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THE PHENOMENOLOGICAL EXPLORATION OF USER-DESIGN IN GIFTED RURAL HIGH SCHOOL STUDENTS WHEN DESIGNING THEIR OWN GAME

A Dissertation in

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by

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ABSTRACT

The purpose of this qualitative dissertation was to explore the lived experiences of five rural, gifted high school students when designing their own games in a high school classroom. This study provides real world accounts of students being user-designers. This study's research questions were: What is it like for rural high school students to have the power to design their own game? How does the process of user-design in the cases explored diverge from or support Banathyan user-design? Is there any evidence that the adoption of an innovation is more likely to proceed smoothly as a result of engaging users in powerful ways in the design process?

This dissertation employed qualitative methodology. I spent four months engaged with these students. My goal was to capture the lived experiences of the five pupils when doing user-design. Phenomenology was the method used in this dissertation. This mode of inquiry allowed me to capture the lived experiences of students as they learned though design. The data consisted of participant observation, in-depth interviews, and document analysis. I used the constant comparison data analysis technique to analyze the data. I followed the analysis method of moving from condensed meaning units into themes. I utilized Pages and Garage Band to assist me with organizing, coding, analyzing and interpreting the data. Thick description, identifying research bias, and member checks were used to establish trustworthiness.

Five themes that emerged from this study: User-design is achieved through authentic empowerment and ownership, user-design is a fun experience, user-design is a participatory activity, user-design is a tool for problem solving, and user-design is

challenging for students. The gifted students designed their own games with minimal assistance from the teacher.

TABLE OF CONTENTS

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Chapter 1

Introduction

There are thousands of Pennsylvanians enrolled in one of several school districts in the commonwealth. Because most educational reform initiatives have been focused on helping below average students, gifted students have been facing significant challenges, including the opportunity to fully express their creativity without scrutiny. This reality, of course, is not peculiar to the gifted population alone and is not a new phenomenon. In the early 1970's, Illich, a distinguished educational scholar, stated that schools inhibit creativity and freedom. In order for pupils to be creative, the educational system should, perhaps, allow pupils to make decisions so that they can develop their individual strengths. A logical way of accomplishing this task could be through user-design. In this study, students were empowered and they had school support, which resulted in them creating their own video games. The fact that they had decision-making power brought them prestige and recognition from other students in the school.

Giving such power to students, of course, requires a major shift in mindset. It requires individuals with power to abdicate their privileged positions for the benefit of others, which is difficult (Carr, 1997). A major shift in power dynamics happened during this study. Clarion Area High School is, like most high schools in Pennsylvania, operating under the philosophy of "teaching the curriculum" to satisfy No Child Left Behind (NCLB) standards. With the exception of the C++ computer programming class, power is in the hands of the teachers. In English classes, for example, the teachers create lessons

plans to address what she wants to accomplish and designs tests to asses how students perform. The students are not asked for their opinions and are not involved in the creation of the lessons and the assessments. A major power shift happened in the C++ class because the students not only were in charge of what they were learning (A game creation program called Gamemaker) but how they were to interact with the teacher (or not interact with her). The teacher acted in a secondary role. In traditional high school classrooms, teachers act in primary roles. The school district allowed students to be on their own because they were looking for innovative ways to stimulate gifted students. It was good timing. In my conversations with the teacher, I received very positive comments, especially in terms of attendance and student conduct. Students who had once been disruptive were focused on their tasks and rarely missed classes. The user-design study had such an impact that the teacher sent a newspaper article to the local newspaper to talk about the students' experiences. The teacher is in a midst of scheduling a meeting with the school board to implement user-design in other gifted classrooms.

To this date, most educational reform initiatives, e.g., a Nation at Risk and No Child Left Behind, have been expert-driven and implemented through top-down policies rarely involving the wishes and concerns of the users. As a consequence, very little has changed in more than 30 years (Carr, 1996).

The field of educational technology is no exception. Most instructional designs are created and imposed by instructional designers, who are often labeled as experts in designing instruction. Even though instructional designers are to design effective solutions for users, they rarely involve the users/learners in the process of design. Scholars, e.g., Banathy (1991) and Carr-Chellman (2007) have argued for an alternative

instructional design model that would empower the users to a level of designers. Because user-design is a relatively new concept, only a few studies have examined it empirically (Cuyan, Breman & Carr, 1998; Carr, 1997). These scholars have argued that empirical studies on user-design would not only morally strengthen our field, but that they are necessary for educational technologists to understand how innovations are implemented. Empirical studies in user-design seem imperative and urgent.

Need for the study

In instructional systems, the words “user” and “design” are often identified as prime constructs in the research literature of the field (Carr, 1997). In fact, there is a wide body of literature addressing issues of design and the end-user. However, the field is lacking research in “user-design,” even though user-design is identified as an avenue to guide human beings' evolutionary process (Banathy, 1991) and as an avenue toward systemic change (Carr-Chellman & Almeida, 2006). In fact, only a few empirical studies on user-design in learning and instructional systems exist (Cuyar, Carr, & Breman, 1998; Carr-1996). The usefulness of such a study on the construct and theoretical validity of user-design extends beyond contribution of something unique to the literature. It aids in the building of a common knowledge base in this promising area, which can truly empower users to create their own systems of human learning (Carr, 1997).

Statement of the problem

Research on user-design (Banathy, 1991; Carr-Chellman & Savoy, 2001) has been very limited to date (Carr, 1997). Most research in instructional design has been expert driven (Carr, 1996) and has been intended to prescribe a potential solution to a

particular problem through a reductionist and systematic process. As a result, the field has been preoccupied with "producing" technologies and largely ignoring issues of adoption and implementation of innovations.

In reality, users are almost powerless in relation to their education. Bela Banathy (1991), one of the most distinguished systemic thinkers of the 20th century, once said that it is immoral for designers to design instruction for learners. Perhaps, he was referring to the fact that, in a democracy, the power should be in the hands of the people for the people, and taking that away is an immoral act (Kohn, 1999).

Purpose of the study

The purpose of this doctoral dissertation was to describe the human experiences of rural, gifted high school students as user-designers (Banathy, 1991). This study focused on the design process and on the development of a game from a user's perspective. Different from traditional studies of instructional design, this study's participants had the power to design their own system. A major shift in power dynamics (Carr, 1996) was required and occurred.

This study needed to be conducted primarily because the vast majority of instructional design research studies are expert driven (Carr, 1996) and are intended to prescribe a potential solution to a particular problem through a systematic process without considering the wishes of the users. For this reason, the sustained implementation of educational interventions has been slim (Carr-Chellman, 2007), and the input and decisions of the users in innovations is minimal. Also, because of the nature of power, administrators have taken away the decision making power from the users (Daresh, 1992).

Significance of the study

The field of instructional systems is very concerned and preoccupied with designing, developing, assessing and evaluating systems. It tends, however, to not give sufficient attention to implementation (Carr, 1997). Hypothetically, engaging users in the design of their own systems (Banathy, 1991) would assist with innovation diffusion and because empowering the users in this way is likely to give them of a sense of ownership (Carr-Chellman & Savoy, 2001). But to this date, there is not sufficient empirical evidence to ratify this statement. Given that user-design is far more complicated and time consuming than linear/reductionist design, and because it relies on significant power shifts, it must be determined if there are tangible benefits to using this process. This is an essential element to the future of user-design in the real world. This study provided a qualitative alternative view on product and curriculum development from the user's perspective rather than from the expert's point of view. It was a first step toward providing additional empirical evidence in terms of how user-design was experienced by the users themselves. The information presented in this doctoral dissertation could be useful to the general educational community, particularly educational reformers, because it provides a real world account of how the users expressed empowerment. Since well before we became informed by the upper-limit hypothesis (Branson, 1987), educational reform has taken a top-down, piecemeal approach. While this study did not follow the innovation through to adoption or implementation, a deep understanding of the lived experience of user-design can help to inform the adoption theories as well as the participative design theories (Schuler & Namioka, 1993). The few user-design studies

that have been undertaken have focused on either broad school change efforts in k-12 public school contexts (Carr, 1997), or corporate training design (Carr-Chellman, A., Cuyar, C., & Breman, 1998). There have been no user-design studies focusing on the implementation of this approach particularly among the rural population or in the gaming context.

This study was significant because it reported the experiences of a group of gifted rural high school students being in charge of their own learning, which represented a major shift in power dynamics in high school activities. Any number of possibilities existed in terms of uniqueness, thus the study could be undertaken with disadvantaged youth, or within an urban setting. The results are likely to be vastly different because, in this case, I was examining the lived experiences of the user within user-design activity.

Nevertheless, the accounts reported in this study may serve as a catalyst to drive systemic change in education and society as they deal most clearly with power issues within the classroom. User-design (Banathy, 1991) can be the avenue by which change occurs and is implemented effectively. This study provided a bottom-up perspective on designing innovations and provided an initial step toward looking at the impact of user-design on a variety of populations. The results of this research study contribute to the knowledge base in user-design, innovation diffusion, and systemic change.

Research questions

As a requisite for understanding the experiences of rural, gifted high school students in designing their own games, it was paramount to expose and report the variety of ways in which the participants engage in user-design. Also, important was how the researcher perceived this engagement. It would also be appropriate to capture information

about the local culture and context. From a systemic point of view, one cannot separate the participants from the society in which they live. They are interconnected and interrelated (Von Bertalanffy, 1968).

This study was conducted to answer research questions relating to exploratory inquiries. Therefore, this study's questions should not be designed to answer causal-relationship inquiries. The questions should "pull the reader into the question in such a way that the reader cannot but wonder about the nature of the phenomenon in the way the human scientist does" (Van Manen, 1997, p. 44).

The following three questions guided this research study: What is it like for rural high school students to have the power to design their own game? How does the process of user-design in the cases explored diverge or support Banathyan user-design? Is there any evidence that innovation adoption is more likely to proceed smoothly as a result of engaging users in powerful ways in the creation of their own game?

Chapter 2

Literature Review

Introduction

A wide range of literature exists addressing systems theory, user-design, games and Wikis issues. Systems thinking is defined as the theoretical foundation from which the concept of user-design emerges (Carr-Chellman, 2007). If one is to empower users to design their own educational games, this activity should be framed through the lenses of systemic thinking, due to the linkages between user-design and systems. After clarifying systems thinking, I will make the connection among systems thinking, user-design and games.

This chapter is a description of the literature in the public domain most pertinent to this research study. The literature is presented in such a way that it helps to make the argument that this question is unique and compelling as an inquiry. In addition, it is an opportunity to illuminate a specific set of foundations and theoretical lenses through which the inquiry was undertaken.

Systems theory

A system can be understood as a coordinated set of parts used to accomplish one or more goals (Checkland, 1981). In other words, it is an assemblage of objects united by some form of interaction and interdependence with a common objective. Examples of systems include the social system, the ecological system, and especially pertinent to this inquiry, the curriculum development and educational systems. The educational system is a living system (Miller, 1995) due to its set of interacting units and interrelationships with

the environment and because of its ability to self-regulate, i.e., to adapt, to function, to reproduce, and fight for survival (Hutchins, 1996). The ultimate goal of any system is to survive (Hutchins, 1996). Systems theory, at least indirectly, emphasizes the importance of building ownership, which can be understood through the term 'wholeness'. In the same way, according to user-design, users should experience a sense of ownership (Carr, 1996) in the design. It can be argued that this stance is one of the major shared values between systems thinking and user-design.

Designing effective educational interventions is a messy, inefficient and problematic activity (Ackoff, 1974). As a result, systemic thinking, or the consideration of every aspect of a problem and its parts, is essential to the process of establishing the appropriate intervention. Ackoff once said "... no problem ever exists in complete isolation. Every problem interacts with other problems and is therefore part of a set of interrelated problems, a system of problems" (Ackoff, 1974, p. 21). Therefore, from a systemic point of view, the wishes of the user should be a major concern in the design process simply because the user is a large and important part of the system. If one is thinking systemically (Carr, 1996), one must not ignore any part of the system. This is perhaps the most simplistic, obvious, and fundamental connection between systems and user-design.

Checkland (1981) distinguishes between two schools of thought within systems theory: hard systems and soft systems. Because user-design philosophies fall under soft systems, a discussion of the differences between hard and soft systems is appropriate. Hard systems have their foundations in systems engineering, as an approach to solving technical problems. Hard systems have a clear goal using an input-process-output model

(Checkland, 1981). A great example of a hard-system approach can be understood through an assembly line, e.g., a car—the training workers receive to work on the line would be a soft social system, the manufacture of the car or machine parts would be the hard system. Proponents of the hard systems mentality include Jenkins, (1972) and Hitch (1955). Hard systems proponents are interested in knowing the processes; they already have an objective goal before hand (Checkland, 1981).

Soft systems, on the other hand, have no known end that can be predicted and contain factors that are beyond the control of the designer (Checkland, 1981). From a soft systems perspective, the final answer is not stated a priori, and the problem is often a social problem. The idea that one might not find the absolute answer is an accepted position (Checkland, 1981; Hutchins, 1996). Proponents of soft systems include Churchman (1968), and Hutchins (1996). The conceptual framework of this study falls within systems theory, which states that any given system involves several components, interconnections and interdependencies (Von Bertalanffy, 1968). Manipulating one element of the system will interfere with the rest of the system (Capra, 1982). For instance, the curriculum is part of a larger system, a school or state, and it has subsystems such as the users, texts, providers, and so forth. When users are doing user-design, i.e., engaging in the design of their own system (Carr-Chellman & Savoy, 2001), they are not only generating knowledge to inform their community, but they are also collaboratively producing knowledge that will improve their lives (Rossman & Rallis, 1998) and the lives of others.

In reality, systems theory was used in this particular research study as a theoretical foundation because of its main premise that everything is connected to

everything else, where one part of the system influences the other. The theory is pertinent to this particular study because of the theory's well-known relation to education reform and its applicability to the successful diffusion and adoption of innovations. The concepts of interdependency, interconnectness and embeddedness are certainly in alignment with how one implements and is affected by technologies. If one is to systemically change/adopt an innovation, one must consider every part involved in the system in this attempt. If we are to diffuse gaming in secondary schools or have an attempt to promote systemic change, we must include the users in the design of their own systems because they are indeed, a vital part of the system. It would be incorrect to assume that the users, just because they lack formal power and are considered "non-experts", are not part of the systems and do not hold any voice in the process of innovation diffusion.

User-design

User-design is a relatively novel phenomenon introduced to the field of instructional systems by Dr. Bela Banathy (Carr-Chellman, 2006), one of the most well respected systemic thinkers of the past 50 years. User-design empowers users in the creation of their own systems (Carr, 1997). User-design is not to be confused with user-centered or learning-centered design (Carr, 1996). These approaches do not provide a necessary shift in power dynamics from the hands of the "experts" to the users themselves. User-design is an "anti-colonial" approach that empowers indigenous knowledge and fosters democratic principles in the world of design by giving decision-making power to those who will use the innovation. It is an approach that allows users to transcend from simply being participants, or informants, to being designers themselves. User-design is not Problem Based Learning (PBL) either. PBL challenges students to

collaboratively solve problems and reflect on their experiences and work as a group with the teacher as a facilitator to solve a particular problem (Savery & Duffy, 1995). User-design is heavily focused on the individuals' power to make decisions, but reflection on one's experience is not a requirement. Also, user-design is not always participatory. In my study, user-design was defined as a model where students had the power to make decisions in the context of game making.

