-minute session.

This process was repeated throughout the hours of instruction for the two sessions daily (approximately 8:00 am to 12:00 pm and 1:00 pm to 5:00 pm). The only times students did not use the computers were during periods of outside play and snack time. These activities were seen as essential for students' well being (both physically and as a part of the classroom community) and therefore no computer use was required at these times. If students were absent the teacher would skip over their names when it came to their WERP-1 session and attempt to make up their

sessions upon their return by having them engage in extra sessions. At the end of each week teachers would fax student usage reports to the director to confirm fidelity regarding minutes of use.

Data Collection

Data addressing the research questions were collected via classroom observations, interviews with three treatment teachers and their site principals, as well as through a student assessment.

Classroom observations. Classroom observations were conducted for treatment teachers in the Fall (October) and Spring (May). In addition, all comparison teachers' classrooms were observed in the Fall. Classroom observation forms were used to denote activities in which students were engaged. Each observation was approximately twenty minutes in length and the purpose was to gain a better sense of instructional approaches and procedures teachers implemented in their classrooms. Observations in treatment classrooms frequently focused on the implementation of WERP-1 software and particularly student use. Furthermore, teachers were interviewed in the Spring to gain additional insights.

Interviews. Interviews were conducted in the Spring (May) with treatment teachers and site principals. These interviews garnered information regarding their attitude towards WERP-1 use, perceived strengths and weakness of the software, fidelity to usage requirements, and general feedback on WERP-1.

Assessment. The District Assessment is a developmental formative assessment designed jointly by kindergarten and preschool teachers in a central California school district. The District

Volume 10, Number 2
ISSN: 1535-0975

Assessment was administered three times (Fall, Winter, and Spring) and scored by classroom teachers. Teachers were initially trained in administering and scoring the assessment upon employment and their training is updated annually.

The assessment includes letter naming, concepts about print, and numeracy. The researchers acknowledge a shortcoming of this assessment is that there have been no attempts to evaluate the validity or reliability. Nevertheless, this is the assessment used by the district, and preschool teachers believe it has been an effective instrument for their purposes for the past five years. Test items include writing one's name, and color and body part identification. Items that address numeracy include counting, recognizing numbers, number concepts, and shapes. To analyze students' emergent reading abilities there are items that address identifying capital and lowercase letters, and creating sounds associated with these letters. In addition students are assessed on their ability to copy symbols.

Results

Major Findings by Evaluation Question

1. What are the effects of WERP-1 on the early reading development of pre-kindergarten students?

In evaluating the impact of WERP-1, the treatment and comparison groups were compared via separate independent samples t-tests on data collected at each time point. In addition, to determine differential growth, the analysis was approached through the General Linear Model whereby Group (treatment vs. comparison) serves as the between-subjects factor and Time of Assessment (pre, mid, post) serves as a within-subjects factor. The presence of a

statistically significant interaction suggests that the change over time is not constant across the two groups.

Results indicate that using WERP-1 software for the prescribed 12-minute sessions five days a week improved the early reading development of the treatment preschool students. Specifically, the treatment group exhibited more growth in letter recognition between the pre and mid-year assessments than did the comparison group (see Table 2 below). Growth in sound identification between the mid-year to post assessments, as well as overall between the pre to post assessments was more pronounced for the treatment group than the comparison group (see Table 3 below). In addition, the treatment group exhibited more growth in the ability to copy symbols between the pre and post assessments than did the comparison group. No statistically significant difference was found between the groups in regards to students' ability to write their names or to identify colors (see Table 4).

Letter Recognition Results

As noted earlier, both the treatment and comparison groups were learning letter recognition and phonological awareness skills through Houghton Mifflin's Pre-K curriculum, "Where Bright Futures Begin!" An item on the District Assessment asked students to identify capital and lowercase letters that were presented in random order. At the midpoint District Assessment, the treatment students performed significantly higher on the letter recognition task (p= .011 for uppercase and p= .005 for lowercase). By the post-test the treatment students had lost this advantage, but it is important to note that they learned the letters earlier in the year than the comparison group students.

