

Dropping Out of High School: The Role of 3 D Alice Programming Workshop

Jackie Hee-Young Kim
Armstrong Atlantic State University
United States
Jackie.kim@armstrong.edu

Abstract

This study explores how high schools, through their curriculum reform with technology, may influence students' decisions to stay in school. There is little focus on how the curriculum with technology projects might hold students in school. This study examines risk factors of why students drop out of high school and further investigate the potentials of a technology-enhanced course that resist those risk factors, and increase protective factors for underprivileged students in an at-risk school.

Introduction

In this study, I explore how high schools, through their curriculum reform with technology, may influence students' decisions to stay in school. Traditional explanations for dropout behavior have focused on students' social background and academic behaviors. There is little focus on how technology-enhanced courses might hold students in school. This study analyses risk factors of why students drop out of high school and further investigate the potentials of a technology-enhanced courses that resist those risk factors, and create a resilient environment that increase protective factors for underprivileged students in an at-risk school.

In this article, AT & T sponsored grant project will be outlined and findings from the qualitative study will be discussed showing how school curriculum can cumulate students' success in school. This pilot program project with 3D Alice programming has developed to serve a group of underprivileged students for becoming statistics in the growing numbers of unsuccessful high school students in the urban areas of Gotham County located in the Southeast of the United States. This has accomplished through the creation of a technology outreach program, in conjunction with a Public University Educational Technology Center, housed in the State University College of Education in partnership with Gotham County Public School System.

When and why young people decide to leave their school depends on many factors. As with any important life decision, adolescents' decisions to leave school draw on a complex web of success and failure experiences of school. Young people continually assess and reassess their successes with people and places in the worlds in which they want to function and fit in: family, peers, school, and the larger world. Some students see schools as locations where they can develop their human capital and stay fit, so that staying in school longer is felt to increase their probability of success in the world, and felt to continue pleasant living experiences. For other students, schools are places where they are reminded on a daily basis of their failure in both the academic world and the social world.

Although the body of researches recognize that the decision to leave school before graduation is made by individuals, a small but growing set of researchers has begun implicate the school in this decision. Riehl (1999) speaks of schools "discharging" students. The drop out phenomena stems from two perspectives: the individual perspective and the school perspective. Researchers and writers concerned with dropping out often divide the construct into two categories: social risk and academic risk. Social risk includes demographic factors associated with a higher likelihood of school difficulties; race/ethnicity, age, language-minority status, gender, family income, parents' education, and family structure. Members of racial and ethnic minority group drop out at higher rates than White students as do those from low-income families, from single-parent households, and from families in which one or both parents also did not complete high school (Natriello et al., 1990; Rumberger, 1987). Individuals also bring academic risks which include a history of absentism and grade retention (Lee & Burkam, 1992), academic trouble (Bryk & Thum, 1989) and more general disengagement from school life (Finn, 1989; McNeal, 1997).

The Context of the Project Development

This project was to provide services to a group of students at-risk for becoming statistics in the growing numbers of unsuccessful high school students in the urban areas of Savannah-Chatham County in an effort to reach targeted benchmarks (aligned with ISTE standards for students), to improve students' grades, to reduce disciplinary problems, to improve regular school attendance and graduation rate. To this end, the project was launched in City

High School with a cohort group of at-risk students as an after-school activity. However, this grant was significantly modified after its administrator learned that the project did not obtain enough number of students from the high school initially selected in September 2010. The reason that the project team did not have enough number of students was that many of students who participated in the project were athletes, particularly football players. During the football season, they had to leave the class for practice. The class attendance was getting down to 2-7 students. Therefore, there was a need for modification of the project after January 2011. The project was relocated to another high school in Gotham County. At this time, the project was implemented as a part of the elective course, called Advanced Web Design. The course was designed to allow the participants of the project to create their own animation project with Alice Computer Programming software, and to incorporate their animation into their advanced Web site. During high school years of 2011 and 2012, there were two cohort groups of 61 students were enrolled in this a year-long Advanced Web design class and learned about how to program animated projects once in a week using Alice Programming software.

