SAMORA JULIAN RESEARCH INSTITUTE

JSRI

Teaching Technology to Hispanic Youth: *A Report on Factors Affecting Students' Learning*

by German Cutz and Emma Theuri
University of Illinois Extension

Research Report No. 46
January 2011

Julian Samora Research Institute
MICHIGAN STATE UNIVERSITY
301 Nisbet Building
1407 S. Harrison Road
East Lansing, MI 48823-5286

Phone: (517) 432-1317
Fax: (517) 432-2221
E-mail: jsamorai@msu.edu
Web: www.jsri.msu.edu

The Midwest's premier Hispanic center undertaking research on issues of relevance to the Hispanic community in the social sciences and economic and community development. JSRI is a unit of the College of Social Science and is affiliated with various units on the Michigan State University campus.

MICHIGAN STATE UNIVERSITY

Teaching Technology to Hispanic Youth:
A Report on Factors Affecting Students' Learning

by

German Cutz and Emma Theuri
University of Illinois Extension

Research Report No. 46
January 2011

Abstract

University of Illinois Extension, in partnership with Our Lady of Mount Carmel Church in Joliet, Illinois, offered a technology summer program for Hispanic youth from June 22 to July 22, 2009. The program, "Looking Back, Moving Forward," utilized self-directed learning activities during the entire program. Eight out of fourteen Hispanic students completed sixty hours of training by attending a three-hour class from Monday through Friday. There were seven females and one male whose ages ranged from twelve to seventeen years old. To assess students' knowledge before and after the program, they were administered pre- and post-tests. The highest score on the pre-test was 32 percent, but that went up to 88 percent on the post-test. To document the factors that affected students' learning, they completed a self-report card every day. Student reports on factors that positively affected their learning included: 1) sense of accomplishment; 2) excitement; 3) experimenting; 4) self-directed learning; 5) confidence; and 6) time management. Factors that limited students' learning included: 1) inability to complete tasks; 2) frustration; 3) equipment malfunctions; 4) uncertainty; and 5) tediousness.

About the Authors

Dr. German Cutz is Sustainable Families and Communities Associate Cooperative Extension Educator in the Department of Extension, College of Agriculture and Natural Resources at the University of Connecticut, having recently moved there from his position as Extension Specialist – Spanish Language Programming at the University of Illinois. He received an M.A. in University Teaching Methods from San Carlos University of Guatemala, as well as two master's degrees, one in Natural Resources and Environmental Management and the other in Community Education and Participatory Educational Methods, and an Ed.D. in Adult and Community Education from Ball State University. Dr. Cutz has over twenty years experience in participatory curriculum development and implementation for marginalized and at-risk populations, and has field experience in both developed and developing countries.

Dr. Emma Theuri is a private consultant speaking on youth programs, strategic thinking, planning and management; and program evaluation. Formerly the Will County Extension Director with University of Illinois Extension, she oversaw Extension programming, building linkages, collaborations, and networks, and has developed and implemented entrepreneurship programs for low-income families. Dr. Theuri received a Master's degree in General Secondary School Administration, an Education Specialist degree in School Administration and Supervision, and her Ph.D. in Educational Leadership and Policy Analysis from the University of Missouri, Columbia.

MICHIGAN STATE UNIVERSITY

Michigan State University
East Lansing, Michigan

Julian Samora Research Institute
Dr. Rubén O. Martinez, Director
Terri Bailey, Layout/Editor

SUGGESTED CITATION

Cutz, G., & Theuri, E. (2011). *Teaching Technology to Hispanic Youth: A Report on Factors Affecting Students' Learning*. *JSRI Research Report #45*. East Lansing, MI: The Julian Samora Research Institute, Michigan State University.

The **Julian Samora Research Institute (JSRI)** is committed to the generation, transmission, and application of knowledge to serve the needs of Latino communities in the Midwest. To this end, it has organized a number of publication initiatives to facilitate the timely dissemination of current research and information relevant to Latinos.

Latinos in Michigan A new, focused approach to disseminating information on Latinos in the state of Michigan. These specialized reports include documents, charts, and graphs that utilize primary data from JSRI's researchers and initiatives.

Research Reports JSRI's flagship publication for scholars who want to produce a quality publication with more detail than is usually allowed in mainstream journals. Research Reports are selected for their significant contribution to the knowledge base of Latinos.

Working Papers For scholars who want to share their preliminary findings and obtain feedback from others in Latino studies.

Statistical Briefs/CIFRAS For distribution of "facts and figures" on Latino issues and conditions. Also designed to address policy questions and to highlight important topics.

Occasional Papers For the dissemination of speeches, papers, and practices of value to the Latino community which are not necessarily based on a research project. Examples include historical accounts of people or events, "oral histories," motivational talks, poetry, speeches, technical reports, and related presentations.

Demographic Reports For JSRI demography summaries using primary data from private research projects and secondary data from government sources. Examples include Census evaluations; projected population summarizations; statistical looks at Latino Household size, educational attainment, and earned income; and localized and regional population projections.

NEXO Newsletter JSRI's official newsletter is produced in both printed and pdf formats. To add your name to the NEXO Mailing List, send an e-mail to jsamorai@jsri.msu.edu, including your name, mailing address, and other contact information.