The foundations of user-design are closely related to Scandinavian models of participatory design, emancipatory design, and stakeholder participation. In fact, Scandinavian countries have been promoting user-design in the development of user-friendly interfaces (Carr-Chellman, 2006) for at least two or more decades (Bansler, 1989; Bodker, 1996). User-design from the Scandinavian tradition is an attempt for users to play an essential role in designing interfaces (Carr-Chellman, 2006). A discussion of examples of user-design within the Scandinavian tradition follows.

Empirical literature relating to user-design

Bjerknes and Bratteteig (1995) investigated the relationship among users and administrators and issues of context defined by user-design to build computer systems for nurses. The project became known as the "Florence Project." The project's aim was to construct systems to be used by nurses to assist them with daily work, based on the nurse's language and skills. The authors argued that one could only evaluate the benefits of such implementation with respect to the users, which was consistent with their democratic definition of user participation: "those affected by a decision take part in the making of the decision; this means giving equal rights for people with little or no power" (Bjerknes & Bratteteig, 1995, p. 74). The "Florence Project" resulted in the creation of

two prototypes and an initial system, which was used in the hospital ward. The resulting system was seen as a practical example of a computer system that was created to support nurses through a democratic process (Bjerkenes & Bratteteig, 1995). This study relates to the current study in that students had to create games for their use, in their daily C++ class. The participants in my research study created several games, which are now going to be used as precursors for the following C++ class. They all were practical examples of a computer system created by the users through a democratic process.

Nygaard and Bergo (1974) also investigated the introduction of novel technology to a Norwegian trade union. They investigated a political project initiated by the Norwegian Iron and Metalworker's union. The main objective of this study was to put into practice the worker's perspective on the development of new technologies. Their perspective was authentic, since they were given power by the union. The overall results of this initiative were the creation of textbooks, vocational manuals, and related technologies by the users, resulting in an agreement between the users (workers) and management. This study relates to this dissertation because the participants had the freedom to design. Even though Nygaard and Bergo worked with a different population with distinct interests and responsibilities, both studies took into account the wishes of the users.

Ehn & Sandberg's (1979) examination of the influences of unions on the planning to introduce computer- based systems to a group of Danish workers is another case related to user-design. In this study, also referred to in Sweden as the Swedish DEMOS (DEMOkratiske Styringssystemer) which occurred between 1975 and 1979, power was given to the "responsible and skilled worker" (Bjerkness & Bratteteig, 1995, p. 76). The

basic premise of this initiative was that the responsible worker “has the right and duty to participate in decisions concerning both what is produced and how it is produced (Bjerkness & Bratteteig, 1995, p. 76). The outcomes of this study resulted in conflicts between workers and management due to issues of power; however, the DEMOS initiative emerged as a model for negotiations between management and unions in relation to computer implementation in the workplace.

User-design is a form of emancipatory design. According to Rossman and Rallis (1998), emancipatory design can be understood as a process by which individuals are empowered to change the structures that oppress them. In other words, individuals collaboratively produce knowledge to better help themselves, instead of simply acting as informants to the academic and social community. The emancipation concept comes from Paulo Freire's (1970) ideas of *praticas emancipatorias e concientizacao* to assist oppressed individuals through liberating education. One can argue that Freire’s (1970) work is highly linked to user-design because of the liberatory nature of both user-design and his pedagogy. Paulo Freire once said, ”If I perceive the reality as the dialectical relationship between subject and object, then I have to use the methods for investigation which involve the people of the area being studied as researchers; they should take part in the investigation themselves and not serve as passive objects of the study” (Freire, 1982, p.34). User-design theoretically benefits the user more than administration (Carr-Chellman & Savoy, 2002).

Research in user-design is closely associated with investigations in stakeholder participation. In stakeholder participation, community members have the opportunity to participate in the decisions affecting their own communities. Carr-Chellman & Savoy

(2001) state that stakeholder participation is a positive fuel for improvement in planning, evaluation and social change. However, effective stakeholder participation only provides results if community members' voices are heard and if they perceive that their input will be implemented. Carr-Chellman and Savoy (2001) also argue that having an understanding of the ways in which leaders give decision-making power to stakeholders in the design of their own human learning systems is the next logical step towards sustained implementation of technology in educational practices. This thought is in perfect harmony with what other researchers claimed in the early 1990's. Successful participation requires users to engage in multilevel and multi-stake participation (Daresh, 1992; Stevenson & Pellicer, 1992). Therefore, successful participation might require a change in power dynamics and decision-making. Carr-Chellman and Savoy (2001) stated that user-design "...extends stakeholder involvement beyond mere input to create empowered users who have design and decision-making power" (p. 709).

User-design is seen as an important new theoretical process for the creation of software and computer interfaces. In fact, Cuyar, Carr and Breman (1998) investigated the implementation of user-design into a home nursing agency, which generated inefficient results when trying to implement user-design approaches towards the introduction of new technologies for home nurses. This study is related to my study because while one of my aims was to try to implement user-design as a method for gifted classrooms, a very different context, notions of efficiency are still of great importance in both cases.

One possible scenario in which user-design could be introduced is in the context of game interface development. Prensky (2001) and Katz (2000) have argued that

developing games for educational purposes is a moral act, as the video game generation tends to avoid the unequal power dynamics of traditional education. Games, when well designed, can also increase students' interest in the subject matter and can present the material in a different context (Gredler, 2003). Examining the phenomenon of user-design could assist game development with qualitative data and help us to better understand the intricacies involved in game creation, from the perspective of the user.

Games

Games are not an entirely new phenomenon. Games have been part of human history, at least, since the Roman era. An accepted time in which educational games became a public activity was in the beginning of the 17th century with the war games of the 1600's (Gredler, 2002). The purpose of the game initiative was to improve strategic planning of the armed forces at the time. In more recent times, especially during the cold war, games were used to simulate political-military crises (Grendler, 2002) and they have become a top priority initiative for the Department of Defense. The U.S government simulated a Polish nationalistic uprising and the emergence of a pro-Castro movement (Allen, 1987). These uses helped to define games as intellectual processes and artifacts (Jones, 1982, 1987; Mcguire, Solomon, & Bashock, 1975).

Although games have a long history, a single definition of games does not exist. Some define games as systems in which players engage in artificial conflict, defined by rules, that result in a quantified outcome (Salen & Zimmerman, 2003). Others define games as competitive exercises in which players must apply subject matter or other relevant knowledge in an effort to advance in the exercise and win (Grendler, 2002, p.

571). A key feature of educational games is the opportunity to apply knowledge from a particular area of interest in a distinct context.

Today close to 145 million individuals play games in one form or another in the United States (ESA, 2004). “Today's learning generation is extremely game literate” (DeKanter, 2005, p. 28). Dekanter (2005) also states that half of the population in the United States plays games. For that reason, a study involving games is certainly a worthy topic of inquiry for researchers in instructional systems. And while games as an educational innovation are coming into vogue and have some empirical studies (Funk, 2000; Cordoba & Lepper, 1996; El-Nasr & Smith, 2006; Durkin & Barber, 2002), there remains a dearth of empirical work in the user-design of gaming environments, particularly for the purposes of learning in formal educational settings.

In a recent survey conducted by Carsten & Beck (2005), 4 out of 5 managers under 34 years of age reported having significant experience playing video games and that 80% of employees ages 34 or younger and 34% of employees ages 34 or older have video game experiences. While there is still a generational gap evident here, what was once seen as an activity dominated by the young has become commonplace among adults. Most people don't realize that Americans spend more time and money on video games than on movies (Carten & Beck, 2005). Employees of the “game generation” are taking over key positions within organizations, which is in itself a force of change. Decisions once made by the baby boomers are now shifting to the control of the game generation. In fact, Beck & Wade (2004) recently stated this position in their book, Got Game: How the Gamer Generation is Reshaping Business Forever. Most young managers today are game enthusiasts who wouldn't have a problem incorporating gaming

into work-related activities. Quite probably, those who ignore the gaming trend will be behind. In fact, Cartens & Beck (2005) go further and state, “Sooner or later, those who grew up without video games will have to understand the gamers” (p.22) and not being adept at video games could result in disfranchisement in the workforce. It seems necessary to conduct studies related to games and the effectiveness of interfaces from a user‘s point of view because the user is the ultimate consumer of the intervention. Thus an extension of this line of theory and research will lead gaming inquiry toward user-design gaming design. This study, which will examine the process and experience of user-design in gaming, is therefore, an initial contribution to the understanding of the user point of view in the innovative and popular learning activity gaming.

Games have been studied from a number of perspectives, not just in the quantitative paradigm. There have also been qualitative studies on the characteristics of games, e.g., in terms of fun, challenge, fantasies, sense of curiosity, and motivation they evoke in the player (Malone, 1982). Some research has sought to explain in qualitative terms the characteristics that make games engaging and how playable they are (Fabricatorre et al., 2002; Malone, 1982). However, very few gaming studies have been conducted that empower the users to be the designer of their own gaming interface, even though almost a full decade ago Gredler (1998) stated that “an innovative use of computer technology is to permit students to design their own computer games using particular content” (p. 576). An exception to this rule is the game The Sims, where 90% of its gaming content is produced/developed by the players (Herts, 2002). Griebel (2006) goes further to state that The Sims is an open-ended game where there is no right way to play it. Rothfeder (2004) adds by stating that in Sims, “much of the story is completed by

the player's personal experiences and aesthetics" (p.84). Sims is a game of self-expression (Thompson, 2003). There has been a multitude of empirical studies on The Sims. Researchers have found that The Sims helped users to learn through reflecting into their own playing experiences and with identity construction (Hsiao, 2007). In a study conducted by Griebel (2006), the researcher found that Sims had a positive impact on player's openness and consciousness. Griebel (2006) found that creative people tend to be more creative within the Sims world than in real life and that younger players accomplished their goals more often than older players. Griebel (2006) eloquently said that, "the Sims player creates an extension of self" (p. 10).

There are other scholars who engaged in Sims research investigations. Kirriemuir (2004) has found that Sims games promote favorable learning outcomes, facilitate group discussion and enhance informal learning, especially engineering skills, economics, urban planning and mathematics. Squire (2004) has said that SimCity is an excellent tool for individuals to learn urban planning. In a study conducted by Kolson (1996), SimCity teaches the players that mayors are omnipotent and that political variables, race and ethnicity play almost no role in urban planning. In another empirical study using SimCity, Barab et al. (2005) found that students learn about supply and demand and develop a conceptual understanding on how cities emerge by playing the game. In fact, one of the participants stated that when the city he created had stable electricity, people started to move into the city. Sims games are related to user-design studies because both empower the users to the role of a designer, though arguably, there are more limits with Sims software than in open-ended videogame programming.

Researchers look at games from different angles and across various disciplines (Aarseth, 2001) but rarely through the eyes of the user, especially in terms of game design. This study, by examining individuals designing their own games, begins to fill a gap in the current gaming research in instructional systems. Because users rarely design games, the anatomy and design of games is developed by practitioners of the gaming industry alone (Crawford, 1984; Rollings & Morris, 2001) and, perhaps because of the lack of a user-design approach, several games have failed to be adopted. Games, when well designed, have the opportunity to increase student's interest in the subject matter and present the material in a different context (Grendler, 2002). The reality is that this study may shed some light on the experiences of user-designers in creating their own games to see if there is any suggestion that learners find satisfaction in the activity or that they are more motivated by the design act.

Games are linked to motivation. In fact, research on motivation in gaming is a topic of interest across many areas of study. Thomas Malone conducted seminal research studies related to gaming in the early 80's. Malone (1981) says that games motivate individuals in several ways, e.g., curiosity, fantasy, and challenge. Good games shouldn't be too easy or too difficult and they should foster player's curiosity. It seems logical to empower the user to design a game or parts of a game according to his or her definition of easy or difficult. Squire (2003) found that 42% of the computer games designed for pre-teen boys are inappropriately easy for this group and 14% of the computer games designed for pre-teen girls are inappropriate for the same reasons. In survey study, Whitebread (1997) and Higgins (2000) found that games support the development of logical thinking and problem solving. In two studies of children interacting with

computer games, Downes (1998) found that early interactions will tend to encourage students to become playful with computers. Mackereth (1998) argues that video games can influence childrens' confidence. A recent study conducted by Cameron (2004), found that learners performed significantly better on factual and conceptual knowledge when receiving gaming as a treatment over the control group, relating to the parts and functions of the human heart.

The qualitative research in gaming focuses on the characteristics of games, e.g., in terms of fun, challenge, fantasies and sense of curiosity and motivation that they evoke in the player (Malone, 1982). Some previous theoretical research has also sought to explain in qualitative terms, the characteristics that make games engaging and how playable they are (Fabricatorre et al., 2002; Malone, 1982) but rarely from the viewpoint of the user. Thus, the bulk of research in gaming is not from within the educational or learning sphere. There is little qualitative study of gaming concerned specifically with learning and educational gaming. In addition, there is nothing which looks specifically at user-design with true empowerment and decision making within educational gaming. Within this landscape of research, theory, and inquiry, this study examines rural, gifted students' experiences in designing their own games. Based on the lack of gaming studies in instructional design, and the lack of user-design studies within gaming research, this study will assist the instructional design community with broader issues related to user-design and implementation of innovations.

Research on Wiki

It is important to consider Wiki (defined as a website in which users are able to edit, contribute, and delete content within a relatively open rules structure) innovations in

this discussion of user-design experiences as a Wiki is perhaps one of the pioneering user-design or mass collaboration tools. Wikipedia, as an example of the Wiki class more generally, represents a new publishing paradigm (Forte & Bruckman, 2005). Different from other types of technologies, Wikipedia relies on the volunteer time of its own users who may or may not be trained experts in what they write about. Ward Cunningham, first introduced the Wiki technology in the midst of the 90's, as an environment to foster support and collaboration (Leuf & Cunningham, 2001). Research on Wiki technology is particularly important to studies of user-design because its core philosophy entails notions of empowerment, ownership and participation. True user-design is based on those assumptions (Carr-Chellman, 2007).

Basically, Wiki technologies allow users to change content without even disclosing their identities, which, to many may seem to be impractical due to concerns over quality and reliability (Forte & Bruckman, 2005). However, there are over 500,000 Wiki pages available at Wikipedia. Users are empowered to edit content at their own pace. It has been said that Wiki articles resemble print encyclopedia entries (Emigh & Herring, 2004) and their content has been found to be reasonably accurate (Giles, 2005). Wiki technologies also provide opportunity for social collaboration, co-production of texts and interaction (Bruns & Humphreys, 2005). This approach fosters new models of learning since success in the information age will require abilities to be creative, negotiate meanings, and generate new knowledge on a team (Bruns & Humphreys, 2005).