A year-long project to teach students programming skills using Alice, an innovative 3D programming environment that makes it easy to create an animation for

- telling a story,
- creating an interactive game, or
- creating a video to share on the web.

Total of 68 students were immersed into the learning environment of Alice(<http://www.alice.org/>) through building 3D visual worlds from September 2010 to May 2012. Instead of creating traditional text-oriented programs which display meaningless messages such as “Hello World” to the screen, students created and manipulated interesting objects (such as an ice skater). Those objects were programmed to execute highly visual, exciting actions (such as skate and twirl). Students created interesting environments in a short period of time, thereby increasing their satisfaction and motivation to continue. Since the Alice application was freely available, students were able to download from the Website www.alice.org. The screen shot of the Alice environment is shown in Figure 1.

Students created animating creatures using a set of objects which have been pre-programmed with the basic methods for movement and interaction by Alice. Students used these as building blocks to create more complex actions, usually to tell a story or enact some type of scene. Students appreciated an infinite number of programs which can be constructed, from simple interaction to elaborate, highly interactive scenes.



Figure 1 The screenshot of the Alice environment.

Students received a notebook for use during their entire program, making it possible for them to continue working on projects during the time when they were not meeting in class. Initially the facilitating device for this project was a netbook, but the administrator learned that the netbook was not comparable with the software program, Alice, so the device change for the project was necessary.

Instructional Delivery

Armstrong Atlantic State University's College of Education is an experienced teacher preparation institution. Of seventeen state teacher preparation institutions, ours is the third largest producer of minority teachers and the eighth largest producer of all completers of university teacher preparation programs in Georgia. Moreover, the College is accredited by the National Council for Accreditation of Teacher Education (NCATE). The Educational Technology Center at Public University has a long history of serving the counties in the East Coastal Area. One of thirteen regional Educational Technology Centers (ETCs) strategically located across the state to provide instructional and technical training and assistance for all Georgia school systems, the ETC mission is to work collaboratively to provide professional learning, consulting, and service for regional educators to promote the appropriate use of technology in support of teaching, learning, and leadership. With numbers of highly-qualified instructors associated with the center, the Public University ETC is in an enviable position to coordinate the kind of instruction with expertly prepared instructors that motivated and provided opportunities for success in the field of technology for students whose futures are uncertain.

Methods

Three groups of 20 at-risk high school students per term (60 total) participated in this study. The subjects of this study are at-risk high school students in one of Gotham County Public High Schools. Students were identified as at-risk students if they meet such characteristics as:

- Repeated grade
- Promotion failure
- Reading or math test scores below grade level
- Attendance problems
- Documented behavioral issues

Subjects was recruited with help of the high school principal and technology specialist. The school principal and technology specialist identified at-risk students based on the characteristics of at-risk students and encourage at-risk students to join the 3 D programming workshop. Upon attending the 3 D programming workshop, at-risk high school students were invited to participate in this study. The project evaluator conducted interview to investigate students' perception on problem solving, improvement of other subject areas before and after the participation of the project.

Data Analysis

The data analysis involves in reading and rereading the qualitative data, and identifying coherent themes and categories that summarize and bring meaning to the data. To identify theme, we assigned abbreviated codes of a few letters, words or symbols and place them next to the themes and ideas we find. This will help me organize data into categories. I will make the main categories be broken into subcategories. For interpretation of data, I developed a list of key points or important findings as a result of categorizing and sorting my data. After synthesizing findings and tapping their meaning of data, findings were interpreted based on the theoretical background of this study.

Despite the individual risks that students bring to school even before they arrive at school, this study found that a well-structured technology course can increase numerous following protective factors: 1) Social capital; 2) Effective school academic organization; 3) Personal connection; and 4) Sense of control.