Teaching Technology to Hispanic Youth: A Report on Factors Affecting Students' Learning

Introduction

Technological aptitude, especially computer skills, is essential to success in the United States. One research study found that computer use among youth positively correlates with the development of cognitive skills and academic performance (Mutchler, Anderson, Taylor, Hamilton, & Mangler, 2006). Without technological aptitude it is difficult to achieve the necessary academic skills for completing a task, even something as simple as using the Internet to find a book in the library. Students—especially minority and at-risk students, such as Hispanics/Latinos—who are involved in extracurricular activities (defined as activities not included in the regular curriculum) are more likely to graduate from high school (Lamm et al., 2005).

Today's youth learn differently due to their dependence on technology-mediated activities (DeGennaro, 2008). Researchers have reported that youth figure out things for themselves, play with technology, have become multitask oriented, and learn through a variety of media (Tapscott, 2002). Youth have also developed a new form of reasoning, connected to ways they use objects and tools, codes, texts, and other forms of communication, as well as access to information, to create products important to themselves (Brown, 2000).

Most researchers have focused on the use of technology in education and how it has affected learning. Gros (2007) indicated that most research has focused on three aspects: 1) a sociological approach in which the main goal is to describe the use of games' effects on social development and relationships; 2) effects on learning with digital games, which has been also called games literacy; and 3) learning with games in schools. However, little research has been devoted to study youth's perceptions of the factors that affect them when learning technology outside the school to produce educational computer games (Mutchler et al., 2006).

Many studies that have attempted to describe the effects of technology on youth's learning have used either a predetermined set of questions or a list of effects graded on some type of scale (Bolhuis, 1996; Boss & Krauss, 2007; Brown, 2000; DeGennaro, 2008; Estes, 2004). Very few studies (Hofer & Owings Swan, 2008) have reported what youth describe as the effects of technology on their learning. Hofer and Owings Swan (2008) conducted a study on youth who produced their own videos. They indicated that when students created their own videos related to coursework, their motivation and engagement increased and new opportunities to engage their creativity arose. Student-
lessons at the same pace. To proceed to the next lesson,

produced digital video also enabled more authentic learning experiences and provided students with a sense of ownership.

This study is similar to Hofer and Owing Swan's in that students created their own computer games. However, as Fingeret (1990) suggested, educators and researchers should stop trying to speak for informants and instead should listen to their voices. Informants as defined by Spradley (1979) are the first and foremost native speakers. They are the source of information; literally they become teachers for the researchers.

This study listened to youth voices and is based on youth's self-reports of factors that affected their learning of technology at a summer camp outside the school setting. Students were exposed to self-directed learning (SDL) activities to produce a computer math game for Kindergarteners through second graders. The study addressed two general research questions:

- How much knowledge about computers do youth gain in a technology summer camp outside the school?
- What factors did youth self-report affecting their learning when using technology to produce educational computer games?

Description of the Program

"Looking Back, Moving Forward" was the curriculum used for this computer program. It was designed by University of Illinois Extension for young students (middle to high school). This curriculum teaches webpage design and digital animation using SDL activities. SDL has been defined as a "form of study in which learners have the primary responsibility for planning, carrying out, and evaluating their own learning experiences" (Merriam, Caffarella, & Baumgartner, 1991).

The program consisted of sixty hours of training and was recommended for technology summer camps or enrichment programs. Students were provided with a copy of the curriculum, which was installed on each of the laptops supplied for the course. The curriculum contained twelve written lessons. To supplement the written directions, the curriculum also included fourteen video lessons. Lessons 1 to 8 relied on video more than written lessons. Lessons 9 to 12 focused more on written directions.

When the program began, students received all of the video lessons and the first five written lessons. The remaining written lessons were provided as students completed previous lessons. Not all students completed the
students must have completed the previous lesson; how-

ever, students did not need to turn in any assignment, project, or class homework for each lesson. The only requirement given students was that they needed to produce a computer math game by the end of the program.

The curriculum was designed in a linear and ascendant format. Lesson 1 introduced the program, its objectives, the software to be used, and the overall goal of the program. Lesson 2 came with videos showing students how to create basic animation tools. As students progressed, subsequent lessons became more challenging and projects were more complex. Early lessons formed the foundation for subsequent lessons, which introduced students to digital animation as well as webpage design techniques. Lesson 12 showed students how to create a math game. Students could start on any lesson they decided, but they knew they wouldn't be able to complete Lesson 12 without completing most of the previous lessons. The final project, which students completed at the end of the sixty-hour training, was a computer math game for Kindergarten through second grades. To complete their project, students needed to learn Flash Creative Suite 4 to design web pages and ActionScript 3.0, a language used to create digital animations with Flash.

To facilitate the learning process, the instructor of "Looking Back, Moving Forward" also needed to know Flash Creative Suite 4 and Action Script 3.0. In addition, the facilitator had to be able to use digital cameras, a camcorder, and a digital projector. The main role of the facilitator was to help students find potential programming errors, or suggest possible ways to achieve animation effects.