It could be assumed that the creation of Wikis by users would be similar in experience to the creation of educational games, even if it is significantly less

complicated to make a Wiki entry than to create a trivia game. There have been several empirical studies involving Wiki technologies. A study by Giles (2005), found that the level of accuracy in Wikipedia entries is as accurate as the printed Encyclopedia Britannica because of the participants' ability to constantly edit each others entries. According to Emigh and Herring (2005), wikipedia content is stylistically congruent with more traditional publications, such as Columbia Encyclopedia, in terms of formality and language standardization. In a qualitative study carried out by Bryan et al. (2005), the researchers found that participation was a frequent and paramount activity and that the participant's roles changed as the study unfolded. Some of these roles were of being an editor, administrator, or what the researcher called "watch-dogs" or individuals who were specifically looking for malicious entries. The researchers also concluded that the more the participants participated, the more they became tied to the community (Wenger, 2002). In a case study exploring the use of TWiki (an open source Wiki technology system) as a support mechanism for 25 teachers when building a web portal, Da Lio et al. (2005), found that the teachers tended to make use of TWiki in their own social context and that they ended up refining their teaching practices with the use of TWiki. The researchers also found that the content created by the community was socially negotiated and had a shared meaning among the community of teachers.

In another empirical study using Wiki in an ESL course, Wang et al. (2005) found that there was a positive relationship between student editing Wiki content and academic performance.

Some of the empirical results include studies where students wrote content and measured its effectiveness through a survey of quality (Viegas, Watternberg & Dave,

2004). Forte & Bruckman (2005) found that 80% of students, when using Wiki technologies, refined their final papers and another 90% engaged in discourse relating to argumentation and content. Emigh & Herring (2005) went further and stated that Wikipedia produced results in a standardized form of academic writing. In a study conducted by Rick et al. (2002), students using Wiki technologies outperformed students who did not have Wiki technologies for the completion of a collaborative assignment. The wide variety of research studies produced should not come as a surprise because there is a growing movement where the end user is being changed from a position of consumer to one of a designer/producer of content. The new producer-user (Bruns, 2004) or what Bruns calls, 'produser', is an individual who is not only active but a participant in the production of new knowledge. Nevertheless, these studies have focused on the quality of content, and quantifying the results far more than capturing the lived experiences of participating in Wiki creation.

Some have argued that the new economy is now being developed to support patterns of consumption where "grassroots activity and user-led innovation are the key to the development of economical and social value" (Bruns, 2004, p. 7). This idea is clearly expressed by Hartley (2004) as the "drift value" meaning that the value of an innovation is now in the hands of the users instead of the author.

The theoretical underpinnings of Wiki technology are clearly in alignment with user-design (Carr, 1996). The fact that Wiki technology is based on the stance that if students are to learn, they must create (Scheneider et al., 2003), it makes it a straightforward link with user-design, which is an attempt to allow users to design their own systems (Banathy, 1991). By definition, both user-design and Wiki technologies are

technologies that empower the user to be in control of their own destiny. Wikis, like user-design, assist with problem solving, conceptual understanding and the acquisition of knowledge to solve problems. For this reason, research on Wiki technologies is highly relevant to this dissertation.

Synopsis of literature reviewed:

Overall, there have been only a few studies relating to user-design and several others, mostly theoretical, relating to the phenomenon of user-design. One possible reason for this could be the ways in which user-design research tends to challenge the expertism of the entire field (Carr, 1996).

There are a wide range of research studies, both quantitative and qualitative, which are *related* to user-design, such as the one conducted by Bjerkenes and Bratteig (1987) and Nyggard & Bergo (1974) that provided accounts of positive outcomes to user-design related activities in participative design. In Cuyar, Carr and Breman (1998) the results were not as positive as in the ones investigated by Nyggard & Bergo (1974) or by Bjerkenes and Bratteig (1995). Games seem to be a good context in which research may be conducted on user-design, due to the overall increase in the individuals having experience with video games (Carsten and Beck, 2005) and due to motivation (Malone, 1982). Recently, Wiki technologies have also been giving students and enthusiasts opportunities to learn by creating, which sits harmoniously with the foundations of user-design. Indeed, Cuyar, Carr & Breman (1998) investigated the phenomenon of user-

design in health care, Nyggard & Bergo (1974) conducted “user-design” like activities in their study with union workers, Malone (1982) and Prensky (2003) had indicated that games can assist with motivation and should be designed to assist with learning. However, to this date, there is no study of user-design among a gifted high school class using gaming as a platform for development. This dissertation is unique because it combines notions of user-design, motivation, gaming, and design in a single study.

Chapter 3

Research Design

Introduction

This was a phenomenological study (Van Manen, 1998) involving rural, gifted high school students' experiences as a designer of their own games. The project built upon Dr. Alison Carr-Chellman's work on user-design and advanced the literature on educational technology by providing exploratory data regarding an alternative instructional design model and an attempt to implement the user-design in gaming context.

Given the exploratory nature of the study, I engaged the participants in the design of their own systems in a familiar environment. I decided to gather the participant's experiences *in vivo*, because my intentions were not to establish cause (Baptiste, 2005), or to select pupils randomly and assign them to a controlled environment. Testing for causality and random assignment were not appropriate given that the question was qualitative in nature. I described the lived experiences (Van Manen, 1998) of the participants doing user-design during the conception and design stage of the design task. I have chosen a phenomenological research approach (Van Manen, 1998) because experiences form the core of the data. There are indeed, several "flavors" of phenomenological research; for this study, I used hermeneutic phenomenology (Van Manen, 1998). This chapter provides a detailed description of the components of this study's research design. First, I provide an account of the qualitative research paradigm, and why a qualitative design is appropriate. Then, I turn my attention to describing the

unit of analysis, the relationship between the researcher and the context, and the rationale for choosing the site. Next, I describe how I collected the data, basic information about the site and how I analyzed the data. Finally, I discuss issues of quality and ethical considerations.

The qualitative research paradigm

According to Creswell (1998), the qualitative paradigm is a constructivist approach, naturalistic, interpretive and post-positivist or postmodern. It is an approach in which individuals create meaning from their life experiences. The qualitative paradigm assumes that reality is not objective but subjective and that individuals create meaning from their lived experiences.

Inductive rather than deductive logic is the norm in qualitative studies. In fact, this study was conducted inductively, moving from particular meaning units to themes. The participants were asked to talk about their experiences of being the designer of their own games. The goal of this research study was to gather the participants' lived experiences as being a game user-designer. Themes emerged from their raw experiences.

Contrary to experimental research investigations, phenomenological studies do not start with an established hypothesis where the researcher lays out a set of theories to draw upon or a priori assumptions to be tested or verified. Instead, an inductive process takes place where a sense of the experience emerges during the data collection and analysis phases of the research study (Creswell, 2003). In fact, Creswell (2003) outlines the inductive mode of research in qualitative studies as the following: " Researchers gather information, asks open-ended questions, analyzes data to form themes or

categories, looks for broad patterns, generalizations, or theories from themes to then, generalizations, or theories to past experiences and literature" (Creswell, 2003, p. 132).

Why a qualitative design is appropriate

Qualitative research was appropriate for this research study because of its emergent nature and its overall suitability for exploratory purposely. This study's findings were a combination of content provided by the respondents and the researcher without any a priori imposed hypotheses. Because the complexity of the real world cannot be reduced to a number of variables without any interrelation and/or interconnections to other variables, a multitude of realities were expressed. In fact, the only method to answer these types of questions under natural conditions would be a qualitative approach. In fact, the conditions stated above were fundamental precepts of this qualitative research investigation.

According to Baptiste (2005), four main types of analytical interests exist. They are categorized as establishing cause (used in experiments or quasi-experiments), generating descriptive frequency distributions (used in surveys), identifying and measuring associations (correlational studies) and using exploratory techniques (qualitative methods). Since the purpose of this research study was to *explore* the experiences of rural, gifted high school students when designing a game, a qualitative method in general and phenomenology in particular seemed appropriate.

Rationale for Conducting a Phenomenological Study

According to Leedy & Ormod (2001), phenomenology attempts to understand people's perceptions, perspectives, and understandings of a particular situation or phenomenon- the "lived experiences of several individuals about a concept or the

phenomenon" (Creswell, 1998, p. 51). Phenomenology aims to study lived and existential meanings and to describe and interpret them in their essence (Van Manen, 2003). Phenomenology employs a naturalistic inquiry that attempts "to inductively and holistically understand human experience in context-specific settings" (Patton, 1992, p. 37). Phenomenology seemed, therefore, to be the most appropriate method to describe the human experiences of rural, gifted high school students.

Some assumptions need to be clarified if one is to conduct a phenomenological study. According to Husserl (1913), people can only know what they have the opportunity to experience. By focusing on their individual perceptions, the meanings they produce from these perceptions are brought to their consciousness. Therefore, what participants experience and how they interpret their world becomes very important to understand deeply. One can argue that to really understand another individual's experiences, researchers must gather as much data as they can relating to the question asked. The researcher must directly observe the subject's actions to gather the essence of the subject's experiences. "These essences are at the core meaning mutually understood through a phenomenon commonly experienced" (Patton, 2002, p. 106).

Since I am interested in describing the experiences of rural, gifted high school students as being the designers of their own games, phenomenology seemed to fit the analytic framework of this study. High school students were asked to describe their experiences designing their own games throughout this inquiry. I have created a protocol with questions that captured the essence of their experiences (Van Manen, 1998). See appendix A.

To be able to achieve a truly democratic society, individuals must believe and have the power to act and be the owners of their own destiny (Freire, 1968). It seems to be beneficial to recognize and capture the experiences of those individuals and share the essence of their experiences through their own lenses. Revealing their experiences provided first-hand descriptions about the process of designing an educational game. Phenomenology assisted me with this purpose, through what Husserl and other qualitative researchers refer to as the process of phenomenological reduction. Reduction is looking at "experiences the way things are" (Moustakas, 1994, p.91). The phenomenological reduction is a method of suspension regarding a belief. It has the purpose of obtaining unadulterated phenomena that are attainable in the 'naïve' belief' (Cohen & Omery, 1994).

Because I based this phenomenological study mainly on Van Manen's theoretical work, I provide a methodological definition of phenomenological research as he defines it:

> "Phenomenological human science is the study of lived or existential meanings; it attempts to describe and interpret these meanings to a certain degree of depth and richness. In this focus upon meaning, phenomenology differs from some other social or human sciences, which may focus not on meanings but on statistical relationships among variables, on the predominance of social opinions, or on the occurrence or frequency of certain behaviors" (Van Manen, 1998, p. 11).

Van Manen goes on to add that,

> Phenomenology is distinct from other methodologies since it does not explicate meanings specific to particular cultures (ethnography), to certain social groups (sociology), to historical periods (history), to mental types (psychology), or to an individual's personal life history (biography). Rather, phenomenology's goal is to gain a deeper understanding of the nature of meaning of our everyday experiences (1998, p. 11).

My reflections of phenomenology go beyond just explaining what one means by a thought or reflection about an experience. Phenomenology, to me, is a method to capture the "real" meaning of one experience while being critical to an objective/absolute representation of that experience. It is a quest to capture and interpret the latent meaning of a person's journey. By capturing the participant's innate experiences as user-designers, I hope to better comprehend the phenomenon of user-design. This research study attempted to represent the experiences of high school students doing user-design, according to their life world.

Unit of analysis

The unit of analysis for this study was the individual participants (rural, gifted high school students). I used the psychological approach phenomenology. According to Creswell (1998), "the psychological approach also focuses on the meanings of experiences but has found individual experiences, not group experiences, central" (p. 53). Thus within this approach universal meanings can be achieved from the individual's meanings created out of their personal experiences. The main principle of the psychological approach is to determine what the meaning of an experience is for an individual through his or her own descriptions. It is from the personal descriptions that universal meanings are obtained, the essences of structures of the experience (Moustakas, 1994).

Researcher relationships & power

The relationship between the respondents and the researcher should be taken into account in a qualitative research study because the researcher will almost certainly have an effect on the participants' responses. In this study, I clarified to the participants that

their responses should be as informal as possible and that I was eager to hear their responses and truly learn what their experiences had been. It was evident that I had no interest in influencing their design decisions and that there were no “right” answers to the questions I asked of them.

I recognize that I was in a position of power in relation to the participants. As a doctoral candidate from a well-known university, I realized that the participants could have seen me as privileged, because the majority of the students I interviewed were high school students with ages varying between 16-18. My experience conducting interviews and engaging in qualitative inquiry and my age also had an impact on the participants. They rarely questioned what I said. Also, they perceived me as a power figure. I was hopeful that my presence there as a graduate student with a high degree of education would help me to serve as a role model to my participants. I expected that my relationship to the population was more likely to be deepened by my ties to the Clarion area region, since I was constantly in town and I still have a strong influence in Clarion county. My hopes were right. They made a difference in how the students and the teacher perceived me, especially in terms of trust.

The site

The Clarion Area High School is a rural public school located in scenic northwestern Pennsylvania. The district is one of Intermediate unit #6 schools with an approximate enrollment of 985 (PA dept. of education, 2005). The Clarion Area School district has a history of academic excellence with a superb fine arts curriculum, high attendance rates, safe surroundings, and modern technological facilities (PA dept. of

education, 2005). The high school is equipped with a fiber-optic network, which is used by its student body to send and receive instructional resources.

Over 65% of its student body participates in extra-curricular activities and recently, the high school track team became state champions. The school has the following data in regards to academic achievement: 83% of its 11th grade high school population had proficiency in reading in comparison with 67% in 2005. 89% of 11th graders are proficient in writing, in contrast with 71% in 2005. 59% of 11th graders are proficient in mathematics, in contrast with 49% in 2005. Clarion Area High school scores in reading, writing and math are higher that the state's average.

Its population is highly homogeneous and primarily white Caucasian. The school district is 96% White, 2% Asian, 1% black and 1% Hispanic. It differs significantly in relation to the state average, with the exception of Asians (White 76%; Asian 2%; Blacks 16%; Hispanic 6%). Only 21% of its student body qualified for free/reduced lunch program. In terms of staffing, there was a 14/1 student to teacher ratio compared to 16/1 statewide (PA dept. of education, 2005). Overall, the school district is among the top districts in the commonwealth of Pennsylvania.

Rationale for choosing the site

The main reason for conducting the study at the Clarion Area High School was uniformity. The vast majority of the student body had a deep rural heritage, which was a perfect fit for the proposed study, because my study dealt with the rural population. Uniformity used here does not relate to gender or class. There was the usual amount of variability in gender and social economic status. Clarion Area High School was clearly

below the average number of free and reduced lunches, typical measure of poverty in a public school.

Clarion Area High School is among the most uniform rural schools in the Commonwealth of Pennsylvania (greatschools.net). Over 97% of its student body is Caucasian. Because I intend to describe the lived experiences of rural high school students when designing their own game, selecting a site with a high percentage of rural students was critical. This lead to a more homogeneous population than might be typical of most American high schools. Because generalization wasn't this research study's goal and I have a specific interest in rural high school students, the fact that the population was homogeneous was not an issue in this particular study.

The second reason why I chose this site was because of accessibility. Even though the school's PSSA scores were above average, the school administration and leadership seemed to be enthusiastic about the possibility of change. Therefore, while the location was not necessarily convenient or optimal, it was an acceptable distance to travel.

Data collection

I captured a dimension of students' experiences as being the designers of their own games by recording the anecdotes and stories that illustrated their experiences (Van Manen, 1998). It was this process that brought their experiences to life and began illuminating my research questions. Due to the emergent nature of qualitative studies, I did not have a set number of a priori interviews. I observed their behaviors in the classroom, audio taped the participants' interviews, and collected weekly reflection papers. I did not limit or set a precise number of participants ahead of time (Rubin & Rubin, 1995).