Table 2

Overview of District Assessment Letter Recognition Results (*p*-values are italicized).

	Did the groups differ at any point in time? If so, which group did best?			**Was there differential growth? If so, which group "grew" more?**		
	Pre	***Mid***	***Post***	***Pre to Post***	***Pre to Mid***	***Mid to Post***
ABC's Uppercase	No *.812*	Yes, Treatment *.011*	No *.203*	No *.190*	Yes, Treatment *.004*	No *.796*
ABC's Lowercase	No *.689*	Yes, Treatment *.005*	No *.085*	No *.161*	Yes, Treatment *.004*	No *.834*

Sound Identification Results

The treatment group had an advantage in regards to identifying the sounds associated with particular letters at the post-test on the District Assessment ($p<.001$ for both the uppercase and lowercase sounds). They also exhibited significant differential growth from the midpoint to the post-test ($p< .001$ for both uppercase and lowercase sounds) and from the pre-test to the post-test ($p<= .001$ for both uppercase and lowercase sounds; see Table 3 below)

WERP-1 treatment students scored significantly higher than comparison students in recognizing letter sounds in post-tests. For Sounds Uppercase they had a mean gain from pre to

post of 17.34 vs. 11.09 ($p < .001$) and Sounds Lowercase they had a mean gain of 16.59 vs. 10.86 ($p < .001$). The results indicate that the use of WERP-1 for the prescribed time period of 12-minute sessions five days a week significantly increased these pre-kindergarten students' abilities to identify the sounds associated with letters. WERP-1 appears to provide an excellent medium promoting phonological awareness as easily and quickly as possible.

Table 3

Overview of District Assessment Sound Identification Results (*p*-values are italicized).

	Did the groups differ at any point in time? If so, which group did best?			**Was there differential growth? If so, which group "grew" more?**		
	Pre	***Mid***	***Post***	***Pre to Post***	***Pre to Mid***	***Mid to Post***
Sounds Uppercase	No *.119*	No *.089*	Yes, Treatment *<.001*	Yes, Treatment *<.001*	No *.135*	Yes, Treatment *<.001*
Sounds Lowercase	Yes, Treatment *.028*	No *.068*	Yes, Treatment *<.001*	Yes, Treatment *.001*	No *.152*	Yes, Treatment *<.001*

Other Results based on District Assessment

The ability to copy a symbol is an emergent skill to writing. The District Assessment measured this skill at the pre-test and post-test, but not at the mid-point. It appears that while the comparison group had an advantage at the pre-test on this item, the treatment group experienced more growth over time than did the comparison group. The groups were not found to differ on their ability to write their names or identify colors (see Table 4 below).

Table 4

Overview of Other District Assessment Results (*p*-values are italicized).

	Did the groups differ at any point in time? If so, which group did best?			**Was there differential growth? If so, which group "grew" more?**		
	Pre	***Mid***	***Post***	***Pre to Post***	***Pre to Mid***	***Mid to Post***
Copy Symbol	Yes, Comparison *.011*	Not available	No *.422*	Yes, Treatment *.024*	Not available	Not available
Writes Name	No *.843*	No *.716*	No *.742*	No *.990*	No *.896*	No *.934*
Colors	No *.568*	Not available	No *.179*	No *.977*	Not available	Not available

The results suggest that use of WERP-1 for the prescribed time period of 12-minute sessions five days a week significantly increased these pre-kindergarten students' abilities to identify the sounds associated with letters. Phonological awareness is necessary for success in both the ability to read and spell words. Therefore, teachers, principals, and parents hope to assist children in developing this skill as easily and quickly as possible. Evidence indicates that WERP-1 provides a medium in which to achieve this imperative skill.

2. What are teachers' and site principals' attitudes toward using the Waterford Early Reading Program?

The interview data corpus included individuals represented from all three of the treatment sites that implemented WERP-1. An interview was conducted with these three treatment teachers and their site principals, in order to attain a more detailed understanding of their attitudes and perceptions about using WERP-1 with students.

