Cross Cultural Reactions to Using Computers in the

Early Childhood Education Classroom

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Berliner and Biddle (1995) state that "by the year 2010, at least 50 percent of school-age children will be of non-Euro-American background"…and that "by the year 2030, language minority students (approximately 40 percent), along with African-American students (approximately 12-15 percent), will be the majority in U.S. schools". Thomas and Collier (1997) recognize that over the past 20 years, issues' surrounding the education of ESOL students has been extremely contentious at times. Some large school systems, like Fairfax County Schools in Northern Virginia (Washington Post, 2001, January 21) and the New York City Public Schools (New York Times, 2001, February 2nd) have taken giant steps forward to serve students and address the need for bi-lingual/ESL programs. These programs range from mixing reading fluency with games and enrichment activities to providing all education to ESOL students in their primary language throughout elementary school.

Language is a complex process that requires the involvement of the culture and community in order to engage individuals in the teaching and learning process. Applying technology to the cultural development of students who have English as their second language is a relatively new approach to classroom teaching. The World Watch documents that over the next 10 years over half of all languages in the world will become obsolete (World Watch, 2000). Traditional oral cultures are disappearing at an unprecedented rate. Part of this is due to the assimilation of individuals into other cultures. However, when a language dies, the "weltanschannge", or entire worldview, is eliminated as well (Thouvenelle, 2001). Entire bodies of knowledge about history, cultural change, and personal involvement in time and space are beginning to disappear. If we view culture as being a method to engage its' members in problem solving, then

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entire methods of discovering solutions to every day problems begins to disappear. The influence of this demise may never be known. The magnitude of this loss is almost impossible to measure.

When dealing with ESOL learners, schools have critical issues that need ongoing attention. How are schools dealing with the presence of multiple cultures? What impact do new ideas about teaching and learning, specifically with technology, have on our understanding of the complex role of language? While the values and priorities of parents and the community are significant factors to be considered in determining what should be learned, the expertise of early childhood professionals should influence decisions about appropriate goals for children (Katz, 1989).

To this end, it is our view that language is the oral manifestation of culture, which influences the ability of its' members to engage in problem solving. Additionally, the disappearance of language causes the elimination of cultural problem solving methods as well. We can't afford to marginalize or dismiss any language; however, beyond this concern it the need to preserve cultures and provide children with the means to be economically self-sufficient. Owning these skills helps to build strength in communities when multiple languages and problem solving abilities are combined. In order to facilitate participation in a global community now focusing on information technologies, preparing ESOL learners is becoming an increasing issue. Readiness for participation should occur as soon as possible and in early grades. Educational efforts should include readiness for pre-school and early elementary age ESOL students to learn how technology can be used, including how technology can support primary languages and problem solving efforts.

Personality formation is known as "the way in which individual children develop a characteristic sense of themselves and a unique way to think and feel" (Damon, 1983). In addition, Damon also states "socialization, which begins as soon as a child is born, is especially important during early childhood as the first understanding of the child's community is constructed". Culture should play an important role in a child's developing role as a member of society; however when cultural responses to American education systems are encountered, the student with alternative problem solving styles based on rich cultural heritages are not often considered. The National Association for the Education of Young Children (NAEYC, 1995) describes three prerequisites for universal school readiness: 1. Addressing the inequities in early life experience so that all children have access to the opportunities that promote school success; 2. Recognizing and supporting individual differences among children including linguistic and cultural differences; and, 3. Establishing reasonable and appropriate expectations of children's capabilities upon school entry. In a survey of 3,600 elementary school teachers nationwide it was reported that 52% of children have a successful entry into kindergarten and 48% have moderate or serious problems (Kindergarten Transitions, 1998). Cultural barriers may prove to be one of the most significant barrier to ESOL students and their readiness to compete in the global economy.

The Early Childhood ESOL Teacher

The impact of the computer in the Head Start and early childhood educational classroom has been established, especially with respect to enhancing student problem solving (Wright, Thouvenelle, & Adams, 1997; Sarama & Clements, 2001; Lehrer, Harkman, Archer, & Pruzek, 1986). However, it is the role of the teacher in the

development of technology-based literacy skills that continues to warrant ongoing research, especially as the advancing capability of available technology tools.