Observations

I followed Bogdan & Biklen's (1992) recommendations on how to conduct observations. I recorded aspects, such as non-verbal behaviors, interactions and the physical setting. I captured events and activities, and took notes of what I witnessed (Bogdan & Biklen, 1992). I observed participants every two weeks using the observational protocol (see appendix B). I gathered observational data because the data collected through observation techniques could lead to a more in depth understanding, using complementary data about the phenomenon under study. I gathered observational data because this type of data assisted me in collecting non-verbal behaviors expressed by the participants' throughout their user-design experience. Observational data was important because it complemented my interview protocol for gathering data that the participants did not discuss with me (Patton, 1990). I also collected verbal and non-verbal cues during my observations. I sat down in one of the student's chairs in the classroom. I was not positioned in a higher or more comfortable chair. I did what I could to act as a student rather than an expert to minimize the tension between the students and me. I was aware that my presence in the room would initially introduce some discomfort. It did at first but with time it decreased just as Schatzman & Strauss (1973) have suggested. I maintained a passive presence in the classroom when I did the observations (Schatzman and Strauss, 1973). I conducted observations prior to interviewing the participants. I observed the participants twice a week, in the first two weeks for approximately 45 minutes. After the second week, I observed them once a week also for 45 minutes. Using a procedure somewhat different from the interviews, I observed all five participants in the same day. I decided to observe the participants for ten minutes a day because I would be

able to observe them all more often. I kept a weekly log of what I observed in my visits. I focused on different aspects during each visit. In the first observation sessions, I focused my attention on the environment. The remaining sessions were focused on classroom behavior, e.g., participant's interaction with the teacher, his peers, and the computer. I looked at how the classroom was arranged, if it had enough light, and overall classroom decoration. In terms of classroom behavior, I observed if students were thinking aloud, whether the participants solved problems alone, if they interacted with the computer, their teacher or peers, and so on.

Interviewing

I conducted interviews because observing behavior or collecting artifacts alone cannot capture the essence of an experience. According to Creswell (1998), conducting interviews is a necessary technique in phenomenological studies. Therefore, I captured the dimensions of the students' experiences by recording anecdotes (stories) that illustrated their experiences (Van Manen, 1998) without ignoring past experiences that I bring to the research as a person. I collected the participants' narratives, reflections and thoughts about being the designers of their own game. My goal was to bring the participant's experiences to life; to uncover their life world. In fact, I believed that if I gathered the participant's life stories and made connections to what my experiences were, I would be able to bring their experiences to life and consequently provide a richer account regarding their experiences.

I followed Seidman's (1998) interview recommendations in my research study. I conducted three semi-structured, open-ended interviews with each pupil. The interviews lasted approximately 45 minutes each. I conducted all interviews in person. Dr. White,

the school's superintendent, granted me permission to use one of the school's conference rooms to interview the five participants. The conference room was a quiet and elegant room. There were no distractions other than daily school protocols, such as the school's bell.

I interviewed two students in each daily visit. Prior to coming to the conference room, they had to ask for permission from the secretary to be interviewed. At Clarion Area High School, students have to ask for permission to enter the conference room. There was no focus group interview. I interviewed the participants separately at an oval conference table facing the participant. The conference room had 12 comfortable chairs and no blackboard.

The first round of interviews was conducted in early September of 2007, the second in mid October and the last in late November. I did not ask participants for their consent signatures because this procedure was done ahead of time in the classroom. I checked the taping device, and then, started the interview according to my protocol (See appendix A). I used prompting techniques to gather clarification, amplification, or illustration of each pupil's statements. This allowed me to capture critical elements of the discourse, and to fully explore the pupil's ideas and thoughts.

The vast majority of participants were not talkative. Therefore, I had to repeatedly ask questions to capture their lived experiences. This process helped me with member checks, because I was constantly asking similar questions.

Document Analysis

According to May (1997), document analysis should contain authenticity, credibility, and should establish the meaning that the document has in regards to what the

researcher wants to illuminate. In order to meet the criteria of authenticity, credibility and relevance, I gathered documents that represented the direct experiences of the participants. I collected their design documents, email discussions, and their weekly user-design reflections. Since this study was conducted as part of a gifted course, the teacher asked the students to submit weekly reflections. She would then submit them to me after she received and graded the reflections. I received participants' reflections and email correspondences periodically. In addition, I collected their final games because their games were artifacts produced by the participants. I decided to collect their final designs as they were the most authentic (May, 1997).

Because I collected documents that were relevant to my research question, I have met May's criteria of meaning. I waited until the last day of the semester to collect their games. I decided to allow them as much time as possible to work on their designs and to minimize the bugs in their games. I received the designs a day after the last interview.

Contacting the site and selecting the pupils

I contacted the Clarion Area High School District one semester in advance to ensure that access wouldn't be a problem. Even though I knew the president of the school board and both the principal and the superintendent, I had to wait over four months to clear IRB and school board approvals in order to formally receive a school board letter allowing me to begin my study. I made the initial contact in person, scheduling a meeting time with the district's superintendent. My subsequent meetings were made through email correspondence and phone calls. I had to write a quick proposal about what I was intending to investigate and submit that as a package to the superintendent. The superintendent then discussed my proposal with the school board in a formal meeting and

only after a collective decision was made, I was granted access to start my study. After that, there were no further access issues other than final IRB approval.

Selecting the pupils was less complicated but still a slow process. The gatekeepers were willing to open the gates, indeed. The front line teachers and some students were interested in being a part of this study. My systematic recruiting plan was the following. I first emailed the teacher and asked her if I could come to one of her classes and ask if the students would be interested in participating in my study. Ms. Shoemaker was kind enough to let me come to her early morning class. Although I had a few students who wanted to volunteer immediately, I had to wait about a week to receive their parental consent forms because they were minors. Only one student was over the age of 18. Therefore, I gave a copy of the Child consent form to the participants who were interested in participating in my research so that they could give it to their parents for consent. I did not conduct any observations or interviews prior to receiving the participants' parent's informed consent. Five students agreed to participate in the study.

Because participants were high school students from a rural setting, I used a purposeful sampling (Miles and Huberman, 1994) and a homogeneous sampling technique (Patton 1990). I decided not to use random sampling techniques because phenomenological studies require that "all participants experience the phenomenon being studied" (Creswell, 1998, p. 118). The goal of purposeful sampling is to gather a sample for qualitative inquiry from which the investigator "can learn a great deal about issues of central importance to the purpose of the research" (Patton, 1992, p. 169). Among the 16 different types of purposeful samples (Patton, 1990), I used homogeneous sampling. By utilizing this type of sampling, I reduced sample variation and simplified analysis.

Because my study participants were rural high school students, I made sure that I had as much homogeneity as I could. In reality, any gifted high school students from the C++ programming class at Clarion High School could participate in the study. There were no pre-requisites, such as prior gaming or designing experience. I engaged in purposeful sampling by going to the class and asking the gifted students if they wanted to participate in my study. The criterion I used to include the participants was that they were gifted high school students enrolled in the C++ class. Gifted students from other classes were not eligible to participate because of the design component of my study. There was no other gifted design course at Clarion Area High School. I decided to focus on gifted classrooms, and C++ programming in particular, because of PSSA regulations. Gifted classes throughout the commonwealth of Pennsylvania are not bound by PSSA regulations and can have freedom and autonomy in the classroom if permitted by the school's principal. I also chose Ms. Shoemaker's classroom because students in her class were required to design a final artifact.

I served as a non-intrusive facilitator and offered minimal guidance to the participants. It is important to clarify that the participants had full power to decide on the final design of their games. Ms. Shoemaker served as a facilitator as well. I visited the school periodically. In fact, I was at the site at least once every two weeks. I had the opportunity to talk with the pupils about their designs every time I visited the classroom. I thought this would assist me with building rapport and better understanding the population.

Due to the emergent nature of qualitative research, I didn't know at the start of the study that I would end up with five pupils for interviews and observations through the

course of my study (Rubin & Rubin, 1995). I had hoped for six pupils but due to class size, I had five. In Ms. Shoemaker's class, five pupils represented 75% of the class. I ended up conducting observations prior to interviewing the participants to refine the focus of this research study. This was, in fact, a suggestion I received from my dissertation committee. At first, I wasn't clear about what I was going to investigate; therefore, I followed my committee's advice and immersed myself in the participants' culture to observe the participants' behaviors prior to asking them any questions. I was advised to explore and better understand the environment in which my study was to be conducted. I started by asking the teacher if I could come to class and deliver a speech explaining my study. Ms. Shoemaker was very kind and allowed me to come to one of her early Monday morning classes. After I finished my speech, I passed out informed consent forms for students who were interested in participating. Because the vast majority of students at Ms. Shoemaker's C++ class were minors, I had to wait two weeks to start observations. I went to Ms. Shoemaker's class for a period of two weeks, three times a week just to take notes about the students and their interactions with the teacher, their peers, the environment, and their interactions with the computer. I quickly found out that the students were completely focused on their tasks of writing C++ code. I also realized that the participants were into games because they often spoke between and among themselves about games. The participants spoke with each other in class but were disciplined enough to respect the teacher's authority in the classroom. Students interacted with their peers and rarely asked questions of the teacher. The teacher acted more as a facilitator in her class. I found it to be an interesting phenomenon, in fact. A possible explanation for their behavior could be due to the fact that they knew more about

programming than the teacher. Most participants were happy to be in class but appeared to be seeking power. Although the teacher was kind enough to let them design what they wanted, they had to comply with the teacher's discipline protocol. However, one of the participants did not appear to be interested. Later in the year, I ended up hearing from the teacher that the project helped him to behave in class. Overall, the participants were not seeking attention. Rather, they preferred anonymity. Most participants avoided asking questions in front of the teacher. They were often asking each other questions. They were often talking during their user-design experience but prior to participating, they did not talk much. Stock car discussions were among the most popular topic. This was not surprising because in Clarion country Pennsylvania, outdoor activities, e.g., hunting and fishing, as well as NASCAR are three activities that most people enjoy.

The Clarion Area school district is an excellent school district with regards to technology. It is lead by a talented staff that believes in computer technology as a tool for learning. The school's facilities were superb, in fact. The superintendent and his leadership staff were a pro-technology group. The school has several computer labs, several wireless antennas and has both Macintosh and PC computers. Ms. Shoemaker's classroom is a PC-based classroom. The classroom was bright and had a large window in the back. The room wasn't too bright or too dark. The lights were in the ceiling rather than in lamps. The computers were placed in a row against two of its four walls. The classroom also had a blackboard and student's chairs. All classroom chairs faced the blackboard. The teacher had a complete view of the entire room and could observe student's behaviors. Because the classroom was also the yearbook room, there were a lot of pictures on the wall. The classroom was relatively quiet even though the classroom

was surrounded by other classrooms and faced a corridor. There were no interruptions during my observations. The classroom was clean and organized. The computers were functional and in very good shape.

According to my observations, the participants interacted more with the computer than which each other. It appeared to me that the participants were constantly looking at the computer screen when designing their game. A few participants preferred playing games over doing the assignment but, they were a minority. They rarely invaded each other's private space but they often pointed at one another's computer screen to make their points. I noticed that students placed their hands on their chins or their forehead when thinking. I interpreted their behaviors as if they were thinking hard trying to solve a problem. Two participants were constantly thinking aloud and were often "talking" with the computer when designing.

My initial plan was to interview the participants' about their experiences designing their own games using the C++ language. When the teacher told me that she was open to experimenting with tools other than C++, I immediately thought about Gamemaker, which is a game engine that has a few C++ functions embedded in the program. I asked her if she would be okay with using Gamemaker for her class and she accepted. I made this proposition so that my study would focus on designing the game rather than programming. As I was speaking with Ms. Shoemaker, I quickly realized that all participants were gifted, the majority were proficient with C++ and would be able to design (invent) a program. The class met every day for 45 minutes a day in a computer lab where each student had his own machine. Working outside the class was expected and required.

Students had to keep a daily journal and submit a prototype by the end of the academic year. After I presented the argument that Gamemaker could assist students when understanding basic C++ commands, Ms. Shoemaker allowed students to use Gamemaker for the class.

I perceived the students to be brilliant. I completely understood why the teacher delegated authority to the students and expected them to work on their own. In fact, the class was structured this way. The students interact with the teacher, their peers and the computer. Students also tended to interact with their peers to assist with the development of their software (participatory design).

Data Analysis

Phenomenological data analysis is composed of several phases. For this study, I followed Patton's (2002) process, which is composed of four phases. Phase one is the epoche, or the time to avoid being judgmental. During the epoche phase, the researcher must be introspective and aware of bias and assumptions regarding the phenomenon under study. Phase two, according to Patton (2002), is the 'phenomenological reduction' stage where the researcher is to bracket out the world and presuppositions. In this phase, I searched for key phrases and statements that referred to the phenomenon of user-design. My goal in this stage was to offer a definition or possible interpretations about the phenomenon of user-design resulting from my analysis of the first two phases and the statements generated from them. Phase three is the horizontalization step in which all aspects of the data are treated with equal value so that I can identify themes, or what

Creswell (1998) refers to as “clusters of meanings.” Phase four is referred to as the synthesis step in which the textual descriptions (what was experienced) and the structural descriptions (how the phenomenon was experienced by the participants) are formulated (Creswell, 1998). According to Patton (2002), “The textual portrayal is an abstraction of the experience in which it provides content and illustration but not yet the essence” (p.409). The structural synthesis goes beyond the surface of the emotions in the experiences to find deeper meanings. In that sense, I reported the “essential, invariant structure” unifying meaning of the experience (Creswell, 1998). I reported those experiences by making sure that I kept as close to the data as I could. I also collected observational data and created a word document containing the raw observational data as well. The same protocol was used for the observations and reflection papers. After I collected and transcribed the data, I used Pages (A software program from Mac which is similar to Microsoft Word) to code the data and generate themes. I followed the advice of Graneheim & Lundman (2003) for this systematic process.

I started my analysis by putting my research question above my Imac computer. I also numbered each transcript prior to analyzing it. I tape recorded and transcribed each interview myself using garage band (A recording studio suite for Mac) and Pages. I did not hire a transcriber to transcribe my data because I wanted to be as close to the data as I could. Doing the transcriptions myself had the added benefit of bringing me closer to the data.

I listened to each tape before transcribing it. I transcribed each transcript with a headphone, by pausing the play button in garage band and writing down the content. I listened and transcribed each transcript prior to starting the data analysis process in order

to capture the pauses and the changes in voice intonation and to note emotional characteristics and vocabulary use. I kept memos of thoughts after hearing each interview. I kept memos for each interview in case an accident happened and to assist me with data analysis. These memos included my personal notes for each interview as well as my reflections from both observation and interviews. This process helped me become increasingly familiar with the transcripts because I had to scan them twice prior to isolating any meaning units. After numbering each line of my transcripts, I ended up generating a pages document containing meaning units (Graneheim & Lundman, 2003). I isolated the meaning units by printing the transcripts and highlighting, with a yellow highlighter, the parts in the transcript that related to my research questions.