Social Capital

"Social Capital" is a concept that the quality of social relationships themselves either enhances or hinders individuals' capacity to attain desirable social goods (Coleman, 1990). Coleman (1988) pointed out the special significance of social capital for children. As children mature, the focus of their social development shifts from parents to include peers, other adults, and schools. Interviews with dropouts as they left school revealed that half said they were quitting explicitly for social reasons (Caterall, 1998). Qualitative studies have also shown that positive social relationships can create powerful incentives for students to come to school, even students who report that school work is difficult and expectations are hard to meet (Fine, 1991; LeCompte & Dworkin, 1991; Lee, Smerdon, Alfeld-Liro, & Brown, 2000; Wehlage et al., 1989). One showed that social capital (Measured by relationships between students and teachers and by whether teachers reported talking with students outside class) was strongly related to dropping out, even after taking students' social and academic risk factors into account (Croninger & Lee, 2001).

This study found that technology-enhanced curriculum increases the desirable social goods in schools. This study found that students enrolled in 3D workshop experiences positive social relationship with peers and teachers.

Due to the nature of 3D workshop, which promoted a more project-based, student-centered and -controlled project, students commented that they had more opportunities to communicate with peers and interact with the instructors. 3D workshop environment create a learning environment that increase interactions between teachers and students as well as among students. Further, 3D workshop environment increases the level of their ability to elicit positive responses from others. The followings are narratives from students.

- (After she showed her project to peers) They like Ahhh, I like yeah (in proud way). Awesomess.(Lakisha);
- I can show how I really do, how I act. That way I can really make friends and contact outside school (Martin).

Those positive responses accumulated as experiences of success in school, which some of students, who came from the lower academic performance group, never had before. The followings are narratives from students.

- (After she showed her project to peers) They like Ahhh, I like yeah (in proud way). Awesomeness.(Lakisha);
- I can show how I really do, how I act. That way I can really make friends and contact outside school (Martin).
- Alice allowed for me to accomplish something I want to do. (Sierra)
- I can make something I like. (Shanesha)
- I am more friendly with Alice class peers than any other classes because sometimes I need help and then can help. (Natasha)
- We tried to help each other more in Alice class. We get to know people. (Sierra)

Despite the individual risks that students bring to school even before they arrive at school, this project found that a well-structured technology course can increase numerous protective factors which might reduce the risk factors of high school drop-out by increasing social capital. “Social Capital” is a concept that the quality of social relationships themselves either enhances or hinders individuals’ capacity to attain desirable social goods (Coleman, 1988). Coleman (1988) pointed out the special significance of social capital for children. As children mature, the focus of their social development shifts from parents to peers, other adults, and schools. Interviews with dropouts as they left school revealed that half said they were quitting explicitly for social reasons (Caterall, 1998). One showed that social capital was strongly related to dropping out, even after taking students’ social and academic risk factors into account (Croninger & Lee, 2001). The project evaluator found the potential of incorporating a programming project into high school curriculum to decrease high school drop-out rate.

School Academic Organization

Lee and Burkam (2003) concluded that the structure of high school curriculum is associated with holding students in high school until graduation. Regardless of students’ own academic background and school performance, schools with what has been called in other studies “a constrained curriculum”—more challenging courses, fewer remedial or nonacademic course—hold students in school (Lee et al., 1998). All of interviewees in this study commented that this creating a game with 3D Alice Programming was challenging, but fun. It further promoted their sense of purpose and future because 3D workshop allows students to build a sense of career that is related to computer technology. They say what they would gain from the project which would stress their intrinsic value and the utility value of such skill (Eccles & Wigfield, 1985). The followings are narratives from students.

- Specially I want to be game programmer, it gets me to the computer field (Lakisha)
- I was gonna open up my private server (Martin).

All of participants commented that creating a game with 3D Alice Programming was creative, challenging, but fun. It further promoted their sense of purpose and future because 3D workshop allows students to build a sense of career that is related to computer technology. They say what they would gain from the project stress their intrinsic value and the utility value of such skill (Eccles & Wigfield, 1985) through using their own imagination to create a project which they never had an opportunity before this project. The followings are narratives from students.

- Specially I want to be game programmer, it gets me to the computer field (Lakisha)
- I was gonna open up my private server (Martin).
- Alice is more to do than the simple Web design which is the same and old stuff (Natasha)

85% of participants reported that Alice helped to improve their problem solving skills. 90% of participants agreed that Alice allowed them to think the outside box, and to be able to show their personality.