Recruitment

Our Lady of Mount Carmel—the largest Hispanic church in Joliet, Illinois, with over 3,000 families registered (approximately 10,000 parishioners)—assisted with the recruitment of Hispanic youth participants. University of Illinois Extension provided the church with a bilingual flyer with program information, including fees. The church publicized the computer camp in their weekly bulletin. At three Sunday masses the camp was announced by the pastor of the church. In addition, the Director of Religious Education talked to parents and personally invited youth to register for the camp. Ten youth registered by the deadline on June 12, 2009. Four more students were accepted the day that camp began. All participants were parishioners of Our Lady of Mount Carmel Church. The registration fee was $25 per family. Although all participants were from the same church, not all of them attended the same school.

Group Characteristics

A total of fourteen students initiated the program, nine females and five males. Students' ages ranged from twelve to seventeen years old. After the second day, two students (one male and one female) dropped out of the program because they had previously committed to volunteer in other programs at the camp. At the end of the first week, three more students dropped out; one wanted to volunteer at another program and two gave no explicit reason. At the end of the program, eight students (seven females and one male) had completed sixty hours of training. All participating students identified themselves as Hispanics, but English was their primary language. Some of them barely spoke Spanish. Six out of eight students, all females, were in high school and two were in middle school (one male and one female).

Classroom Environment

All classes were taught in English. Classes lasted three hours, from 1:00 to 4:00 pm Monday through Friday. About halfway through each class, students had a ten- to fifteen-minute break, during which all requested to leave the classroom.

Students were seated in a U shape and each had an assigned laptop. They could all see each other face-to-face. Each computer was loaded with Flash Creative Suite 4 and a copy of the curriculum, "Looking Back, Moving Forward."

Every day the facilitator, who had the instructor's version of the curriculum, used a digital projector and a laptop. He regularly spent between ten and fifteen minutes explaining the activities of the day, answering general questions, or assisting students with specific questions about their projects.

Students knew they could spend as much time as needed on each lesson. They did not need the facilitator's approval to move from lesson to lesson, but they knew they needed to complete each lesson's project. Students were allowed to communicate among themselves, help each other, or walk around the classroom if needed.

Self-Directed Learning Activities

SDL views learners as responsible owners and managers of their own learning process (Bolhuis, 1996; Garrison, 1997). They have the primary responsibility for planning, carrying out, and evaluating their own learning experiences (Merriam, Caffarella, & Baumgartner, 1991).

SDL took place every day. From the first to the last day of classes, students took responsibility for their own learning. Each lesson outlined what students needed to do and the type of activities they needed to complete.

However, students administered their own time and made decisions about what to learn to complete each lesson's project. All lessons provided written instructions as well as video lessons that students could watch to complete their projects. Students could skip sections, lessons, or projects if they decided to.

SDL used challenging tasks (Taylor, 1995) or problems that involved the students' problem-solving and decision-making processes and instructor facilitation when needed. Each lesson required students to complete a project. For example, Lesson 6 asked students to create a computer animation from general ideas provided. Story #1 read, "A boy or girl is sleeping on grass. The sky is clear. When it gets very hot, your character gets up and finds shade under a tree." However, students did not have to follow the stories exactly. They could choose the names of characters and the location of the story, and the sequence of animation was their decision. They could even change the story if they wanted.

Methodology

This study used a combination of quantitative (Bourdeau & Taylor, 2007) and qualitative methods (Kudryavtsev, Krasny, Ferenz, & Babcock, 2007). Quantitative data was collected using the scores from pre- and post-tests. Descriptive statistics were used to analyze pre- and post-test scores. Descriptive statistics, as defined by Leedy and Ormrod (1992), are used to describe relationships in terms of proximity or remoteness between two or more groups of data. Qualitative data through self-reports were collected from students. A combination of ethnographic and interpretive research was utilized to analyze qualitative data. Ethnographic research acknowledges that informants are the sources of information (Spradley, 1979), and interpretive research makes sense of contextual experiences and builds patterns of meaning and relationships connected to a particular situation (Erickson, 1986).

Pre- and Post-tests

Pre- and post-tests, each consisting of twenty-five questions, were administered to all participating students. To maintain anonymity, names and any other personal information have been removed from this report. Students were assigned an identification letter. However, pre- and post-tests collected students' names, gender, and age. This report includes the scores of students who took both tests. Students who dropped out of the program took only the pre-test but not the post-test; those scores are not included. The pre-test was administered on June 22 and the post-test on July 22, 2009. Eight youth—seven females and one male—attended the program from beginning to end.

A three-section written questionnaire was administered at the beginning of the program. Questionnaires were available in English and Spanish. Students were asked for language preference. All chose the English version. On the pre-test, one section requested general information such as the student's name, age, and gender. The second section consisted of twenty-five multiple-choice questions. All questions were directly related to "Looking Back, Moving Forward" lesson content. Scores on this section were recorded for comparison with post-test results. The third section comprised two questions: Do you have a computer at home? and Do you have access to the Internet from home? At the end of the program, students took a post-test, which was basically the same as the pre-test.

Scores on the twenty-five questions were recorded. Data from section one and section three were not scored. Following are sample questions:

1. What type of images can be created with Flash?
   - ☐ Bitmaps
   - ☐ Vectors
   - ☐ JPEG (Joint Photographic Experts Group)
   - ☐ PNG (Portable Network Graphics)
2. What happens if an image created based on a Bitmap is enlarged?
   - ☐ The image is seen as bigger
   - ☐ The image is not modified
   - ☐ The image is distorted or it begins to distort
   - ☐ The image moves a little but it is not distorted

Students' self-reports

Index cards were used for students to answer two open questions (one on each side of the card). Each card was dated, and students needed to write their names. However, when students forgot to write their names, their cards were grouped based on students' handwriting; cards were also grouped and identified with letters. All students completed their report cards in English.