After reading my final "meaning units transcript," I used Pages to assist me with data analysis. I started this process by creating a table (see appendix C for an example) containing all the meaning units vertically. After that, I did what (Graneheim & Lundman, 2003) recommended. I generated condensed meaning unit descriptions close to text. I reduced the meaning units into chunks of meaning in order to make a more concise version of my meaning units selection. By following the recommendations made by Graneheim & Lundman (2003), I made my meaning units pages document more abstract. It was not until the next step that I started to interpret what the participants reported. In the next step, I took the condensed meaning units and interpreted their underlying meanings (Graneheim & Lundman, 2003). As I interpreted the participants' experiences of being a user-designer, I moved upwards again on the ladder of abstraction so that I could start generating themes. Because (Graneheim & Lundman, 2003) recommend that qualitative researchers generate sub-themes prior to themes, I first generated sub-themes.

I generated them by looking for common patterns, e.g., frequency and how relevant the codes were to my research questions. Once I isolated the sub-themes, I then grouped them into more abstract patterns, which emerged as my study's themes. My data analysis process consisted of a systematic approach to generating themes moving up the ladder of abstraction from what the participants told me in their interview responses to my abstract interpretations of their experiences through common patterns.

Enhancing the study's quality

Issues of quality in qualitative research studies remain an emerging area (Lincoln, 1995). According to Baptiste (2005), resources, power, and expertise can all impact the quality of inquiry. I am still a novice researcher with a few research experiences as a qualitative researcher. I believe, however, that quality in a research study has to be contextual, as Baptiste (2005) states, because the indicators of quality rarely exhaust the meaning of quality itself. Therefore, quality, to me at least, meant quality in terms of what I could provide under the realities of my circumstances. In this study, my research purpose and resources largely influenced my research.

Given the resources and the purpose of this study, I chose triangulation, clarifying research bias, and thick description to enhance the quality of this dissertation. I chose member checks because they were not costly and because my lack of expertise might be minimized in using these tools for quality. I collected data from different sources to ensure triangulation. I stated up front my biases of being a Latino male whose experiences were oppressive in middle and high school in this dissertation. I did periodic member checks with the participants by asking them similar research questions over time to ensure that what they were reporting was indeed, what they meant to report, and that

those reports remained somewhat constant over time. My concern, common to those who research using the interpretivist tradition, was to ensure that my findings would be as faithful as possible to the constructions of my participants. According to Creswell (1998), member checks are described as a quality technique where a researcher asks the participants to confirm if the data he or she provided is indeed a reflection of their experiences. In fact, this procedure is viewed by Guba & Lincoln (1989) as the "most important critical technique for establishing credibility" (p. 314). It was exactly for those two reasons that I engaged in member checking. I wanted to ensure that the participants' responses were their accurate user-design descriptions. I tried my best to gather repeated experiences from the participants' interview responses.

The rationale I used to ensure that my instruments and procedures were sufficiently robust was based on a pilot study I conducted in a previous qualitative research class, INSYS 574, in spring of 2006. Although this pilot study was conducted with a different population, I was able to answer, after a refinement of these questions, the initial questions for the final research study. In the pilot, I was able to gather the experiences of college students engaged in user design over a short period of time. Although I did not use the same interview protocol for this research study, the pilot interview protocol served as a guideline to construct this study's protocol. See appendix A for a more detailed description of the instruments.

I also clarified my research bias to help ensure quality. I informed the readers up front that I had a set of biases regarding empowerment in education (Merriam, 1998). My biases didn't mean that I would purposely ignore the results in case the results of this study went against my beliefs or expectations. In fact, I maintained an open-minded

attitude throughout the study. In fact, by the end of this study, I changed my mind about a few user-design related arguments, e.g., the fact that user design is difficult. I included clarifying research bias as a measurement of quality to allow others to critique my work. I did my best to ensure the quality of this study, even though I had a bias, as I believe all researchers do.

I also engaged in triangulation. According to Creswell (1998), triangulation is the use of several sources and methods to provide evidence of accurate data. I engaged in data triangulation to assist with naturalistic generalization (Baptiste, 2005; Stake, 1978). Naturalistic generalization can be understood as providing sufficient information that can be used by the targeted reader to assist him or her to decide if the findings of a particular qualitative research study are applicable to a new situation or not (Lincoln & Guba, 1985). Because I observed the participants, interviewed them, collected their reflection papers and their final games, the readers of my research should have sufficient information about the subjects under study and what they actually said and did. I addressed issues of quality by using a multitude of strategies.

Ethics

According to Bogdan & Bilken (1992), there is not an agreed upon code of ethics for all qualitative researchers to follow. However, they suggest that the qualitative researcher should strive to maintain confidentiality, treat the participants with respect, avoid deceit, and be clear in negotiating access and truthful in reporting results. I kept these guidelines in mind as I collected, analyzed, and reported the data without violating any participant's confidentiality.

In order to ensure an ethical study, I took the following steps. Prior to selecting the participants, each participant was informed that their participation in the study was voluntary and that they could quit at any time. The duration, methods, possible risks and the purpose of the research study (Soble, 1978) were explained prior to participants signing the consent forms. I advised the participants that their privacy would be maintained by ensuring that only my advisor and I would have access to the raw data. Participants' identities were kept confidential (Soble, 1978). Each participant was assigned a number for data transcription and analysis. A pseudonym was assigned to each participant. The data was kept in a locked cabinet and the documents were protected by a password.

Researcher Identity

In any high quality interpretive inquiry, disclosing researcher identity is essential. My identity will help the reader to understand and frame the work that follows. It will also assist them to understand how my life experiences affected this study I am a middle class graduate student, Latino male, divorced, in my 30's, living in the United States. Even though I hold Bachelors and Masters of Science degrees from U.S educational institutions, I am still bound by high-class Brazilian values, morals, and beliefs. I am a critical, passionate, caring, friendly person who believes, albeit naively, in the perfect society: a place where every person is able to live in harmony without having to fight for power and position. I believe that when one has power over another, one ends up being powerless.

I struggle with power distance issues. I hesitate to raise my voice to elders, tend to have a collectivist orientation, and love, like many Brazilians, to solve the problems of

poverty and oppression. I am driven to research ways to alleviate poverty in other countries, especially the U.S. In fact, educational oppression in America has become my primary focus. This is why I believe in user-design, which can be argued as an anti-oppressive educational model.

I am of the belief that one cannot think about designing educational interventions without thinking about their relationship to society. In other words, one cannot think about parts without seeing the whole. Therefore, being a systems thinker is a very important part of my researcher identity. Because I possess a systemic thought process, it is difficult for me to separate out bits and pieces and to point to specific causes or effects. I remain, however, interested in sharing a sense of the whole experience in this study and in all my work.

During my elementary and high school career, I was not exposed to user-centered philosophies. In fact, I do not recall being asked about my opinions regarding anything related to the classroom and/or the curriculum until I reached graduate school. This fact had an impact in this research study, indeed. Because I did not have the power to express my opinions during my elementary and high school years, I heard the participant's voices continuously and rarely questioned what they reported throughout my research study. The fact that my previous experiences were oppressive had an impact on how I behaved with the participants. It helped me to fully document their lived experiences without having to place myself in a position of power.

The reality is that I have been educated in a teacher-centered (Huba and Freed, 2000) environment where the students' voices were purposively disregarded and ignored

by educators. It was for this reason that I did not disregard the participant's voice in my research study. In fact, I was overly attentive and polite with them.

My experiences as a student in Brazil were so teacher-centered that my former wife was astounded when I said that I never chose a book to read or a topic on which to write in any classes I took in elementary and high school. Perhaps, the reason behind this sad reality was due to the fact that I grew up under a dictatorial regime where people's voices were synonymous with rebellion. Being empowered to design anything was certainly a utopian dream in the social and cultural context of Brazil at that time. Because the United States is a democratic country, I assumed that students in public schools had the freedom to decide what they wanted. I quickly came to feel that the system was anti-democratic and that students had to "blindly obey" the teacher. I made it clear to participants that their voices carried weight and that their design opinions mattered.

I am a self-motivated individual who thinks outside the box. I enjoy playing games and solving brain teasers. For these reasons, I was open to participants' unorthodox opinions and beliefs. This, in fact, made me closer to the participants in several aspects, especially in terms of trust.

I come from a postmodern, point of view (Wilson, 1998). I am certainly not a positivist; in fact, I am extremely skeptical about the notion that there exists an "absolute truth" in the world. I live my life to find alternatives or to disprove the norm, which I believe is far too often imposed by a small number of powerful people. At one point, I almost gave up schooling because I became frustrated by the teacher-centered nature of my learning experiences and my lack of opportunity to be creative. I had no control over

my own destiny and was powerless to choose what I wanted to do. For this reason, I focused my efforts in athletics to have the freedom to make decisions. These experiences made me closer to one of the participants, in fact. Although his school experiences did not appear to be as oppressive as mine, he repeatedly stated that his experiences were oppressive. Now that I am more educated, I classify my educational experiences in junior and senior high school as oppressive (Freire, 1970). I felt as if I was a robot or a machine that had to perform functions in a factory environment (Gatto, 1992). According to Spring (2006), this was not an uncommon reality for South Americans.

I believe that we learn by building on what we already know. I consider myself to be a systemic thinker and a constructivist. I see interconnections and interrelations everywhere. I cannot see my world without making links between and among the different parts of society. I am a person who believes in the promise of change as a source of improvement. In fact, I believe that change is good and necessary (Fullan, 1998) for the evolution of human beings. I believe change can come most effectively through empowering those in need not by the use of mandates. Mandated change brings resistance and often outright rejection (Fullan, 1998) on the part of users in the system.

I believe in mutually satisfying personal relationships, developing relationships with others human beings, and I feel the need to belong to a specific community. It is not unusual for me to be a good friend to those I care about. If a personal friend is sick, I get upset and try to help with what I can. I don't trust people easily because of a few unfortunate experiences I had in the past. However, when I trust, I really trust. It was perhaps for this reason that I became friends with a few participants. They shared part of

their school experiences with me and I shared some college experiences with them. They trusted me because of my sincere personality.

I am an open-minded individual who would change my beliefs if I find enough evidence indicating that my perceptions are erroneous. This study, in fact, changed some of my initial beliefs regarding user-design.

Chapter 4

Results and discussion: Six themes illustrating the phenomenon of user-design

In this chapter, I provide a description of this study's participants, how they came to make a decision for what game they selected and their process of design, the study's findings and a discussion of the findings. The findings are the themes that emerged from the gifted high school student's experiences as they were creating their games.

Background of the participants

There were five participants in this research study. The five participants were all gifted students at the Clarion Area High School. They were all members of the C++ programming class with major interests in advanced mathematics and computer programming. While Pennsylvania state legislation stipulates that gifted students are those who have an Intelligence Coefficient (IQ) of at least 145, not all participants met this criteria. Some participants were in class due to a combination of factors, including their capacity to multi-task, achievement scores and an above average IQ. There were no students with an IQ of less than 126. However, not all students were consistently earning "A" grades. Some of them were struggling to maintain higher grades in humanities, in fact. However, most students had outstanding mathematics achievement scores. In fact, the students were so proficient in mathematics that every year, the gifted class placed itself in the top three seats in the statewide mathematics competition. All the students were gifted but there were significant distinctions between them. The descriptions that

follow are my perceived representations about them based on observations and from speaking with the teacher.

Robert

Robert was a perfectionist. He was, perhaps, the best student in class. This was what Ms. Shoemaker told me the first day I came to class to observe the participants. It did not take much to realize that Robert was indeed, brilliant and a perfectionist. During the four months that I observed his behaviors, he was the most focused and attentive of all. Robert preferred distance to closeness. In fact, he was often annoyed when his peers interrupted his user-design activities.

He knew how the system worked and quickly understood what was necessary to succeed in it. I had the impression, based on observing his behaviors, that Robert was a near perfect child. He was obedient, well behaved, and cognitively efficient. At times, he appeared to be bored in class perhaps because of his active and fast working mind. At times, I thought he wasn't as creative as his peers perhaps because he understood how the current system works. Although his final game was outstanding, his game was not as creative as some of his peers. However, he was the first to finish his prototype.
Robert provided more guidance than he received assistance. He had an introvert personality (Jung, 1923) and preferred interacting with the computer and the teacher rather than with his peers. He was an "A" student who was in the top of his class. Different from other participants, he started class with prior knowledge of C++. However, he did not have any experience with Gamemaker. By the end of the classes, he was one of the best Gamemaker users in the group. He seemed very straightforward, sincere, polite and goal-oriented.

Mark

He was brilliant yet disruptive and with high levels of creativity. He tended to portray himself as an average person even though he knew he was gifted. Mark was an athlete. He enjoyed running. Mark was eccentric, creative and was constantly searching for recognition. He was constantly looking for his peers' feedback. He was the participant who took the longest to complete his initial game prototype, even though he was an avid user of Gamemaker. His behaviors did not change throughout the study. However, his game was as complex as his peers and was one of the closest to being completed.

His peers appeared to interact with him and respect his opinions. He tended to lead the discussions and start the conversations. His social skills were superb; he was an extrovert, open to suggestions, and wanted to show his game and the progress to others on a daily basis. At times, I thought he was trying to seek peer recognition even though he was brilliant.

Although he was one of the most outspoken students in Ms. Shoemaker's class, he was hesitant to share his experiences. Perhaps he demonstrated this behavior because of his eccentric personality. Mark also enjoyed being different and wanted others to know that he was indeed, not mainstream.

Tom

He was autonomous, successful, with high levels of cognitive ability, eloquent, disciplinary, and a leader. He had a passion for music and played drums for the school marching band. Tom always came to the interviews on time. He was the oldest and the

first to agree to participate in the study. The teacher described him as brilliant, organized, and polite.

His risk-taking, independence and goal orientation were evident. Based on his constant concern for perfection, I would argue that his goal was to design the very best game possible. He did not have any knowledge of Gamemaker but he was an avid C++ programmer. Tom was quite involved in school. He was in the school's marching band, involved with the yearbook project, and was also in several honors classes. Different from other participants, Tom enjoyed designing his game on his own with minimal interaction with his peers. Based on my observations, Tom took his assignments quite seriously and disliked not being able to know what others expected from him in advance. He had a low tolerance for ambiguity. It was my belief that the user-design experience was especially challenging for him because there wasn't a set of guidelines informing what was expected. Tom seemed to have learned to work effectively in the current educational system. Being the owner of his own system did not seem to be an easy task for Tom.

James

James was the youngest of the group and yet one of the most outspoken and conscientious participants. He occupied the highly competitive third seat on the math team, even though he was only in 10th grade. He was Scott's younger brother. He was often comparing himself to his older brother's standards. His efficiency was excellent. James started the project a week late, due to an illness. He had no experience with Gamemaker and minimal knowledge of C++. In a period of a week, he had a fully conceptualized the car game prototype and had most of Gamemaker's functions

mastered. In fact, after just a few weeks of making his game, he served as a “tutor“ for others. He was successful, autonomous, obedient, a high achiever, yet still a risk taker and had great leadership skills. When James spoke, everybody in the group listened. He was humble enough to seek guidance and kind to help others when requested. The teacher predicts that James will be among the top students in the district when he achieves senior status. James was so efficient that he designed a collection of games rather than just one. In fact, in one of my school visits, I was quite amazed to find James working on a completely different game. James had the ability to influence others in the sense that when he wanted something, he would get it. There were other participants who were as eloquent, but James appeared to be the most charismatic of all.