Teachers' overall views of WERP-1. Teachers reported that WERP-1 was an effective supplemental curriculum that taught basic skills, reinforced teachers' lessons and was a fun and engaging way for students to learn. It appeared to address different learning styles, allowed students to learn at their own pace and ability level, and was able to be accomplished with some degree of student independence.

All three teachers said that if they had the option to use WERP-1 with pre-kindergarten students in the future they would voluntarily use it. These teachers also commented on the fact that they thought that WERP-1 covered the basics, and two of the teachers made direct reference

to the fact that WERP-1 reinforced the skills they were teaching in the classroom. One teacher said, “Yes, it reinforces the content of the curriculum…” Another teacher said, “I would choose to use it because it gives the kids a different program to help.”

Principals’ overall views of WERP-1. All three principals mentioned that they believed that WERP-1 would give their pre-kindergarten students a distinct academic advantage in kindergarten and were pleased about how the students’ exposure to it may increase their performance with basic skills. One principal said, “Next year they are going to have kindergarten with all those basics, they don’t have to worry about that, they are coming in with that.” Principals were also excited to compare the performance of the previous year’s kindergarten students to the results for the treatment students who attended preschool (hence receiving WERP-1 instruction). As one principal said, “It will be a really neat experience to…compare [student performance from] this year to next year at the same time. And I am sure there will be something significant... This is exciting!”

Challenges of WERP-1 for EL students. In addition to liking many attributes of the WERP-1 software and the students’ performance, teachers and administrators offered recommendations as to how the program could be improved to assist EL students. Overall, there were nine mentions to EL students in the interview data corpus, with three people observing that ELs were frequently scared of the computers and resistant to working on them due to language difficulties. Those expressing concerns suggested offering directions in various primary languages and/or providing for an adult to work with students at the computer.

Additional benefit of learning technology. One teacher and one principal mentioned their excitement in regards toWERP-1 not only teaching early reading skills, but also teaching

Volume 10, Number 2
ISSN: 1535-0975

children to use technology, which will benefit them in the future. This was best stated by a teacher who commented, "Yes, it [WERP-1] is a good accompaniment to the curriculum, but more important than that, it teaches them computer skills. I think that to me that was more effective, more, for life long [learning]…they'll go to kindergarten and they'll know how to use the computer. They're going to get their letter sounds and that in the classroom…" A principal also commented on the fact that, "Technology is our future…I just like the idea that preschoolers are having access and starting [with technology] that early." One of the teachers mentioned that parents are also excited that students have the opportunity to go on the computer. She said one of the parents asked with excitement, "Oh, my child gets to go on the computer?" So it appears, that for some participants and parents, the technology skills obtained from using WERP-1 were also seen as extremely beneficial. Results indicate that WERP-1 treatment students, with at least 1000 minutes of use, recognize uppercase and lowercase letters more quickly (a statistically significant advantage at the midpoint) than the students in the comparison group, and score significantly higher than comparison students in recognizing letter sounds in post-tests as well as demonstrate more growth (from pre to post) in sound identification.

One obvious question may be, "Do the results presented in this study justify the expenditure on WERP-1 by early childhood programs?" If the results do not warrant the expense, are there aspects of WERP-1 that could be simulated in the curriculum without the actual use of the ILS (e.g. if graphics were helpful, could additional use of pictures improve student achievement)? Furthermore, does the exposure to literacy through the personalized instruction of the ILS compensate for a literacy sparse environment at home or would instructional time used on computers be better spent on other classroom activities? And if

Volume 10, Number 2
ISSN: 1535-0975

according to assessment data students' attainment of literacy skills is not statistically significant, is there still sufficient value to be gleaned from WERP-1, or other ILSs, by students using technology daily?

All three treatment teachers said they would voluntarily use WERP-1 in the future with pre-kindergarten students. Some of the teachers expressed their desire to learn more about modifying the order of WERP-1 lessons to match their particular curriculum, and voiced their preference that EL students receive WERP-1 instruction in their home language. If these modifications were realized would that contribute to additional statistically significant results from WERP-1 usage? Also, it would be interesting future research to investigate what assessment results teachers and administrators consider as indicators that WERP-1 or other ILS software is worth the expense and curricular time.