The first day that students completed their self-report cards, the instructor asked them if the questions were clear or if they had any questions about how to complete the cards. The instructor asked students to provided examples of answers for each question. Then the instructor handed out the cards and students completed their report. Index card questions were:

- Describe any factor that positively affected your learning today.
- Describe any factor that limited your learning today.

Measuring students' gains in knowledge

Table 1 (on page 4) shows that at the beginning of the program students didn't know most of the content of the program. The highest score was 32 percent or 8/25. Even more, three of the students who took the pre-test scored 0 percent.

Table 1. Technology Summer Camp Participating Students' Pre- and Post-test Scores

Student ID	Pre-test 6/22/2009		Post-test 7/22/2009	
	Correct	*Percentage*	*Correct*	*Percentage*
A	6/25	24%	22/25	80%
B	8/25	32%	20/25	88%
C	6/25	24%	21/25	84%
D	2/25	8%	15/25	60%
E	0/25	0%	12/25	48%
F	5/25	20%	14/25	56%
G	0/25	0%	10/25	40%
H	0/25	0%	13/25	52%

However, results of the post-test showed that all students gained knowledge during the program. The highest score was 88 percent (20/25) and the lowest was 40 percent (10/25). Students whose scores were high in the pre-test also scored high in the post-test. Students who scored 0 percent in the pre-test also showed lower scores in the post-test. Although none of the students scored 0 percent on the post-test, students who scored 0 percent on the pre-test didn't score more than 52 percent on the post-test. Students' increased knowledge ranged from 36 percent to 60 percent.

Table 2 shows that all participating students reported having access to the Internet at home. There appears to be a relationship between age and knowledge. Older students possessed more knowledge about the program at the beginning than younger students. For instance, sixteen- and seventeen-year-old students scored the highest on both pre- and post-tests and also achieved the highest gains in knowledge. Students whose ages ranged from sixteen to seventeen years old gained from 56 to 60 percent. Students whose ages ranged from twelve to fourteen years old increased their knowledge between 36 and 52 percent. Overall, 75 percent (6/8 students) scored above 50 percent in the post-test and 63 percent (5/8 students) showed an increase in knowledge between 52 and 60 percent. Post-test scores ranged from 52 percent to 88 percent. Most students who scored low on the pre-test also scored low on the post-test. Only one student who scored 0 percent on the pre-test scored over 50 percent on the post-test (52 percent).

Table 2. Students' Age and Knowledge Gains in Percentages

Student ID	Student Age	Pre-test	Post-test	Knowledge Gain	Access to Internet
		Percentage	*Percentage*	*Percentage*	
A	16	24%	80%	56%	Yes
B	16	32%	88%	56%	Yes
C	17	24%	84%	60%	Yes
D	14	8%	60%	52%	Yes
E	14	0%	48%	48%	Yes
F	14	20%	56%	36%	Yes
G	12	0%	40%	40%	Yes
H	14	0%	52%	52%	Yes

Students' self-report of factors that affected their learning

Every day at the end of class, students were handed a dated index card. On one side, they described factors that had positively affected their learning, and on the other side they wrote factors that had limited their learning that day. Students were required to write their names on the cards. Data from students who did not write their names on the cards were grouped using their handwriting. For analysis purposes students were assigned an identifying letter. Information provided by students has been quoted. In some cases, students' information has been edited for legibility, indicated by enclosing in brackets [ ].

Students' self-reports were tallied by day in a two-column table. One column lists the factors that positively affected their learning and the other column records factors that limited students' learning. A domain analysis (Spradley, 1979), finding a common theme among students' reports, helped identify both factors that positively affected students' learning and factors that limited students' learning.

Some of the factors reported as positively affecting students' learning included:

1) Accomplishment
2) Excitement
3) Experimenting
4) Self-Directed Learning
5) Confidence
6) Time Management

Accomplishment

As shown in Table 3 (page 5), the factor that most positively affected students' learning was accomplishment (23 percent), the feeling that they had finished a task or completed a project by themselves. Each lesson required students to complete specific tasks or projects. Student C: "[I] finished the legs and animation for my body." Student E: "[I was] finishing the 5 page website." Student F: "[I] finished Lesson 8 and started Lesson 9."

Excitement

Excitement was a progressive experience from Week 1 to Week 4. Student A: "[I] enjoyed taking pictures." Student C: "taking pictures was fun and [I] finished Lesson 4." As the program progressed, students were excited about completing more complex projects, such as designing an interactive game or completing a website. Student F: "[I] finished the game and it works!" Student C: "My website was amazing; it looked great and everything matched."