Scott

It was difficult to make him speak at times. Different from Mark, who preferred to avoid talking to be eccentric, Scott would not talk perhaps due to an introverted personality. From what I observed, Scott was more organized than his peers. He planned to design only one game throughout the overall user-design experience where others planned to design several. His game was one of the most complex of all. It was a complex pac-man battle. He was creative but not overly creative, in my opinion, because he modified an existing game and made it more complex. I was not sure why Scott decided to transform an existing game idea rather than make his own game. Based on what I have observed, Scott understood how the educational system works. I believe he chose to manipulate an existing game idea due to his perceptions of what would bring him recognition in the existing system. He would be able to design whatever game he wanted, due to his superior task orientation. Scott wasn’t a talker but would talk if

somebody asked him a question. He was, however, quite straightforward, honest and focused. Scott was a hunter and fisherman who enjoyed the outdoors and country life. He was James' older brother. From what I observed, he was quite comfortable with his position as the oldest brother. He spoke with confidence and determinism. I found Scott to be a genuine and authentic participant who enjoyed design. He offered assistance but was also humble enough to accept suggestions. His Pac-man game was one of the most amazing versions of Pac-man I have ever seen.

The participants were highly capable and intelligent. They all designed a game at their own pace. Some finished earlier than others but overall, all students accomplished their tasks. Some participants were younger, more creative or conservative than others. Some were introverts where others were extroverts. Some knew about programming or how to use Gamemaker.

Game Selection Decision

According to my observations and my class interactions, the participants decided to design their games based upon the previous games they played, peer pressure, and their programming ability with C++. Several participants adapted concepts from Pac-man and tanker in their games, a finding that coincides with previous studies in game design (Kafai, 2002). A few participants decided to design a particular game because his classmates were designing a similar game. This might explain why several games contained had a Pac-man theme. One of the participants decided to design a NASCAR game because creating the NASCAR game in C++ would be very difficult.

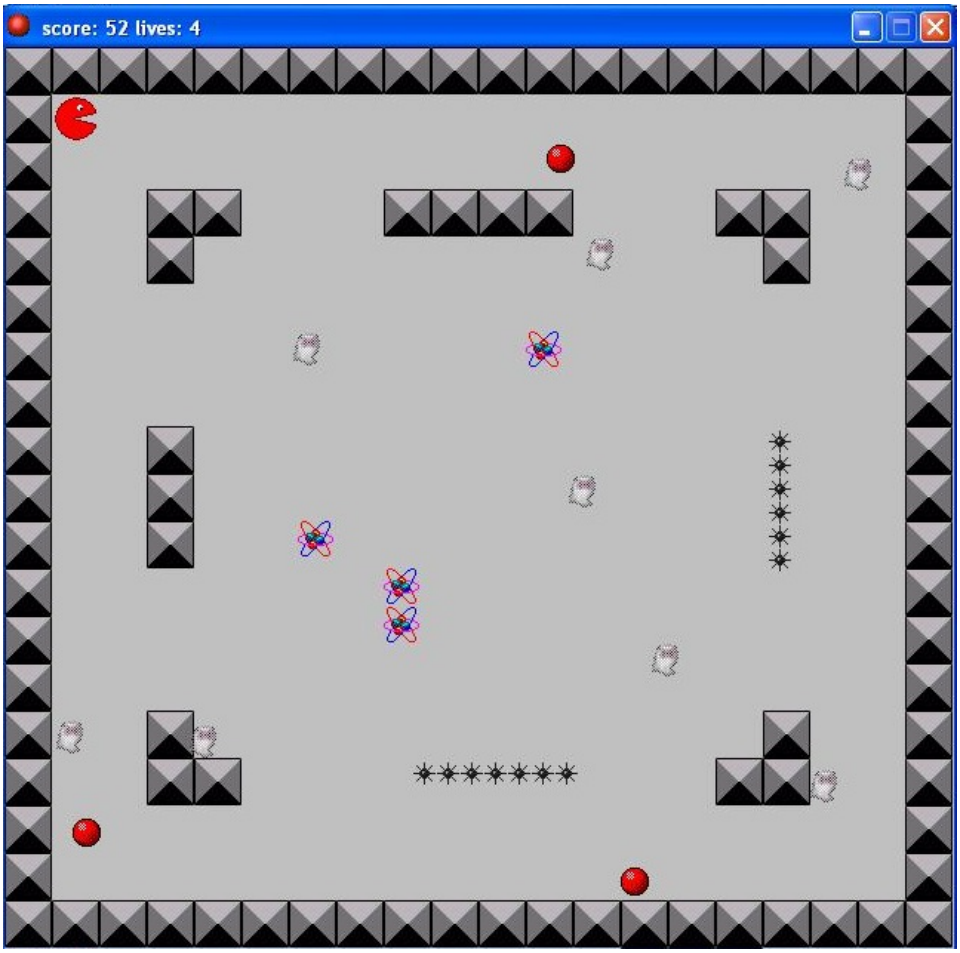
Process of design

The students' design processes had a logical sequence. Very few participants started working on their final games right away. In fact, only Robert did. All others started on a project but abandoned the idea a few days later. Mark, for example, came up with the idea of creating a car game, in his first attempts. He later ended up developing his Pac-Man Revenge, a psychedelic version of Pac-man, which made me believe that he used a gaming idea to generate another idea in the process of design and in leaning Gamemaker. Most participants took the first few days to learn Gamemaker, e.g., understand what a sprite was, how to work with rooms, compiling and so forth. It took a few weeks for participants to start creating their games. James, for example, tried out several Gamemaker functions in the first week of the study. Scott, however, postponed creating his game until he had a better idea of what to create. It appeared to me that participants wanted to start developing their own games shortly after my first visit but they had the common sense of learning basics of Gamemaker first (Kafai, 2002).

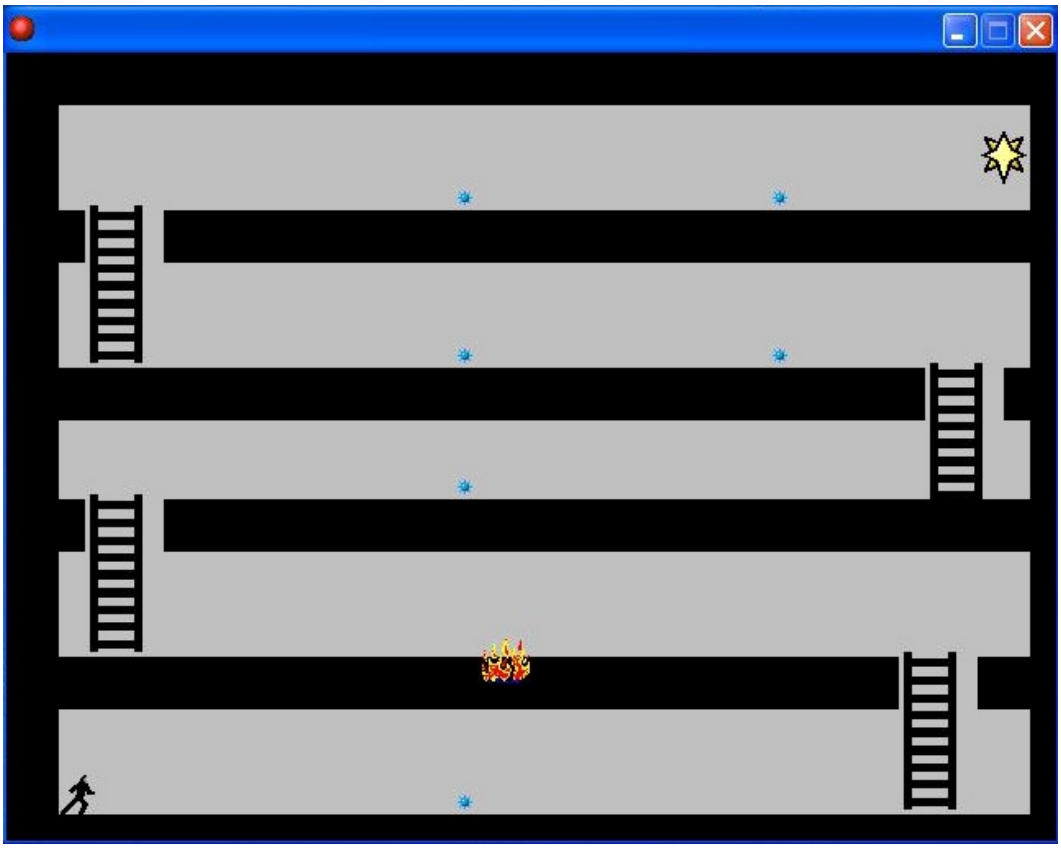
Most students generated screens pretty quickly. A possible explanation for this phenomenon was because Gamemaker is a user-friendly program. Some participants, e.g., Scott, took a few days to design a single screen.

At first, the participants were confident in their abilities to design their own games. They often spoke with each other about how "cool" playing their games would be. With time, they realized that designing a game wasn't a simple task. In fact, most participants took months before having a functional game. James had a version of his NASCAR game five weeks into the semester. It wasn't the final version of his game because he wanted to add more levels. In fact, whether or not to have several levels was a

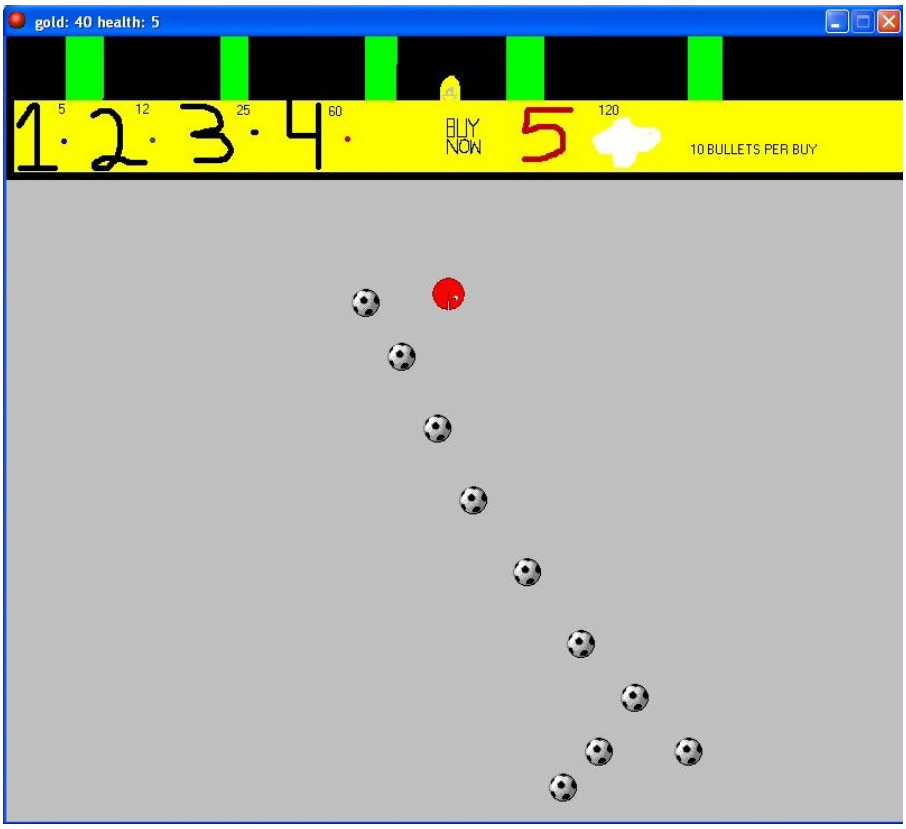
deciding variable indicating when participants determined that their games were finished. Based on my observations, participants took a few days to understand the Gamemaker interface. All participants played with the program, asked questions to each other prior to designing their first screens. Once they had a screen, they would move on to developing other elements, to increase difficulty. They built their games gradually and were often revising it and solving syntax problems. It was obviously a gradual process. Below are a few examples of the games they made.



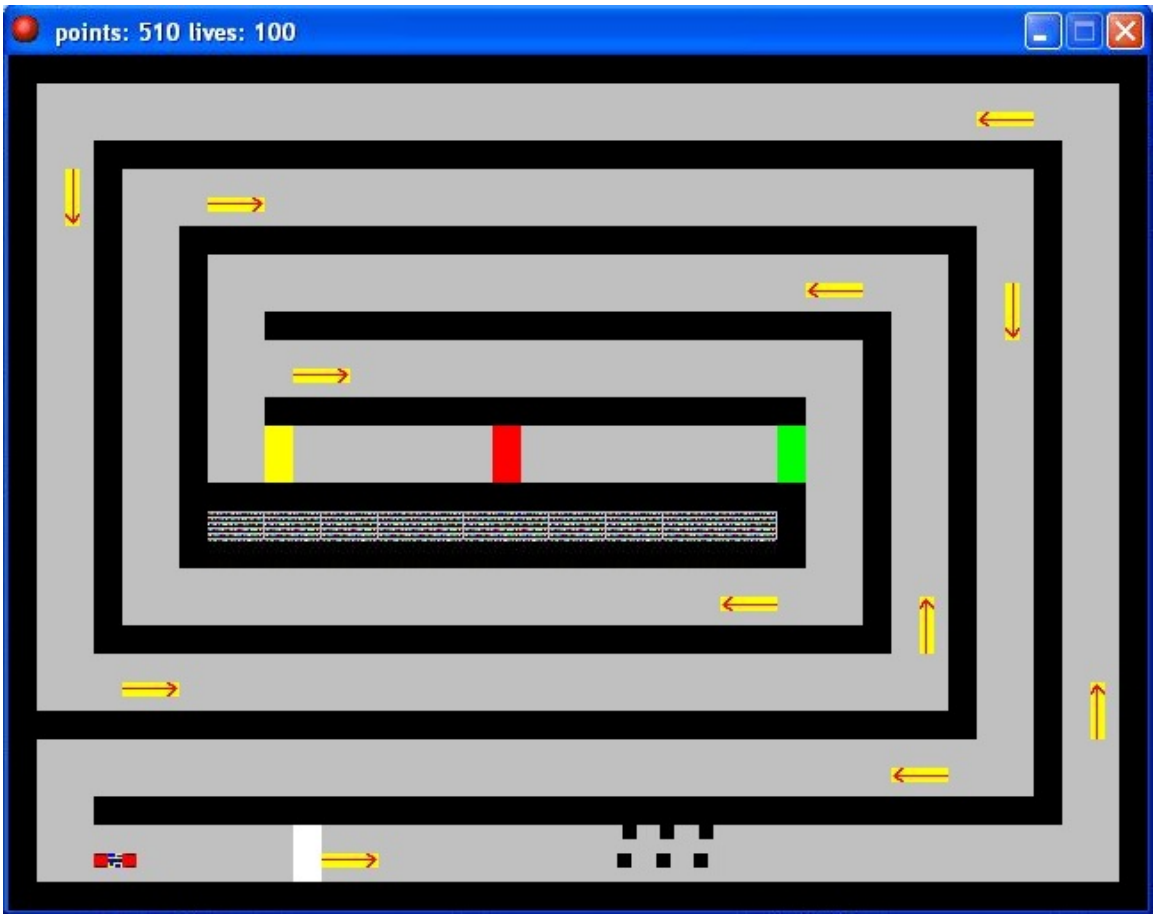
Screen shot from the game Pac-Man Revenge



Screen shot from the game Donkey Kong Pac-Man.