The importance of developing emergent literacy skills is paramount to future academic success (Kamil, Mosenthal, Pearson, & Barr, 2000; Snow, Burns, & Griffin, 1998). While computers and ILSs cannot replace the valuable interactions between students and skilled adults, the individualized sequence of lessons, positive gains in phonological awareness (and other benefits) reported in a number of studies (Hecht & Close, 2002; Tracey & Young, 2007), and exposure to technology may positively contribute to students' emergent literacy development. Each early childhood education program will need to assess whether an ILS fits their objectives and if so, do the results and experiences provided warrant the expense.

References

Adams, M.J. (1990). *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press.

Becker, H.J. (1992). A model for improving the performance of integrated learning systems. *Educational Technology*, 32, 6-15.

Clay, M.M. (1967). The reading behavior of 5-year old children: A research report. *New Zealand Journal of Educational Studies.* 2, 11-13.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom.* Cambridge, MA: Harvard University Press.

Dooley, C (1993). The challenge: Meeting the needs of gifted readers. *The Reading Teacher*, 46, 12-17.

Dyrli, O, E. (2007) *District buying power*, Retrieved: June 2, 2009 from District Administration.http://www.districtadministration.com/viewarticle.aspx?articleid=1263&p=2#0

Elliott, E.M., & Olliff, C.B. (2008). Developmentally appropriate emergent literacy activities for young children: adapting the early literacy and learning model. *Early Childhood Education Journal.* New York: Knopf. 35(6), 551-556.

Hecht, S.A., & Close, L. (2002). Emergent literacy skills and training time uniquely predict variability in responses to phonemic awareness training in disadvantaged kindergarteners. *Journal of Experimental Child Psychology*, 82, 93-115.

Honig, A. (2001). *Teaching our children to read.* Thousand Oaks, CA: Corwin Press.

Houghton Mifflin, *Pre-k "Where bright futures begin!"* Retrieved August 2006, from http://www.eduplace.com/marketing/prek/.

Kamil, M.L., Mosenthal, P.B., Pearson, P.D., & Barr, R. (Eds.). (2000). *Handbook of reading research* (Vol. 3). Mahwah, NJ: Erlbaum.

Kamil, M.L., & Lane, D.M. (1998). Researching the relationship between technology and literacy: An agenda for the 21st century. In D.R. Reinking, L.D. Labbo, M.C. McKenna, & R. Kieffer (Eds.), *Literacy for the 21st century: Technological transformations in a post-typographic world* (pp. 323-342). Mahwah, NJ: Erlbaum.

Maddux, C.D., & Willis, J.W. (1992). Integrated learning systems and their alternatives: Problems and cautions. *Educational Technology*, 32, 51-57.

Paterson, W.A., Henry, J.J., O'Quin, K., Ceprano, M.A., & Blue, E.V. (2003). Investigating the effectiveness of an integrated learning system on early emergent readers. *Reading Research Quarterly*, 38, 172-207.

Shaywitz, S. (2004). *Overcoming dyslexia: A new and complete science-based program. Reading Research*. Volume III. Mahwah, NJ: Lawrence Erlbaum Associates.

Sherry, M. (1990). Implementing an integrated instructional system: Critical issues. *Phi Delta Kappan*, 72, 118-120.

Snow, C. E., Burns, S., & Griffin, P. (1998). *Preventing reading difficulties in young children.* Washington, DC: National Academy Press.

Strickland, D.S., & Shanahan, T. (2004). Laying the groundwork for literacy. *Educational Leadership*, 61(6), 74-77.

Sulzby, E. (1985). Children's emergent reading of favourite storybooks: A developmental study. *Reading Research Quarterly*, 20, 458-481.

Tracey, D.H, & Young, J.W. (2007). Technology and early literacy: The impact of an integrated learning system on high-risk kindergarteners' achievement. *Reading Psychology*, 28: 443-467.

Wood, D., Bruner, J.S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17, 89-100.