Table 3. Participating Students' Self-Reported Factors That Affected Their Learning at a Technology Summer Camp

Factors that positively affected students' learning	Total	
	#	%
Accomplishment	21	23%
Excitement	18	19%
Experimenting	17	18%
Self-Directed Learning	16	17%
Confidence	12	13%
Time Management	9	10%
TOTALS	**93**	**100%**
Factors that limited students' learning		
Inability to complete tasks	25	42%
Frustration	15	26%
Equipment malfunctions	9	15%
Insecurity	6	10%
Tediousness	4	7%
TOTALS	**59**	**100%**

Experimenting

Students had the opportunity to experiment almost every day. Lessons provided the basic guidelines to complete tasks or projects, but students made decisions regarding the way they wanted to complete their assignments. Experimenting was a way for students to master animation and website design techniques. Student E: "[I] experimented with different tools." Student B: "[I was] doing more new things on the website and fun with video camera." Experimentation occurred during the first three weeks of the program.

Self-Directed Learning

SDL was the main feature of this program. Students took responsibility for their own learning and were able to learn at their own pace. There were two main sources of learning: written guidelines and video lessons. Students acknowledged that they were learning by themselves. Student F: "[I] learned to make buttons on Flash by watching a video." Student B: "[I] learned how to do more things on websites adding codes. [I] made an input box and dynamic text." Data in Table 4 show that most learning occurred during the first (69 percent) and second (25 percent) weeks of the program.

Confidence

Students gained confidence as they were learning how to use the program, how to create digital animations, and website design techniques. Student D: "[I] messed up while making the house, but got [it] together." Student C: "[I] fixed errors by myself." Student B: "[I was] fixing code problems and other navigational issues."

Time Management

Traditionally, teachers or instructors manage or control what students should learn and how much time they should spend learning. However, in this program students were responsible for managing their own learning time beginning on day one. They decided what to do and how much time to spend on each activity. Student E: "[I] took pictures of different objects for next project." Student E: "Break time, I didn't want to go on break." Student E: "[I] finished [my] website buttons and [started] working on the story."

Factors reported as limiting students' learning included:

1) Inability to Complete Tasks
2) Frustration
3) Equipment Malfunctions
4) Uncertainty
5) Tediousness

Inability to Complete Tasks

Students' inability to complete tasks or projects was reported as the most limiting factor affecting their learning. Table 4 (page 6) shows that during the first and second weeks, students reported that tasks were difficult to complete (48 percent and 44 percent, respectively). Student A: "Making the movie clip was hard and [I] kept getting stuck." Student C: "[I] couldn't get a circle in the middle of other circle to save it as circle path." Student B: "[I] had trouble drawing the tree trunk."

Frustration

Students had to self-learn the content of the program, use program tools, and create animations on their own; many experienced frustration because they couldn't understand directions or accidentally clicked on a wrong key. Student D: "[I was] frustrated with Lesson 3. [I] got stuck on the bird." Student C: "[I was] messing up because I didn't understand." Student F: "[I was] not able to understand everything."

Equipment Malfunctions

This program relied very much on computers and other equipment, such as a digital projector, cameras, and a camcorder. Although the equipment was tested before starting the program, some students reported having problems with both hardware and software. Student D: "Computer not working/starting work over two times/starting movie clip." Student G: "[My] computer [was] shutting off." Student C: "[It was] hard to restart computer." Student G: "Program was quitting by itself." Student H: "Flash kept shutting down and had to start over twice."

Insecurity

Table 4. Students' Self-Reported Factors That Affected Their Learning by Week

Factors that positively affected students' learning	Total		Week 1		Week 2		Week 3		Week 4	
	#	%	#	%	#	%	#	%	#	%
Accomplishment	21	100%	7	33%	4	19%	7	33%	3	14%
Excitement	18	100%	3	17%	4	22%	5	28%	6	33%
Experimenting	17	100%	6	35%	7	41%	4	24%	0	0%
Self-Directed Learning	16	100%	11	69%	4	25%	1	6%	0	0%
Confidence	12	100%	2	17%	7	58%	1	8%	2	17%
Time Management	9	100%	5	56%	1	11%	1	11%	2	22%
Factors that limited students' learning										
Inability to complete tasks	25	100%	11	44%	12	48%	1	4%	1	4%
Frustration	15	100%	6	40%	5	33%	0	0%	4	27%
Equipment malfunctions	9	100%	4	44%	2	22%	2	22%	1	11%
Insecurity	6	100%	1	17%	2	33%	2	33%	1	17%
Tediousness	4	100%	1	25%	1	25%	1	25%	1	25%

Insecurity was closely related to lack of knowledge and confusion. Student C: "I don't know how to put my game onto my website." Student B: "Not knowing how to make a background." Student F: "[I was] not sure what we were doing with pictures." Student B: "[I] wasn't sure how to move the body." Student E: "[I didn't know] how to make my animation move."

Tediousness

Digital animation is very detailed and time-consuming work. Students who were learning animation basics spent hours drawing their characters or pieces of a story. For some it was a tedious job. Student F: "Detail work is very tedious." Student C: "Creating coding and the webpage is tedious work." Student G: "[I] had to type a long action script, which was very tedious."

The order of factors shown in Table 3 was based on the frequency each theme was cited by students on a weekly basis. Therefore, one student might have reported the same theme more than once as shown on a sample domain analysis of Week 1, as follows:

Self-Directed Learning – Week 1 (eleven entries)

Student A: "[I was] learning to make movie clip, save circles, modify, arrange, and send [objects] backwards."

Student B: "[I was] learning to make animations [with] movie clips."

Student F: "[I was] learning to make a movie clip and transforming flipping a circle horizontally."

Student C: "[I was] learning how to do a movie clip [and] motion tween."