If we were to rank order the predictors of success for students being able to read and write in kindergarten, a teachers prediction of a child's ability to read and write is the foremost indicator of student's success with literacy (Lewis, 2001). A teacher's ability to appreciate and understand a student's language seems essential to building competent and functional citizens that can compete in a technological society. This leads us to ask, what are we doing to train teachers to deal with confounding barriers? Even for teachers who excel at their craft, the issues related to culture and learner characteristics would be an enormous task. When issues of language, culture, problem solving exists, what options do teachers have to assist with problem solving? Many teacher-training programs are not designed to prepare teachers to deal with complex cultural issues. Programs need to address how technology might serve as a solution to cultural issues and facilitate the teacher's understanding and integration of cultural recognition in the classroom.

Since 1990, there have been several major comprehensive reviews of the literature on staff development for technology (see Office of Technology Assessment, 1995; Fisher, Dwyer, & Yocam, 1996; & Birman, Kirshenstein, Levin, Matheson, Stephens, 1997). Incorporated into each of these studies/reviews is a component for re-thinking the role of the teacher for learning, encouraging university partnerships, and making staff development a part of effective technology planning.

Throughout the literature on staff development and technology, several themes have been important for successful teacher training. Within the different models of professional development for technology, many of the available programs suggest

common elements; attitudinal influences, administrative support, teacher mentoring, evaluation of staff development, and the importance of the 4 T's: time, training, technology, and teacher-type tasks, such as hands-on activities and specific classroom applications.

Studies have suggested a need for attitude change on the part of teachers, administrators, and superintendents (Bailey, 1990; Washington, 1990). In order for researchers to understand school technology policies, they must first identify how attitudes towards technology are shaping practice in the classroom. Research has suggested that beliefs and attitudes present within the schools infringe upon continued technological development (Dyrli & Kinnaman, 1994).

Staff development for technology tends to be more effective in the presence of a consistent model for supporting collaboration between teachers. Mentoring programs have significant effects on the use of technology in the classroom. Typical staff development programs for an inservice teacher tends to be one-shot, disconnected training that instructs teachers on splintered uses of technology in for the classroom (Janas, 1996). Those programs that integrate technology with a clearly identified mentoring program tend to sustain technology use in the classroom, increase teacher satisfaction with technology, and provide motivation to seek out new technologies (Kerry & Farrow, 1996).

As for teachers, Kinneman (1993) states, "once their attitudes to teaching are incorrect or inappropriate, it seems extremely hard to satisfy the educational goals and fulfillment of instructional achievement."   Research is needed to help reinforce the importance of the development of teachers' roles in a high technical classroom as clear as

possible (Rogers & Mahler, 1992). Educators are aware that the mere presence of technology is not the answer to the problems being encountered by the entire educational system (Mecklenburger, 1990). Policy analysts argue that a major reason schools are not changing is directly related to the way that technology is being integrated into the schools (Sharp, 1992). These analysts suggest the need for strategic planning and the development of technology-competent individuals in charge of teaching and learning (Beaver, 1991). With respect to Head Start teachers and technology use, Wright, Thouvenelle, and Adams (1997) have found through their research on the use of computers in early childhood settings repeated examples that indicate the "absolute necessity of staff development and ongoing support required for educators".

Research Intentions for This Study

We have more than sufficient data on the exponential increase on cultures in the growth of US Society, but we haven't matched the technology as a catalyst to help us to include all students in traditional curriculum, to encourage problem solving through students' individual voices that take into account their culture and the values of that culture. An effort needs to be made to honor learners's culture and at the same time, use the culture as a bridge to participating in their new culture.

The purpose of this research study was to examine how teachers work with ESOL students through the use of technology in order to promote growth and change through a constructive and authentic view of teaching and learning. Technology has the capacity to allow students to work in authentic environments and create meaning based on their understanding of the teaching and learning task. Computer software can be used as a human artifact and as such can express the culture of its creator (Bowers, 1988; Scott,

Cole, and Engel, 1992). This study was designed to engage such software and explore how it was used in an early childhood setting for ESOL learners.

Methods

<u>Research Participants and Project Site</u>

Five teachers and 35 students participated in this study. The teachers and students were participating in a well-implemented summer ESOL program under the auspices of the county in which these individuals are from. Part of the impetus for choosing this county is that is has one of the largest growing ESOL populations in the state of Maryland.