Screen shot from the Castle game.



Screen shot from the game NASCAR.

Screen shot from Night of the Ninja

Themes

This study had five themes. The themes were: User-design is achieved through authentic empowerment and ownership; user-design is a fun gaming experience; user-design is a participatory activity; user-design is a tool for problem solving; and user-design is challenging.

User-design is achieved through authentic empowerment and ownership

The idea that user-design is, or should be empowering and liberatory represents the essence of Banathyan user-design. According to Bela Banathy, learners should be able to ‘design within’ rather than being a small part of the ‘design by dictate’

community. Learners should have the power to design authentic experiences through creativity (Banathy, 1991). In fact, Banathy categorizes empowering experiences as an "ethical" approach to systems design due to a self-guided approach to art (Banathy, 1991). In this study, students had an active role when designing their games, a belief that constructionist scholars consider to be variable lessons (Papert, 1993; Kafai, 1995). The participants' responses indicated that their game design experiences were emancipatory and had different "flavors" of emancipation (Freire, 1968). Authentic empowerment, ownership and true partnership (Carr-Chellman, 2005) were a few flavors that appeared in this research study. There were several poignant accounts supporting this theme.

Several participants reflected on their experiences and reported that they had the freedom to design their own game. One of the participants, James, went even further to express feelings of authentic empowerment and ownership, two concepts repeatedly mentioned by Banathy (1991) as being crucial for real user-design to occur. Robert provided detailed descriptions about his design process.

> *I think it is pretty interesting. I really like being able to make it exactly how I like it rather than doing what someone else thought they would like. It's interesting the feeling of being able to do what you want. I am more empowered. You can do whatever you want to make it. (Tom, interview #1).*

> *Yeah, it is cool to see how you can just hit a few buttons and then it comes up on the screen. Then, like today, I was getting really getting in to it, putting stuff there like crazy and getting better and better. It gives you the ability to make the game the way you want and improve it and modify it in which direction you wanna go. I like that fact that it is your own game that you are making (James, interview #2).*

In two of his reflection papers, James provided more detail on how much power he had to create his games. His accounts confirmed my suspicions that he was indeed, in

charge of designing his own game. James rarely asked questions for the teacher or me, when I was at the classroom. I had the opportunity to observe James on numerous occasions and he was, for the most part, concentrated on designing his game, often trying out functions and making decisions of what he could or couldn't do in his game.

> *I have created other cars on set paths so that the user can race other cars. I have also made my game so that a race is three laps long. I also created another level for the user to race on but I have yet to add all of the computer cars. I made my game so that if the user hits the wall three times his car is destroyed and if he hits a computer car his car stops momentarily. This week, I may add boosters and other obstructions to the game as the user moves up the levels. So far in Gamemaker, I have experienced freedom to do whatever I want. I can create whatever I want whenever I want. I enjoy making games because I can see exactly what I am doing. I feel that I have accomplished a lot by using the Gamemaker program. I have already created a racing game and I am starting on a fighting game. Basically, I would have to say that my experience in Gamemaker has so far been awesome! (Reflection paper, James).*

Robert gave a descriptive account on how empowered he was in the process of design:

> *First I tried to do simple things (such as?) like making movement things to appear and stuff but then I thought about what I wanted to put into the game so I tried to create objects. After that, I planned a variety of things to do (such as?) multiple different strategies (yes), levels, point system, (u hum), I then did some customization (of what?) of characters (what else?) hmmm, a storyline. [elaborate on that?] In my game, I made very simple storyline but I ended up creating all the characters first and made them functional. My storyline progressed as I did it (Robert, interview #3).*

The participants had the opportunity to construct their own games (Kafai, 2006), which in today's educational system is rarely the norm. This is the case because of the teacher-centered orientation of our educational system (Illich, 1971). Our educational system has been, for too long, repressing students from being empowered and in charge of their own learning (McLaren, 1999). I observed the participants for a full semester

and part of why they could construct their own games in a timely fashion was due to the power given to them. I heard them saying in class how nice it was to be able to decide what they wanted to do and not being bound by anybody. On one occasion, James even screamed, “yeah, this is cool.”

In reality, Tom and James were not the only participants who indicated that designing their own games were empowering and emancipatory. Scott also provided several accounts indicating that his experiences were emancipatory as well. Scott reported that he had a high degree of decision-making power and was an active rather than a passive learner (Kafai, 2006).

> *When you are making your game, it’s your own. If you can, like figure it out a new thing to do, a new way to interact, you can. [so you really had the power to design?] yeah, that’s what I see (Scott, interview #1).*

Scott’s experiences could be understood by what Carr-Chellman (2007) refers to as authentic empowerment. He was reflecting on his own learning by trying to understand what he was learning (Kafai, 2001) as he was designing his game. It seemed clear to me that he was engaging in intellectual activities to explore his experiences so that he could develop a deeper understanding and appreciation of what he was learning (Boud, Keogh, & Walker, 1985). In class, he was often doing think alouds and “communicating” with the computer, which to me, meant that he was engaging in some sort of intellectual activity. Strong evidence that user-design resulted in a sense of ownership (Carr, 1996) was also expressed by another interview response given by Scott.

> *I don’t like being told exactly what to do at any time. I very much prefer to being [sic] able to do things my own way. It’s really. It’s really good like, hum... fun,*

> *different, empowering, like I said, it is fun to mess around with things and see how it works like, what you do... how you are able to affect whatever you are designing... in your own way and how you can make it essentially your own (Scott, interview #1).*

I wasn't surprised to hear that Scott disliked being a passive learner. After a month of classroom observations, I heard him telling his classmates how he liked to make decisions and being in control of his own learning. He even said in one instance that he liked to design his game his "own" way and that he would do the very best he can.

Scott's experiences coincide with Kohn's (1999) argument that individuals tend to hand in inferior work and have a false sense of obedience if they are cohered through rewards. He goes further to argue that when an intelligent person receives a few rewards, he instantly eliminates the possibilities that could really make an impact in his own learning (Kohn, 1999). His argument is certainly reflected in this quote by Scott because according to his words, he seeks more decision making to ownership. This seemed to be what Scott indicated when he said, "you can make it essentially your own." This, of course, is in alignment with Systems Theory (Von Bertalanffy, 1968) in the sense that a part of the system, in this case Scott, had as much decision making power as the teacher. From a systems point of view, this makes perfect sense because the whole is more important than the sum of the parts (Hutchins, 1996). The fact that Scott felt empowered about designing his own game should carry more weight than if the teacher should or should not delegate authority to Scott. Scott's experiences were empowering indeed. However, he wasn't concerned about his colleagues' feeling of empowerment. He seemed to enjoy telling others what to do. I perceived his interview responses as authentic but also surprisingly controlling.

> *Yes it's empowering... you just have other people that will be playing it and you know that so you are able to essentially make them think about how like what they are going to do and you can go through and think about how they are going to think about doing it and then stop... you can plan your next step or whatever so that they can think and follow that same path (Scott, interview #1).*

By the end of his account, he was already expressing controlling tendencies as a result of authentic empowerment (Carr-Chellman, 2007). I have to admit that this came as a surprise to me because Scott seemed to be a calm and democratic person, especially because I didn't get the impression that Scott wanted to control anybody's moves. Scott was a quiet person from what I observed. He did not talk too much but when he spoke, he was quite democratic. I did not hear him making any autocratic statements that would indicate he wanted to control others during my classroom visits.

Much of the research in controlling behavior, in fact, is associated with violence and abuse (Shepherd & Campbell, 1992; Merrill & Wolfe, 2000; Baldry, 2003). I tried to make sense of why he ended up wishing he could control other people's decisions, because he was far from being a violent person. Could it be that one of the most natural outgrowths of sincere empowerment in our society is the subsequent manipulation of others? I did not ask this particular question to the participants. However, I observed their experiences designing their games and participants would comment and visualize how people would play their games. Perhaps, they were all leaders who wanted to lead others. I was intrigued by his experiences and therefore, I decided to ask him again to explain to me why predicting the player's move was so crucial. He told me the following:

> *Yeah, like you can… ha just... like I said, essentially if you think through enough you can control what they think about what they are playing and... Whatever. and*

> *if your game is good enough you can control how they spend their time (Scott, interview #2).*

I wonder what Bela Banathy would have said about this participant's "collateral effect" of User-Design. Scott's lived experiences were quite unorthodox, even for Banathy, I would argue, perhaps, his controlling behaviors were a manifestation of his motivating leadership style. In an empirical study conducted by Tetrick (1989), the researcher investigated leader behaviors of 422 naval personnel and their supervisors and found that leaders' controlling behaviors significantly influence subordinates' perceptions about their roles in the navy. I would argue that Scott was perhaps trying to influence his game's future players by making it clear what he wanted them to accomplish because for the first time in his life, he had the power to make those decisions. Maybe, his decisions were partly based on his brother. His brother Scott led by example. He was often looking at his younger brother to see if he was concentrating in his game. Could it be that Scott wanted to reaffirm himself over his brother? In the C++ classroom, James was often looking at his older brother Scott, which to me meant that he was looking for assurance. Could it be that Scott decided to make controlling decisions because he felt that he was in control of his brother?

Mark, on the other hand, didn't reveal controlling or manipulative behaviors in the classroom. He did, however, emerge from being a passive to an active learner. I came to this conclusion because he would look at other participants for ideas and support, especially in the first few weeks. As he started to learn more functions from his classmates, he started to make more decisions, which eventually resulted in him being an active learner.

Mark's second interview responses were revealing to the overall theme of this subsection. He enjoyed learning through design, he felt self-empowered, and stated that he was able to control his own destiny. However, his previously oppressive experiences as a student become evident nearer the end of his account.

> *Oh yeah... I like doing it my way... Power of a lot of sorts, yeah...Power of your own mind. Do whatever you want. In this stage in my life, it is pretty different considering that basically living in school ... basically I have to do everything the way somebody else wants you to. I think it is cool to be able to do things for yourself not always had to obey orders and rely on people (Mark, interview #1).*

Mark seemed to agree that the educational system is controlling. Mark's lived experiences are in alignment with the work of McDermott (1999) where she states that there is a high degree of control in public education. She states that school districts are controlling and as a consequence, schools fail to influence students' creativity. In addition, she contends that the current educational system can be more democratic by moving away from centralized control over funding to delegating most authority to the level of schools themselves. Perhaps, what Mark was really expressing were his reflections about the reality of our current educational system and its philosophies, which could be argued to be controlling and centralized at both the district as well as the classroom levels. I interpreted his experiences as frustrating overall. Perhaps he wanted to be a part of a more democratic system of education but the realities of his circumstances were in conflict with his ideal system. It could be argued that Mark's experiences revealed discontent because he could not have a voice in the decision making process of his own education (Banathy 1991; Carr-Chellman, 2007). Banathy (1991) would argue

that Mark's responses were clearly an indication that the current educational system tends to be undemocratic or even advancing immoral practices. Although McDermott (1999) does not argue that controlling educational leadership practices result in immoral outcomes, she agrees with Banathy (1991) that they are in conflict with democratic principles. According to (McDermott, 1999), a truly democratic system of education should foster citizen participation in school leadership and provide an opportunity for equality rather than constructing hierarchies, which tend to result in privilege and inequality.

I also interpreted Mark's comments as a statement of discontent with the current educational system. Mark was seemingly indicating that in order to advance in his educational career, he had to "do what others tell you" which in our current system could mean pay attention to the lesson, study and take a test to prove me that you have learned. Reigeluth (1999) would categorize Mark's accounts as expressions of students living in the industrial age paradigm, where school is a place to test and see if you could learn with an emphasis on norm-referenced education and assessment. Perhaps, Mark was discontent because he suspected that he lived in the age of information where he needed the ability to think, learn and adapt, in order to "make it" in the current society. Ely (1990) categorizes this change a paradigm shift, and argues that society is changing and therefore, our schools should also change. This has been a concept that several scholars have argued (Banathy, 1991; Carr, 1996, Reigeluth, 1999)

I admit that the more that I heard, talked, and observed students' being user-designers, the more I remembered a Native American proverb I read in one of Bela Banathy's articles, "Tell me and I will forget; Show me and I might remember; involve

me, and I will understand." Perhaps, the proverb should end with "and... let me design and I will create."

Robert described his lived experiences doing user-design as authentically empowering and prone to result in creative outcomes. He held the belief that power goes beyond an open invitation to be "heard" in the design process. James's experiences were in alignment with Robert's with the distinction that he could visualize the implications of his own gaming experience.

> *I feel empowered to design, yes.* I feel I can go in any direction I want, and that's what I mean. *You are able to express your creativity. You are able to do whatever you want and be able to and ha, you are in control of what you do. Yeah, you could be very creative (Robert, interview #3).*

> *Like, to learn how to make different things would be like… if you were able to make so many things that would produce the amount of what you have to buy and stuff. You can make your own stuff. Like, people buy their own plant?… but their own plant's pot … it is like making your own plant or whatever (James, interview #2).*

Several participants indicated that their experiences were empowering and allowed them to be creative. Empowering to them seemed to be the ability to make decisions without approval from anybody. Bisson and Luckner (1996) state, "Enjoyment and fun as part of the learning process are important when learning new tools since the learner is relaxed and motivated and therefore, more willing to learn" (p. 108). This seems to fit my study's findings because the participants' learning through design (Papert, 1993) seemed to indicate that user-design was a fun activity.

User-design is a fun experience

Participants were enthusiastic when designing their own games at the Clarion Area High School gifted C++ class. Other scholars have argued that students tend to have fun when designing games (Hooper, 1998; Koster, 2004). I heard several students talking to each other in class saying that they were having a great time because they could be creative. At one instance, James said, “Man, I call the shots… I am going to create a car game.” From a constructionist perspective (Harel, 1988; Kafai, 1993; Resnick, 1994), children tend to create their own projects and express their creativity through design. This seemed to be the case in my study as well.

A possible explanation for this finding might be due to the fact that students were active participants of their own learning (Banathy, 1991), a notion that the current educational system rarely adopts. Scholars have argued that the current educational system often sees pupils as repositories of factual knowledge with limited ability to influence their own learning (Damarin, 2001; Wagner & Mccombs, 1995). Perhaps by limiting students to a role of receivers of knowledge and stopping them from influencing their own learning results in prevention of over-education. This, in fact, has been a major problem in U.S educational history since 1889 when William Harris, then commissioner of education said, “Our schools have been scientifically designed to prevent over-education from happening… The average American [should be] content with their humble role in life, because they're not tempted to think about any other role” (Harris, 1889).

I interpreted participants' experiences as being fun perhaps because the traditional school system might be boring, discourages creativity and rarely delegate power to students (Mclaren,1999).