Student A: "[I was] learning to do a bird animation."

Student B: "[I was] learning to animate a bird."

Student F: "[I drew a] house and bird flying."

Student D: "[I] tested a move clip and a shape animation."

Student F: "[I] learned to make buttons on Flash by watching a video."

Student D: "[I was] learning how to make legs move like Michael Jackson."

Student A: "[I] learned to mask texts on flash and animate face."

Table 3 shows that students reported factors that affected their learning, both positively and negatively, 152 times while attending a technology summer camp out of the school environment. Factors that positively affected their learning were reported 93 times (61 percent) compared to 59 times (39 percent) for those that limited their learning. Among the factors that positively affected students' learning, the sense of accomplishment—that they had finished a task or a project—was the most reported (23 percent). From the same group, three factors that affected students' learning almost equally were excitement (19 percent), experimenting (18 percent), and self-directed learning (17 percent). The two factors that scored the lowest among those that positively affected students' learning were confidence (13 percent) and time management (10 percent). Of the factors that limited students' learning, the inability to complete tasks (42 percent) and frustration (25 percent) were the most reported. Other factors, including equipment malfunctions (15 percent), insecurity (10 percent), and tediousness (7 percent), were also reported.

<u>Factors that positively affected students' learning</u>

As Table 4 shows, the most reported factor among those that positively affected students' learning was accomplishment (23 percent). While the sense of accomplishment fluctuated from week to week, excitement almost doubled from Week 1 (17 percent) to Week 4 (33 percent). Experimenting increased from Week 1 (35 percent) to Week 2 (41 percent), but then decreased in Week 3 (24 percent) and was not reported at all in Week 4. Self-directed learning showed the highest score among all the factors that positively affected students' learning. During Week 1 it was reported by 69 percent of the participants, but it decreased to 25 percent during Week 2, to 6 percent during Week 3, and to 0 percent in Week 4. Confidence began at 17 percent in Week 1, then was reported as second highest among this group's factors during the second week (58 percent). However, it decreased in Week 3 (8 percent) and Week 4 (17 percent). Time management had its maximum score in Week 1 (56 percent), dropped during Weeks 2 and 3 (11 percent), and then increased again in Week 4 (22 percent).

Factors that limited students' learning

The inability to complete tasks was reported as the factor that most limited students' learning. However, it decreased from 44 percent in Week 1 to 4 percent during Weeks 3 and 4. Frustration also decreased from Week 1 (40 percent) to Week 2 (33 percent) to Week 3 (0 percent), but then increased during Week 4 (27 percent). Equipment malfunctions decreased from Week 1 (44 percent) to Week 4 (11 percent); this factor basically included the laptops assigned to students. Insecurity was another factor that showed ups and downs. During Week 1 it was reported by 17 percent of the participants, then it increased and kept the same level in Weeks 2 and 3 (33 percent), but it went down in Week 4 (17 percent). Tediousness was the only factor that was consistently reported at the same level from Week 1 to Week 4 (25 percent).

Discussion of Findings

This study demonstrates that out-of-school programs can engage youth, especially Hispanics, in meaningful and productive learning experiences during the summer. It also shows that educational institutions like universities can effectively help youth meet their educational needs and interests, which are connected to ways they use technology (Brown, 2000; DeGennaro, 2008; Tapscott, 2002). Out-of-school youth development programs, such as 4-H, represent an opportunity to fill the education gap among schools, parents, and communities by devoting schools' and other higher education institutions' resources to provide non-traditional programs that meet the shift in the educational needs and interests of children and youth (Schlink, 2000).

The study reveals that Hispanic youth gained knowledge while attending a technology summer camp outside of school. Elbert and Alston (2005) and Bourdeau and Taylor (2007) recommend partnerships between universities and community organizations to provide middle school youth with in-depth science and technology experiences. This program was offered by University of Illinois Extension in partnership with Our Lady of Mount Carmel Church, a community-based organization.

Overall, 75 percent (6/8) of the students scored above 50 percent in the post-test and 63 percent (5/8) showed an increase in knowledge between 52 and 60 percent. Although all participants reported having computers and access to the Internet at home, there appeared to be a relationship between age and knowledge. Initially, older students possessed more knowledge about the program, which was related to technology, than younger students. Sixteen- and seventeen-year-old students scored the highest on both pre- and post-tests and they also reported the highest gains in knowledge.

A similar study (Hofer & Owings Swan, 2008) reported that when students created their own products, their motivation and engagement increased and new opportunities to engage their creativity arose. Indeed, students participating in this Illinois program spent sixty hours of their summer attending the program to complete their own computer math program, which, as Hofer and Owings Swan (2008) found, provided students with a sense of ownership.

An analysis of factors that positively affected students' learning showed that experimenting and self-directed learning progressively decreased from Week 1 (35 percent and 69 percent, respectively) to Week 4 (0 percent each). We expected that students would experiment more and use more self-directed learning activities as the program progressed. Similarly, confidence, which increased from Week 1 (17 percent) to Week 2 (58 percent), suddenly decreased during Week 3 (8 percent). Although it increased again in Week 4 (17 percent), we expected that confidence would steadily increase from Week 1 to Week 4. These decreases and variations on factors that positively affected students' learning may be explained by the fact that the curriculum's content progressed from simple to more challenging activities, and that final projects were more complex (see Description of the Program, page 1). When students were working on their final project, there was no time to experiment because they had a definite deadline. Self-directed learning almost disappeared (see Table 4) because, during the last week, students helped each other complete their projects. They also asked the instructor to check their projects, especially their ActionScript (computer language). Nonetheless, more research is needed to further explain these factors.