The research site was Stevenson Elementary (pseudonym), which was one of two schools within a large and mainly Suburban/rural County within the state of Maryland conducting summer ESOL enrichment programs. The ESOL director chose the schools based on their location in the county, so that students could easily get to the sites. There were a total of 37 individuals at the Stevenson site, including 33 students, two teachers, and two aides. Tracy and Margaret both taught at the Stevenson School during the summer and were full-time ESOL teachers during the school year. Both teachers taught at the same site the year before with many of the same students. Their class sizes were 16 and 17, respectively. The ESOL director based on a screening and interview chose these teachers. The director wanted teachers who had worked in the county for more than 5 years, were past their 5th year of teaching, had an advanced degree in ESOL, and experience working within a summer program.

Students attended the summer program based on their enrollment in the county's ESOL program and were open to all second language learners. Student ages ranged from

5 to 11, although the camp accepted students from ages 5 to 12. The camp ran from 8:00am to 12:30pm four days per week, for three weeks. Each week had a theme being plants, animals, and food. The plants, animals, and food software programs within KIDWARE supported each of these topics.

Site Selection

The program has a growing history of providing well-implemented programs for minority children who speak English as a second language. The school had also purchased site licenses for KIDWARE in many of their schools throughout the county. This study avoided random assignment and used sample restriction to maintain internal validity. In addition, data was collected on individual student level in order to provide a view of instructional strategies based on student interactions with the KIDWARE software program. This systematic data collection facilitates the research process by enabling teachers to actively engage in the teaching/learning process while the technology captures the ongoing "process/product" results of engagement.

The summer program was conducted by teachers who work with many of the same students throughout the school year. The KIDWARE Software was installed on machines in the spring semester and was available to teachers before the summer program started. In some cases, students and teachers had interacted with some components of the software program. The site and research methods were selected for these reasons.

KIDWARE Intervention and Curriculum

KIDWARE, an existing, flexible-technology-based curriculum, is conceived as an integral part of the framework for this cultural responses project. *The flexibility of the*

KIDWARE software offers opportunities to explore basic concepts such as colors, numbers and shapes in the heritage language of the culture, and additionally offers the English language equivalent to these concepts. The KIDWARE program includes unique cultural priorities and practices that can be incorporated into a simulated community environment. This unique customization permits details and icons of culture to be transmitted to users in the context of their own environments.

One of the initial purposes of this research was to explore the nature of children's engagement when using the computer as a tool. This concept is examined within the context of the teaching/learning process in early childhood environments. Two approaches to curriculum are considered: (1) the project approach that incorporates the representation of ideas through multiple symbol systems and uses multimedia tool software and (2) a thematic approach that links concepts to a central subject and uses computer software to extend practice with related concepts. The initial phase of this research documents the effective use of technology with primary-age ESOL students. Preliminary results are based on the analysis of the research questions and data collection strategies summarized in the attachment. The tool software that is used in these early education environments incorporates unobtrusive collection of children's narrative stories and graphics, frequency of software use data, analysis of the narrative stories collected, and the development of children's multimedia products.

Research Questions

The purpose of this study was to explore teacher and student use of KIDWARE as an integrated element throughout the countywide summer enrichment program. In particular, the intent of this research study to look specifically at how

elementary school ESOL teachers and student used the KIDWARE program. The project was organized around social interactions. Herbert Blumer (1969) described how social interactions influence individuals:

- People relate to things based on the meaning those things have for them,

- People learn the meaning of things in interaction, and

- People filter what they learn through their own perceptual lenses, which are based on their own particular socio-cultural and psychological backgrounds.

As a result, the following research questions provided a focus for this study:

1. How do teacher context variables encourage or discourage the effective use of technology with primary-age ESOL children?

2. How and why do early childhood ESOL teachers integrate knowledge of KIDWARE for student directed learning during a countywide summer enrichment program?

3. In what manner does the integration of the computer with cultural experiences assist primary-age ESL children to actively explore their learning environments?