- Alice is creative, spontaneous, and let me think the outside of the box and allowed me to express myself. (Sierra)
- I love to manipulate things that show my personality. (Allen)

Personal Connection

Researchers in the area of student motivation (e.g., McCombs & Pope, 1994; Wlodkowski & Jaynes, 1990) have advocated that teachers address students' needs, related instruction to students' experiences, and emphasize the value of learning activities. Many students do not see learning activities as personally meaningful because they are unable to connect the activities to their lives. However, students in 3D Alice Program Workshop saw those personal meaning of the activity since they played the computer games constantly. Students commented that they thought about how to program the certain game they were playing now. And they even had a desire to create a game for them to play.

Most of participants in 3D Alice Program Workshop saw the personal meaning of the activity since they played the computer games constantly at home or on the way to school. Because of their personal connection to the project, 95 % students reported that the level of enjoyment in class was the highest among other classes. Students commented that they thought about how to program the certain games they were playing now. And they even had a desire to create a game for them to play. Researchers in the area of student motivation (e.g., McCombs & Pope, 1994; Wlodkowski & Jaynes, 1990) have advocated that teachers address students' needs, related instruction to students' experiences. Many students do not see learning activities as personally meaningful because they are unable to connect the activities to their lives.

Most of participants commented that the 3D Alice Programming workshop offered to control their project by letting them to create their own games. Students appreciated the fact of the project that they have control over what to accomplish, not particular assignments that were thrown to them, which would more likely happen in all other classes. They worked for what they wanted to accomplish. They commented that this class was the only class that they could make choices about the projects. A growing body of theoretical and empirical literature supports the view that when students' perceptions of personal control in the learning situation increase, so does their motivation to learn (Alderman, 1990; Ames, 1990; Deci & Ryan, 1991).

- Alice gives better confidence for other classes such as Math and science (Natasha)
- I am proud of myself to see something I came from my hands. (Jaialesha)
- I enjoy creatures that I kinda put myself into Alice. (Justin)
- It is related to my life. If I see the cartoon animation, I felt that I could make something like that with Alice. (Shenesha)

Student interest and enthusiasm are critical for effective learning and classroom management (Borich, 1992), especially for at-risk students. In addition to promoting learning, active student involvement increases interest and enthusiasm. Within teacher-coordinated boundaries, LGB provides student choice in what of learning so that students choose their preferable gaming activities to create. Students have been found to perform above established achievement levels when a topic, skill, or method of instruction is of particular interest (Choate, 1993). Creative applications of technology, such as the use of 3D programming, can increase student interest and enthusiasm to complete projects. Classroom teachers can enhance the interest and enthusiasm of at-risk learners if they encourage and allow students' open creativity with their infinite imagination.

Sense of Control

A growing body of theoretical and empirical literature supports the view that when students' perceptions of personal control in the learning situation increase, so does their motivation to learn (Alderman, 1990; Ames, 1990; Deci & Ryan, 1991). The 3D Alice Programming workshop offers to control their project by letting them to create their own games. Students appreciated the fact of the project that they have control over what to accomplish, not particular assignments that were thrown to them, which would more likely happen in all other classes. They worked for what they wanted to accomplish. In addition they can make choice about the projects.

Conclusion

The continuing rise of student dropout rates emphasizes a need for further investigation into identifying influence of 3 D workshop on creating resilient environments which has been failed to build in school systems. This project offers a model of a framework to help educational administrators and teacher organize and construct their curriculum that promote successful and personally meaningful school experiences both socially and academically. The successful experiences in high school years can reduce the risk factors of high school students and consequently prevent from the drop-out.

While recognizing the importance of teacher models and demonstrations of skill performance fundamental to the instructional process (Meier, 1992), the majority of LGB instructions are composed of examples and step-by-step demonstrations, which students anonymously appreciate for their easy understanding of concepts of

programming. The examples and demonstrations presented as concrete and familiar examples and objects that are preferable to abstraction and unfamiliarity (Choate, 1993) for at-risk students. The inherent nature of programming allows students to share thinking techniques with peers: "How did you do that?" The actual content of examples and demonstrations influences not only learning in computer concepts but also building confidence in learning which seems to transfer to other academic areas according the findings from our qualitative data. Computer programming has been taught within the context of high-interest lessons, real-life content, and high engagement.