On the other hand, among the factors that limited students' learning, the inability to complete tasks was the most reported (42 percent). However, this factor decreased from 44 percent in Week 1 to 4 percent in Week 4. Although we may infer that this decrease was related to students' knowledge gains, data collected does not provide evidence of that assumption. A similar situation was found with students' frustration, which also decreased from 40 percent during Week 1 to 0 percent in Week 3, but it increased during Week 4 (27 percent). The students' inability to complete tasks was related to the fact that most of them did not know the content of the program (see Table 2). Some were not familiar with the computer program used to create animations (Flash Professional CS4), and in many cases their computers did not work properly (see Table 4). As students learned to use the program they became more comfortable completing their tasks and projects.

Some findings of this project were similar to other studies (Gros, 2007; Hofer & Owings Swan, 2008; Mutchler et al., 2006), which found that regular computer use is positively correlated with self-esteem, motivation, and problem solving. In this study, accomplishment, excitement, self-directed learning, confidence, and time management were factors reported as positively affecting students' learning. Among them, the sense of accomplishment (23 percent) and excitement (19 percent) were the two most reported. Indeed, problem solving was a key component of SDL activities. Although accomplishment showed ups and downs over the four weeks (see Table 4), it demonstrates that students realize they can complete tasks and small projects by themselves. Similarly, excitement kept students motivated to continue learning animation techniques, which they could immediately apply to their final projects.

Limitations of the Study

There are some limitations to be considered before reaching definite conclusions based on findings from the present study. First, findings should not be generalized among youth because the sample studied was relatively small. Second, the sample involved Hispanic youth and more female than male youth. Therefore, findings should be related to female Hispanic youth.

Students were able to self-report a list of factors they believed positively affected or limited their learning, but they might have not been aware of SDL activities or they may not have paid attention to factors affecting their learning.

Findings from this study are incomplete and should only be considered a starting point for continuing research on similar topics. Indeed, more in-depth research is needed to explain unexpected behaviors or variations on the factors reported by students.

Implications for Future Practice

This study has some implications for educators who teach technology, especially to youth.

Teaching technology through SDL activities requires a self-tutorial type of curriculum. The curriculum for this program was developed using a combination of video lessons and written directions, so that students could complete tasks and projects on their own. The curriculum was also designed to progress from simple to complex tasks (inductive-deductive).

Teachers or instructors of technology interested in using SDL must support the roles that students assume when learning. SDL allows students to take control of their own learning and to modify the projects as they consider appropriate. When students realize they are responsible for their own learning, their motivation and engagement increase. Therefore, they are presented with new opportunities to use their creativity.

The use of SDL seems to match the new ways today's youth learn and their ability to handle multiple tasks simultaneously. SDL motivates and challenges students to figure things out by themselves. Not only do students take responsibility for their learning, but they also actively participate in research studies. In the present study, students identified positive and limiting factors that affected their learning.

This study confirms that for educational institutions, such as universities, colleges, schools, or cooperative extension agencies, to effectively reach at-risk youth, they must build relationships and partner with trusted community organizations. By working with community partners, these institutions will benefit in several ways. They will be able to: a) recruit both participants and volunteers; b) build relationships within the community; c) expand their services to other untargeted groups (i.e., parenting classes when teaching a youth program); and d) gain a better understanding of how specific networks function within the target community.

Implications for Future Research

The use of SDL has not been widely applied to teaching technology, especially to youth. Before using SDL, it should be tested more. One way of testing the effectiveness of SDL is teaching the content of the present program using a different approach (i.e., lecturing, project-oriented teaching, demonstrations, online programs, etc.).

This study was based on students' self-reports of various factors that affected their learning. However, the group was not only small (eight youth), but it also did not represent males and females equally. There were more females than males (seven out of eight). This aspect could bring more opportunities for more research involving male youth.

The study results (see Table 4), left several questions unanswered that may be further explored through more research. For example:

- ❖ Why did experimenting and self-directed learning report 0 percent at the end of the program? These factors were expected to show a significant increase compared to the beginning of the program.
- ❖ Would the results change if more males than females self-reported?
- ❖ What kind of factors would be identified by students if the program had used a different teaching approach?
- ❖ What other variables affecting students' learning would be identified?

Conclusions

Out-of-school programs have become an important component of youth's education, because they are proven to effectively contribute to youth's knowledge. The present study showed that students' increased knowledge ranged from 36 percent to 60 percent while learning technology out of the school environment. The knowledge students gain through these programs help youth graduate from high school (Curtin, Ingels, Wu, & Heuer, 2002). In addition to knowledge, the present study showed that students participating in out-of-school programs gained lifelong skills, such as time management, confidence, and problem-solving skills.

When students are exposed to different learning experiences, such as SDL, they gain the opportunity to use the new learning skills they have developed and their ability to discover things by themselves. In this study, SDL allowed students to make several decisions that impacted their own learning, such as how much time to spend on each lesson, how to modify the proposed projects, and the kind of final product to produce. Students who make these types of decisions take ownership of their learning as well as keep themselves motivated and committed to completing their projects.