The following chart demonstrates how research questions

Research Question	Data Collection Activities
How do teacher context variables encourage or discourage the effective use of technology with primary-age ESOL children?	*Teacher Observation* *Teacher Questionnaire*
What is the difference between early childhood ESOL teachers' integration of KIDWARE for students during a countywide summer enrichment program?	*KIDWARE Data*
In what manner does the integration of the computer with cultural experiences assist primary-age ESL children to actively explore their learning environments?	*KIDWARE Data* *County Reports Story Dictation once per week* *All stories* *Slide Show at least once per week*

	Photo Copies of Offline work

Table 1

Data Analysis

For the purposes of this study, both quantitative and qualitative data collection and analysis were used. Both data collection activities and analysis were based on the interactions of teachers and students with the KIDWARE program. Data were analyzed through interactions automatically captured within the KIDWARE program as well as through classroom observations and teacher surveys. Additional surveys were sent to the teachers and aides mid-way through the summer program. Four additional observations were made during the computer lab session as well. The nature of this data collection was structured to provide an exploratory framework for isolating how teachers and students were using KIDWARE within their daily lessons.

It is important to analyze how teachers and students are using culturally appropriate software and how this software impacts teaching practices and pedagogical beliefs. It is also important to listen to what teachers are saying about how technology is affecting their teaching. This importance is based on the premise that they are the individuals who are using the tools in the classroom and dealing with the complex variables each learning situation and learner brings to the classroom (Dede, 1998). When dealing with complex student issues, such as culture, it is important to capture how teachers use the computer as an integral portion of their lesson delivery. When considering culture as a method for problem solving, it is additionally important to view how students interpret and use culturally and developmentally appropriate software. The results section includes information from teacher surveys, classroom observations, and student use of the KIDWARE program.

The results section includes information from teacher surveys, classroom observations, and student use of the KIDWARE program. This study was designed to provide the system with formative information about the use of technology in the classroom and also provide a basis to begin discussions about reforming ESOL practices through the use of the KIDWARE (and other) program(s). Data are presented in the form of tables, charts, and narrative based on their usefulness to the educators looking at these questions in the school, rather than extensive tables of statistics. This is based on an alternative view to statistical reporting being used by researchers looking at school effectiveness for language minority students (Thomas & Collier, 1997). These results are preliminary findings, and are short-term descriptions rather than long-term depictions of school success, unlike other studies surrounding ESOL students.

Research Question #1: How do teacher context variables encourage or discourage the effective use of technology with primary-age ESOL children?

Margaret was an ESOL teacher who worked with the county for over 16 years at the same site. She had worked for over 25 years as a classroom teacher. She had a master's degree in ESOL as well as an undergraduate degree in French and a certificate for elementary education. She described herself as a beginning computer user. She had worked with computers in her classroom somewhat but did not see these an integral part of her regular teaching experience. For the summer program; however, Margaret structured her classroom around the use of KIDWARE and other electronic games that she had available through the county. The following is a graphical representation of her classroom:

Board

C = Computer
E = Electronic Game

Writing Center

Door
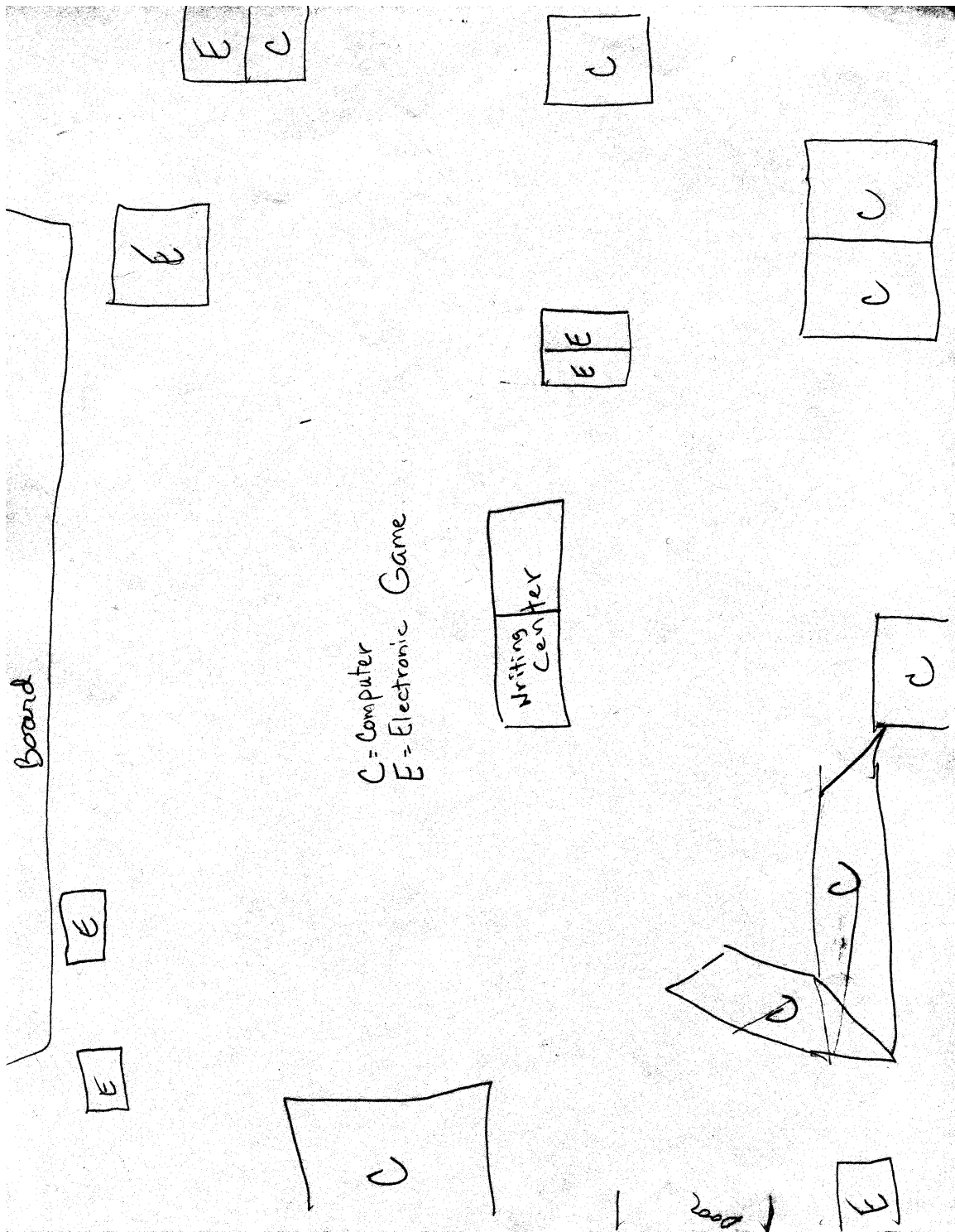
Margaret had the computer and electronic games positioned throughout the classroom, although she used the computer lab for classroom computer activities. The computers in the classroom did not have access to the KIDWARE program, since the program was

only installed in the computer lab. Apart from KIDWARE, she rarely used the computers available to her in her classroom. She organized one computer carrel with additional information about plants, animals, and food. The items included books, magazines, and coloring books. She had two additional computers put together for shared work.

Although her room was structured to include computers and games, her actual teaching behavior was quite different. She described both her classroom management style and use of the computers in her classroom as being very teacher directed. Margaret was asked, "Does the use of the computer activity (KIDWARE) support concepts that are introduced, explored, or discovered at other learning centers or during groups times?" She responded that often times, she would extend activities in the classroom and allow students time to complete work on the computer, most often when exploring the unit on flowers, she would go through the lesson and have students complete activities offline. She gave students short periods of structured time to either complete the "I can count the Petals" program or allow students to use the electronic easel and write about flowers. However, students did not have an opportunity to self initiate computer time.

Students worked on different ideas about plants during the week, irrespective of language. The materials in her classroom were English only. At the end of the day, about two times per week, she would allow the students to start the computers, start the KIDWARE program, and work with the computer along side a peer, aide, or herself. At no point during the summer did Margaret use the second language feature of the KIDWARE program. Students were responsible for reading, writing, and working with words in English with no connection to the student's original ideas about language. She

would sometimes speak to students in their native Spanish, but students having other languages were always spoken to in English.