References

- Alderman, M.K. (1990). Motivation for at-risk students. *Educational Leadership*, 48, 27-30.
- Ames, Carole A. "Motivation: What Teachers Need to Know." *Teachers College Record*, 91, 3 (Spring 1990): 409-21.
- Bryk, A.S. & Thum, Y.M. (1989). The effects of high school organization on dropping out: An exploratory investigation. *American Educational Research Journal*, 26, 353-383.
- Catterall, J. S. (1998). Risk and resilience in student transitions to high school. *American Journal of Education*, 106, Pp. 302-333.
- Coleman, J.S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, S95-S120.
- Coleman, J. S. (1990). *The foundations of social theory*. Cambridge, MA: Harvard University Press.
- Croninger, R.G., & Lee, V.E. (2001). Social capital and dropping out of high school. Benefits to at-risk student of teachers' support and guidance. *Teachers College Record*, 103, 548-581.
- Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska symposium on motivation: Vol. 38, Perspectives on motivation* (pp. 237-288). Lincoln: University of Nebraska Press.
- Eccles, J. S., & Wigfield, A. (1985). Teacher expectations and student motivation. In J. B. Dusek (ed.) *Teacher Expectation* (pp. 185-217). Hillsdale, NJ: Erlbaum.
- Fine, M. (1991). *Framing dropouts: Notes on the politics of an urban public high school*. Albany, NY: State University of New York Press.
- Finn, J.D. (1989). Withdrawing from school. *Review of Educational Research*, 59, 117-142.
- LeCompte, M.D. and Dworkin, A.G. (1991). *Giving Up On School: Teacher Burnout and Student Dropout*. Newbury Park, CA: Corwin Press, A Division of Sage Publications, 300 pages.
- Lee, V.E. & Burkam, D.T. (1992). Transferring high schools: An alternative to dropping out? *American Journal of Education*, 100, 420-453.
- Lee, V. E., & Burkam, m. T. (2003). Dropping out of high school: The role of school organization and structure. *American Educational Research Journal*, 2, 353-393.
- Lee, V.S., Chow-Hoy, T., Burkam, D.T., Gevert, D., & Smerdon, B.A. (1998). Sector differences in high school course taking: A private school or a Catholic school effect? *Sociology of Education*, 71(3), 314-335.
- Lee, V., Smerdon, B.A., Alfeld-Liro, C., Brown, S.L. (2000). *Inside large and small high schools: Curriculum and social relations*. *Educational Evaluation and Policy Analysis*, Vol. 22, No. 2, pp. 147-171.
- McCombs, B.L., & Pope, J.E. (1994). *Motivating hard to reach students*. Washington, DC: American Psychological Association.
- McNeal, R.B. (1997a). Are students being pulled out of high school? The effect of adolescent employment on dropping out. *Sociology of Education*, 70, 206-220.
- Natriello, G., McDill, E. L., & Pallas, A. M. (1990). *Schooling disadvantaged children: Racing against catastrophe*. New York: Teachers College Press.
- Riehl, C. (1999). Labeling and letting go: An Organizational analysis of how high school students are discharged as dropouts. In A. M. Pallas (Ed), *Research in Sociology of Education and Socialization*, (pp.231-268). New York: JAI Press.
- Rumberger, R.W. (1987). High school dropouts: A review of issues and evidence. *Review of Educational Research*, 57, 101-121.
- Wehlage, G. G., Rutter, R. A., Smith, G. A., Lesko, N., & Fernandez, R. R. (1989). *Reducing the Risk: Schools as Communities of Support*. New York: Falmer Press.
- Wlodkowski, R. & Jaynes, J. H. (1990). *Eager to Learn: Helping Children Become Motivated and Love Learning*. San Francisco: Jossey-Bass Publishers.