The variety of factors affecting students' learning may vary depending on such variables as the teaching method, the subject matter, the age of the target group, and whether the content is part of the school curriculum or part of an enrichment program. This study reports two sets of factors identified by a group of youth exposed to SDL when attending a technology summer camp. Factors that positively affected students' learning included: accomplishment, excitement, experimenting, self-directed learning, confidence, and time management. Factors that limited students' learning included: inability to complete tasks, frustration, equipment malfunctioning, insecurity, and tediousness.

To recruit participants and volunteers from communities where Extension programming, such as 4-H youth development, is unfamiliar, cooperative extension agencies must establish community relationships and/or partner with trusted community organizations. This study shows how a faith-based organization obtained ownership of Extension's summer camp from program planning to program delivery. When community organizations are given opportunities to engage in educational activities, they are empowered and fully committed to succeed.

References

Bolhuis, S. (1996, May). *Towards active and self-directed learning. Preparing for lifelong learning, with reference to Dutch secondary education.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.

Bourdeau, V., & Taylor, E. (2007). Creating a 4-H technology camp for middle school youth. *Journal of Extension*, *45*(5). Retrieved from http://www.joe.org/joe/2007october/iw4.php

Boss, S., & Krauss, J. (2007). *Reinventing project-based learning: Your field guide to real-world projects in the digital age*. Eugene, OR: International Society for Technology in Education.

Brown, J. S. (2000). Growing up digital: How the web changes work, education, and the ways people learn. *Change*, March/April. Retrieved from http://www.johnseelybrown.com/Growing_up_digital.pdf

Curtin, T.R., Ingels, S.J., Wu, S., & Heuer, R. (2002). *National education longitudinal study of 1988: Base-year to fourth follow-up data file user's manual (NCES* 2002-323). Department of Education, National Center for Education Statistics, Washington, DC.

DeGennaro, D. (2008). Learning designs: An analysis of youth-initiated technology use. *Journal of Research on Technology Education, 41*(1), 1–20.

Elbert, C., & Alston, A. (2005). An evaluative study of the United States Cooperative Extension Service's role in bridging the digital divide. *Journal of Extension*, *43*(5). Retrieved from http://www.joe.org/joe/2005october/rb1.php

Erickson, F. (1986). Qualitative research on teaching. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed.) (pp. 119–161). New York, NY: Macmillan.

Estes, C. (2004). Promoting student-centered learning in experiential education. *Journal of Experiential Education, 27*(2), 141–161.

Fingeret, H. A. (1990). Changing literacy instruction: Moving beyond status quo. In F. P. Chisman (Ed.), *Leadership for literacy: The agenda for the 1990s* (pp. 25–50). San Francisco, CA: Jossey-Bass Publishers.

Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly*, 48(1, Fall), 18–33.

Gros, B. (2007). Digital games in education: The design of games-based learning environments. *Journal of Research on Technology Education, 40*(1), 23–38.

Hofer, M., & Owings Swan, K. (2008). Technological pedagogical content knowledge in action: A case study of a middle school digital documentary project. *Journal of Research on Technology Education*, *41*(2), 179–200.

Ingram, P., & Syvertsen, A. (2005). Hearing their needs: Voices of underrepresented populations. *Journal of Extension, 43*(5). Retrieved from http://www.joe.org/joe/2005october/a1.php

Kudryavtsev, A., Krasny, M., Ferenz, G., & Babcock, L. (2007). Use of computer technologies by educators in urban community science education programs. *Journal of Extension, 45*(5). Retrieved from http://www.joe.org/joe/2007october/a2.php

Lamm, A., Harder, A., Lamm, D., Rose III, H., & Rask, G. (2005). Risk factors affecting high school drop out rates and 4-H teen program planning. *Journal of Extension, 43*(4). Retrieved from http://www.joe.org/joe/2005august/rb6.php

Leedy, P. D., & Ormrod, J. E. (1992). *Practical research: Planning and design* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Merriam, S., & Caffarella, R. (1991). Learning in adulthood. A comprehensive guide. San Francisco, CA: Jossey-Bass Publishers.

Mutchler, M., Anderson, S., Taylor, U., Hamilton, W., & Mangle, H. (2006). Bridging the digital divide: An evaluation of a train-the-trainer, community computer education program for low-income youth and adults. *Journal of Extension, 44*(3). Retrieved from http://www.joe.org/joe/2006june/a2.php

Nicholas, H., & Ng, W. (2009). Engaging secondary school students in extended and open learning supported by online technologies. *Journal of Research on Technology Education, 41*(3), 305–328.

Schlink, K. (2000). Addressing educational needs of youth in today's society. *Journal of Extension, 38*(4). Retrieved from http://www.joe.org/joe/2000august/comm1.html

Spradley, J. P. (1979). *The ethnographic interview*. New York, NY: Holt, Rinehart & Winston.

Tapscott, D. (2002). *Growing up digital: The rise of the net generation*. New York, NY: McGraw Hill.

Taylor, B. (1995, Nov.). *Self-directed learning: Revisiting an idea most appropriate for middle school students*. Paper presented at the Combined Meeting of the Great Lakes and Southeast International Reading Association, Nashville, TN.