When asked about the computer software, Margaret described it as "light weight". She thought that more computers should have been made available to teachers so that all students could participate in one activity at the same time. She thought that the summer experience with using KIDWARE was "inconclusive" as far as she was concerned due to issues she had with accessing computers at the same time. She displayed students' work in the classroom that was printed from KIDWARE programs completed on the computer and praised them for doing a "good job". Margaret added that the software did not have a "lot of content" and was "not supportive as a writing tool". She thought that the program was geared more towards younger students and not useful to children over the second grade. As a culminating activity, teachers were asked to print off their final stories. When Margaret handed her stories in, all of the stories had the same picture but different text, which did not correlate to each other.

Mary was the second teacher for the summer program. Mary was in her 8th year of teaching and had worked with the county for the full eight years in the ESOL immersion program. She also had a master's degree in teaching English as a second language as well as an undergraduate degree in early childhood and elementary education. Like Margaret, she described herself as a beginning computer user as well.

Mary worked with the KIDWARE program primarily in the computer lab, separate from her classroom. She did not have access to computers in her classroom. At the beginning of the summer, both Mary and Margaret attended two training sessions offered by the KIDWARE software developer. The goal of this training was to work with

teachers to understand how to use the software in conjunction with classroom activities.

During the first part of the session, Mary was confused about how to integrate the

program into her daily activities. About mid-way through the training, Mary began

brainstorming ideas about KIDWARE and how she thought the program could be used in

conjunction with books she had students reading in Spanish. As they began to make sense

to her, she developed more concrete ideas. When time was given for the teachers to

explore, Mary was extremely active and trying to understand the computer program.

Mary began to demonstrate understanding of the program and became more

interested in integrating the program into her classroom activities throughout the three

weeks. She used the program to allow students to work with graphics, drawings, etc. Her

student stories emerged as beginning examples of what could be accomplished; however

this reflected how she ran her classroom in general. The following story provides one

example of this instructional strategy.

My favorite fruit is sweet lemons. Thay are yellow, round and sweet. That's the special thing about my favorite fruit. Thay have seeds in side thay growon on trees in Iraq. I can eat them ollby theum selves. Or you can eat them with kababs or any food you like.

I likethem becues back home at ramadan. I used to eat sweet lemons at late night .

Figure 2

In order to complete this paragraph, Mary worked with the student and posed individual questions to the student in order to have him reflect on sweet lemons. Although this is one example of how to integrate ideas about culture into a computer outlet, this was the only 2 out of 16 that produced a story that related to culture and made connections between new language and vocabulary related to student-generated ideas.

Research Question #2: What is the difference between early childhood ESOL teachers' integration of KIDWARE for students during a countywide summer enrichment program?

This research question was based on data from the KIDWARE program and demonstrates an initial comparison of both Margaret and Mary's use of the software. In order to test levels of significance, this research question was divided into three hypotheses as a test for significance. The research hypotheses that resulted from the research question #2 are:

1. The presence of different teachers influenced students' use of the KIDWARE program.

2. Teacher use of KIDWARE influences the number of stories within the KIDWARE program

3. There is an interaction between individual teachers and student use of the KIDWARE program during the summer enrichment program

The dependent variable under question was the total number of stories in each of the three designated software program, Fun with Animals, Petals of a Flower, and Aquarium (FWASF, PETSF, and AQSF respectively). In addition, data was entered for the total

number of real words used in the story compared with the total number of made up words (FWARW, PETRW, and AWRW as well as FWAMW, PETMW, and AWMW, respectively. The KIDWARE program captured data as students used the software. This information was divided into categories within SPSS. The independent variable for this study was the classroom teacher.

Teacher data was entered as either a 1 (for Margaret) or 2 (for Mary). A mean comparison as well as an ANOVA was used to determine the influence of the individual teacher on student participation with the three elements identified above. The mean comparisons were run to check for external influences apart from teacher interactions. Overall, students were more likely to work on the computer in Mary's class than Margaret's class. On the average, Mary's students completed an average of 2 stories per child. Margaret's students completed an average of less than 1 story per child (.7).

Both Mary and Margaret used Fun with Animals the majority of the time to generate student stories. Within the Fun with Animals section, an analysis of students real words per story Mary's students had an average of 32 words per story and Margaret an average of 5 words per story. When using Petals of a Flower, Mary's students had an average of 16 real words per story for flowers as Margaret 10. Margaret had 3 words per story with the electronic easel and Mary less than 1, indicating that Mary did not use the electronic easel.

Because the teacher may not have been the primary factor in the total number of stories, a mean comparison was run for BOTEL scores. Margaret's students had lower BOTEL scores on average (.5) than Mary (1.5), which indicates that Mary's students were functioning at a higher level and therefore completed stories at a faster rate than

Margaret's students. This may have influenced how many real words per story that each student; however, an ANOVA indicates that BOTEL score did not significantly influence the total number of real words overall (.5% probability on a one way ANOVA at 95% confidence level)

Research Question #3: <u>In what manner does the integration of the computer with cultural experiences assist primary-age ESL children to actively explore their learning environments?</u>

During the summer program, students went on three field trips, one per week. This left three days of the week for teachers to work with students on language, reading, and writing. The topics for the three weeks were based on what teachers thought would be the most interesting and motivating things to learn about over the summer. The primary effort for the summer program was for language enrichment and to provide students with opportunities for expression. Teachers were left with the decisions about specific instructional interventions. Mary made greater use of the lab than Margaret, however measure were not put into place to determine whether or not other instructional strategies apart from the computer were significant factors in student language acquisition or problem solving.

A review of student demographics indicated that 98% of the students had Spanish as their primary language. Only one student had Urdu as their primary language. Out of this 98% of students, half were born outside of the U.S.A. Half were born in other various countries (Nicaragua, Brazil, and Spain).

The following charts represent the degree to which students used the KIDWARE program during the three-week session. Both Mary and Margaret planned to take the

students into the lab at least 30-45 minutes per week, for a total of an hour and a half. Through an initial look at the data, it was apparent that both teachers made greater use of the Fun With Animals component of the KIDWARE program, with fewer interactions with the electronic easel or the Aquarium component. According to the data, 62% of the students had completed one or more stories with Fun with Animals (29% had 1 story, 15% completed two stories, and 4% completed three or more stories) as opposed to 8% having completed a story from the Aquarium component. The class combination of frequencies for story completion for Fun with Animals is as follows:
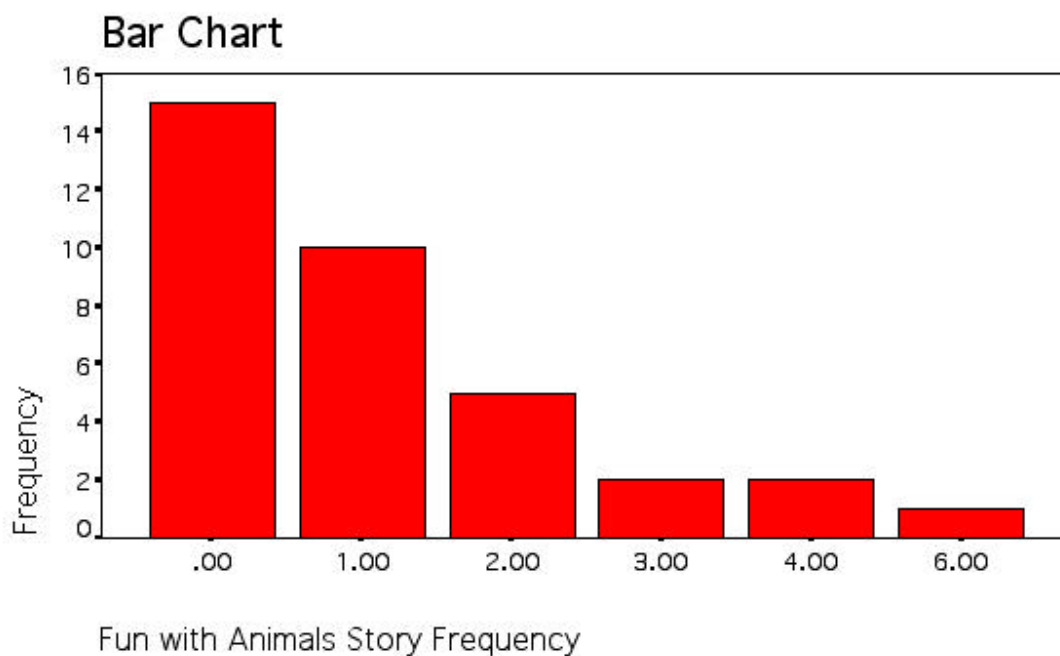

Figure 4

Research hypotheses H1, H2, and H3 were demonstrated by running a two-way ANOVA. Student's primary language was generally Spanish. For students with higher BOTEL scores also had higher frequencies of real words for the Fun with Animals program (0 = average of 8 real words, 1 = average of 20, and 2=24 words, 3=30 real words). Girls were more likely to have lower BOTEL scores M=1.15 and F=.6 with a

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standard deviation of 1.0 as well as fewer words per story M=17 and F=13; however, students BOTEL scores did not significantly influence the total number of stories overall.

Discussion

Based on this initial review of the data, it is apparent that teachers did not actively engage students in the use of the KIDWARE software program. This was partly due to the shortened length of time for teachers to integrate the computer into their daily activities (3 weeks), although continued use of this software was possible during the following school year. It is likely that use increased, however, this study did not extend to capture this data.

During the initial training session, it was clear that both teachers were struggling with how to integrate the computer into their daily instruction. Although Mary made an attempt to work with culture through the program, student stories do not indicate that she was successful dealing with problem solving, culture, the use of the computer, as well as considering additional issues for teaching and learning. Neither teacher specifically addressed how students should combine novel words with familiar English vocabulary on the computer. Teachers failed to work with the alternative language feature within KIDWARE, given that all 34 stories generated for each student were in English only. This is alarming since 50% of the students had BOTEL scores at or below level 1. There was also little involvement with parents. Teachers responded that most of the interactions between parents had to do with transportation and not on teaching and learning, especially with language. Although there was some indication that male students used the computer more than females in the group, no conclusive evidence was presented that teachers encouraged or discouraged females from participating in computer activities.

The recommendations that were made as a result of this study are as follows:

1. More research needs to be conducted on the issue of culture and computer use in the early childhood classroom

2. Teacher's need extensive opportunities to explore their expectations of students entering the classroom that are grounded in cultural similarities and differences,

3. By using authentic problem solving approaches to teaching and learning, teachers can provide opportunities for students to work on specific language skills and bridge the novel and familiar based on primary and secondary language use.

4. Teachers need ongoing support and training for integrating technology into the ESOL curriculum by finding a "comfort level" that helps them understand how technology to facilitate cultural differences

5. Curriculum development for early childhood and elementary ESOL students should be grounded in an analysis of learner characteristics. For many students access to curriculum may mean translating content into their primary language, however, after that access has been established, teachers need to identify student behaviors that are culturally influenced.

6. For ESOL students, the content of the curriculum is not nearly as important as the way in which it is delivered.

Students who engage in authentic software programs that have options for language (including instruction in their first language) is an important accessibility feature. This feature may provide teachers with computer-based choices for language. Although not used by teachers in this study, other studies conducted by individuals using the KIDWARE software indicates that the language feature is particularly useful for

combining cultural and problem solving strategies in the classroom. Use of these features allows the teacher to concentrate on content and reduces the amount of time necessary for adapting curriculum materials to fit into appropriate language activities.

<div align="center">Conclusions</div>

Developmentally, students' early years are increasingly dynamic and cognitively, students change dramatically over the course of a regular school year. From a neuroscience perspective, the brain has the capacity of making quantum leaps in learning provided that the environment facilitates this. For early childhood ESOL students, the curriculum needs to be matched to the learner's skills, abilities and readiness to learn. Software programs that allow individuals to find expression and control of content are necessary for student's success (CAST, 2001).

NEAYC notes the significance of allowing students to feel secure in their learning environment where they see the teacher as someone who identifies with their unique culture. Our recommendation is that portions of initial early childhood instruction be geared specifically towards culture and support the uniqueness children. Students should view the teacher as a proactive advocate of their learning. Although technology is not the means to the end, it does provide opportunities for teachers to structure the learning environment in culturally inclusive ways. It provides a tool that allows children to engage in self-exploration and tailor it to their individual needs. Traditional textual materials do not always allow for this type of student-content interaction. It is possible to work with tools where designers have taken into account a vast amount of learner characteristics in the design and development process. The goal would be to provide teachers with the training and skills necessary to use any curriculum for this end; however, the

development of curriculum, especially technology-based, provides one more opportunity for students to construct their own learning experiences. The power in the technology is in its flexibility and ability to customize learning experiences. Those technologies that include culture, as a way to customize these learning experiences, should be further explored.