In a brief yet critical account, Robert described his experience as fun because he had the power to design his own game. In another interview, he went further and stated that his experiences were fun because he applied mathematical concepts to fit his own needs. Perhaps, what he really meant was that empowerment allowed him to express himself (Hooper, 1998). In fact,

> *Haaa... I felt good about designing those games. It was a very fun thing to do, I mean... you are designing games... haa, I like being able to make the choices and making the game the way I want it (Robert, interview #1).*

> *It was pretty fun and... since I could use mathematical formulas to find out exactly how far it would go since I had to calculate the distance (Robert, interview #1).*

Robert was probably also making an association between user-design and formal school learning. This is another interesting finding to report because scholars have stated that it might be possible to transfer or associate particular experiences to real life practices if the individual is encouraged to reflect about his own learning in the process (Papert, 1998). I interpreted that Robert was reflecting on his own learning and tied his reflections to other real life activities he had experienced. Perhaps Robert realized that creating and playing his own game could be tied to other experiences. Several gaming scholars have indicated that the knowledge and experience that players gain by thinking about games are transferable to other contexts and domains (Gee, 2003; Hornyak & Page,

2004; Prensky, 2003). Robert's comments seemed to confirm the theoretical assumptions of these scholars.

Robert wasn't the only one who found that creating a game was fun. Several participants reported similar experiences. A possible explanation could be due to participants' true ownership accounts (Carr, 1996). I heard participants repeatedly talking about their games and how they thought their games were cool during my observations. Part of why their games were "cool" could have been because they were heavily invested in making decisions about how the game was going to look like. In fact, I would argue that this was the case because of their power to design (Hooper, 1998). I am not sure if their comments would be so positive if somebody else were making their games' decisions. I caught Robert making several attempts to make his game more sophisticated during my interviews.

Tom's experiences indicated that he had full decision-making power (Carr-Chellman, 2007), which resulted in a true grass root activity, which is certainly a reflection of true user-design and in alignment with "bottom-up" software design approaches (Jeffries, Turner, Polson & Atwood, 1981; Newell & Simon, 1972).

> *Well, I first started programming last year and I designed one game, so it was not different this year but it is definitely enjoyable. I like being (uh hum) able to... I just like programming a lot because I like those computers so... (uh hum) and how they work ... and to be able to create my own programs to fit my needs. (Tom, interview #1)*

It wasn't clear to me if Tom found his experiences "enjoyable" because he liked programming and computers or because he liked to design his own game. Tom had

extensive opportunities to work with a PC, however. Regardless if he found enjoyment in programming or designing, it is likely that he was constructing his identity (Turkle, 1984) when creating his game. Perhaps, Tom's experiences were fun because he felt that traditional education inhibits creativity; Also, because traditional education tends to inhibit student emancipation and often treats students purely as *tabula rasa*. Duffin (1998) eloquently puts:

> *"One type of teaching technique a traditional technique overrun with chalkboard lectures and unenthusiastic teachers. This uneventful classroom structure forces students to act like the receptacles Freire described in "Pedagogy of the Oppressed." Now, students function as trash-cans for a teacher's input. Children do not express or think for themselves anymore. Today's students only know how to act subservient to their teacher's will" (p.1).*

Proponents of user-design warn educational reformers about the negative consequences of purely relying on expert opinions and seeing the world as a machine (Banathy, 1991; Carr-Chellman, 2007). I interpreted Tom's experiences as fun because he had the power to decide and create his own system rather than having to obey orders and agree with what others perceive to be good design. Tom had his own quality standards. I heard him saying "my game rocks." From what I observed, good design for him meant having a systematic game, starting with a welcoming screen, instructions, a clear storyline and so forth, as long as he made the decisions.

Fun meant something different for James. He described his experiences as fun because he had the decision-making power and because his overall designing experience was challenging.

> *Yeah… yeah, yeah, it was very fun designing my own things. Yeah, you could be pretty creative (James, interview #2)*
>
> *Yeah, now I have a sweet game. I think it was rewarding but it was ha, challenging at the same time and it was rewarding because I did it all. I think yeah... I think I was less reliable to asking others to help (James, interview #3)*

Having the power to make game is probably challenging because it takes time for individuals to design what they want and tends to be a rewarding experience due to ownership that is built (Carr, 1997). In fact, scholars of User-Design have argued that "struggle" is part of the user-design process (Banathy, 1991; Carr-Chellman, 2007) and that user-design brings a sense of ownership (Carr, 1996), responsibility and accomplishment. Carr-Chellman (2007) has suggested that in addition to its benefits, user-design is also often inefficient and difficult. My study confirmed her theoretical accounts. In reality, design is difficult (Norman, 2002). Different from Hooper's (1998) study with 'Keanna' where she found that her contributions and accomplishments came out of continuous support and difficulties with Logo, the students in my study had no assistance from the teacher and, not surprisingly, they also experienced challenges with the tool.

James's lived experiences did not indicate, however, what he meant by challenging. Perhaps, challenging for James meant being empowered to design what he wanted to. It was, perhaps, a difficult task because our educational system does not necessarily encourage this high level of responsibility (Giroux, 1992). Taking the power away from the teacher and giving it to the students requires a major shift in power dynamics, and mindsets as Carr (1996) would put. For this to occur, public education needs extensive reform (Gatto, 1992). Our current educational system was not designed

to let students purely create their own experiences or select their learning goals, and critically analyze the capabilities of particular software. No wonder James reported that user-design was both fun and challenging. James did not express that creating games was challenging in the classroom but in one of my visits at the high school, he stated that using some functions in Gamemaker were tough to use. The fact that James had to deal with technical issues, e.g., Gamemaker limitations and bugs, was what he also meant by challenging, even though he did not indicate that this was the case.

Other participants also indicated that user-design was fun. As I was hearing the experiences of the gifted students in *vivo*, I started to think and reflect about what theorists of user-design have been telling the educational community for years. Why can't students be more involved and affect their own learning? (Jenlink, 1995; Reigeluth,1993). Scott's accounts were not different from Robert and James.

> *I like it. It's fun to change things around and see how it affects it. It's really good like, hum... fun, different, empowering, like I said, it is fun to mess around with things and see how it works like, what you do... how you are able to affect whatever you are designing. It is just fun to go and play it myself and change it to make it better, whatever I can. It was an adventure (Scott, interview #1)*

Scott is describing his user-design experience as fun because he could relate it to his own learning awareness. Different from early research on learning that was dominated by behaviorism where results were limited by observable behavioral outcomes (Brockbank, Mcgill, & Beech, 2002), several modern theorists promote the concept of reflection as essential for learning. According to Dewey (1933) reflection is a process by which learners construct meaning from the experiences and interactions with each other. Learning is more than simply attending events. Perhaps Scott's experiences designing

his game indicated that, indeed, the best way to learn is by doing (Schank, 1999). Perhaps, Scott was, through his project, gaining awareness of his own learning activity.

During my observations, he was constantly trying out new functions and using trial and error as his strategy. Scott was constantly modifying rooms, in terms of pixels, and creating sprites.

Mark also indicated that his user-design experience was fun. Similar to Robert and Scott, Mark was able to make decisions but tended to see the idea that others would use his game as joyful than manipulative.

> *Yeah, hmmm, essentially it is really fun to make so that other people will like it just as much as you like making the game. Just really cool to feel likes someone else like your... something that you made... by yourself. For some people they want to make their own things for other people want to try our things that other people made. There is an essentially different type of people involved. Let's say... Yes, an adventure Yeah, it's fun, it is fun making stuff in general... making the game is fun (Mark, interview #1).*

Mark expressed his experiences as fun in a distinctive way. He described it as being an adventure. A possible latent meaning for his unique response was that being a user-designer was fun because he could play, design and redesign his game without needing to ask the teacher for approval. A likely manifest meaning could have been that he realized that "adventure" meant difficulty and emancipation. Students are rarely in charge of their own education (Banathy, 1991) and emancipatory practices (Freire, 1968) seem to be a utopian concept in the current state of affairs of the U.S's educational system. Yet, Mark described it as an "adventure." I often wonder why schools tend to be so anti-liberatory (Giroux, 1992). Perhaps, educational reformers should consider

listening to stakeholders' voices prior to imposing piecemeal reform attempts (Carr, 1996). Perhaps, "adventure" meant frustration to Mark. Tom also reported that his experiences were fun and enjoyable. Fun, for him however, meant freedom of expression and creativity a finding that both Papert (1996) and Hooper (1998) identify.

> *Yeah… definitely, it's just…hmmm, whatever you want to do is just expressing your creativity. Whatever you want it to do. Yeah, it's hmmm… It's simply fun to just make something like a program or whatever to do what you want and then… it just feels good (Tom, interview #2).*
>
> *It is cool to be able to control the computer and allow it to… allow yourself to create whatever you want… hmmm, be able to use it whatever you want. AND, there aren't really any limits as to what you can do. Design is making off to me... thought that do really count (Tom, interview #2).*
>
> *"It's really a pretty good experience all together. Everything I can think of, I like about it" (Tom, interview #3).*

With so many positive user-design responses, I was starting to question if the participants disliked anything about designing their own games (Banathy, 1991). I ended up finding out that there were challenges, indeed. Carr-Chellman (2007) previously stated that user-design is difficult, inefficient, and probably not the best model to be used for non-systemic problems. A more detailed discussion on the challenges of user-design will come after the next section.

User-design is a participatory activity

The participants in my study had the power to design their own games (Carr-Chellman, 2007) and their design reasonings were shared between themselves and the teacher (Chin & Rosson, 1998). They were not simply informants in the design process

(Chin, Rosson, and Carroll, 1997). They were involved, engaged and had a stake (Chin, Rosson, Carroll, 1997) in the design of they own games, which according to the scholars are traits of participation. They were not required to seek assistance from their classmates. However, they helped each other throughout the study, which to me meat that the participants had a well-defined problem that could be accomplished in a reasonable timeframe (Pea and Hawkins, 1987), they had enough status to recognize that each participant had strengths in a certain area, and power, which allowed them contribute, take positions and make decisions (Kensing & Munk-Madsen, 1993). However, their level of participation wasn't equal because not all participants were fluent enough with Gamemaker, which resulted in some being 'backgrounded' (Chin & Rosson, 1998) because of lack of technological skills.

From my observations of how they designed their games, it seemed that they were forming a community of practice (Wenger, 2002). According to Wenger, communities of practice can be understood as groups of people who are passionate about a particular activity and learn to improve their abilities as they interact with one another. In one of my visits, for example, I had the opportunity to observe James interacting with Mark in one of my visits at the C++ class. James asked Mark if his car game should include shooting capabilities. James initial reaction was of disagreement until Robert decided to elaborate on his response. Robert pointed at the computer screen and explained how a NASCAR game with shooting capabilities would be better; Shortly after, both Robert and James were talking about the pros and cons of having a shooting NASCAR game, which to me meant that they were having general discussions that lead to a richer view of Gamemaker features (Chin, Rosson & Carroll, 1997), which perhaps,

improved their interests about Gamemaker. This made me believe that they both were passionate about having the power to create their own games and that both had input in the decision-making. The next time I saw James' game, it had shooting capabilities, which also made me believe that he learned something from his interactions with Mark.

One of the participants, Tom, reported low levels of participation throughout the study. He had to ask for technical help (Chin & Rosson, 1998) in order to design his game. Tom understood the value of having his colleagues who are as passionate about having the power to design games as he did, and how they can offer significant inputs that extension of their designs but his limitations with technology impacted his level of participation.

> *Robert was working a lot with gravity, so, when I went to work with gravity or when he went to work with different random movement, we helped each other on that. It usually works out (Tom, interview #2).*

> *It is definitely different in the structure of the class. Well first I use, I try to make the game pretty simple at first and then, I go and I modify it step by step and I see where I am going with it. Yeah. We help each other a lot (Tom, interview #2)*

Brockbank, McGill, and Beech (2002) stressed the importance of being engaged with others in a social environment to improve one's learning. The scholars argue that by collaborating, learners have the opportunity to think about their own performance and identify the systematic process that they engaged in. Gargarian (1996) identifies early phases of design in the musical domain where there is no data on which designers can build confidence. The scholar goes further to state that composers often investigate

musical artifacts from other composers to help their designs. This seemed to be what Tom was referring to when he reported that he could get "help from others."

Scott's remarks were similar to Tom's. It appeared to me that Scott's experiences designing his game were participatory because he could receive help from his classmates in a shared environment with common terminology (Chin, Rosson, Carroll, 1997). He had support to demonstrate his creative expressions through alternative epistemologies, as Hooper (1998) argues. In the end, however, he made a comparison between his lived experience designing his game with the reality of the current educational system.

> *Yeah... in C++ you can it's more an open type of thing that you can do whatever you want, share with everyone else and ask them for suggestions on it and you can chose to use the suggestions or not if you. If you are in another class where the teacher makes a suggestion, you better follow it because it is probably the best thing to do (Scott, interview #1).*

Mark indicated that a participatory approach to game design was beneficial. He was often engaged and had a stake in what he was doing (Carroll & Rosson, 2003). I came to this conclusion because I rarely saw him playing around in the classroom when he was designing his game. He has enough access to information to help him with his tasks, including his classmates. He was from the position that allowing a bit of control and co-design wasn't bad. Mark also found guidelines useful, which was quite intriguing because, at the same moment, he disliked being controlled. This, in fact, seemed obvious from my observations of Mark. He was often asking questions about his game to other participants. He once asked for help on how to use the gravity function to make his game character jump. Scott helped him with this. He smiled and a few minutes later, he proudly showed his game to the teacher and told Ms. Shoemaker that Scott

helped him. I believe he did this because he wanted to tell the teacher that making all the decisions by himself wasn't an easy activity. Perhaps, he was arguing, indirectly, that some guidelines would be beneficial.

> *Well, the guidelines wouldn't be that bad to have as long as it does not say how I have to get to the end point. I guess it is because I don't like being controlled (Mark, interview #1).*

Mark was a bit more direct in his request for a guideline, which made me believe that his experiences were somewhat participatory. Perhaps he recognized that he had the power and the status to make the decisions but having some scaffolding (Collins, Brown, & Newman, 1989) would be useful. Hooper (1998) also found in her constructionist study of 'Keeana' that most projects in her research were completed with assistance from other children. Mark seemed to agree with the findings presented by Hooper.

> *You do your own thing… taking some ideas from other people, getting advise from other people... Quite different, yeah. I would say, some guidelines but not completely (Mark, interview #2).*

Mark extended his experiences and explained that access to relevant information (Chin, Rosson, & Carroll, 1997) played a major role in his experience. In one of his reflection papers, he mentioned that he provided assistance to other classmates.

> *During my empowering experience of game make so far, I have received some aid from my colleagues, such as Robert's idea to put my mine counter as lives and my lives as health which has been entirely successful. Scott game me the incredible idea to steal stuff from Pac-man (Reflection paper, Mark).*

It wasn't surprising to hear that Mark was giving credit to his colleagues. According to my class observations, he seemed to be the most eclectic, outgoing but yet, dependent on others. He was part of the gaming generation. In fact, all participants are part of the gaming generation (Papert, 1993). According to Bowman (1982) digital games can serve as agents of socialization. This seemed to have happened in this study with the exception that the participants were starting to become a formal design gaming community of practice. While they did not begin with a common language or a set of codes that they only identified, they were clearly interested in the practice of game making and they certainly engaged in joint activities, discussions, interacted and learned together to achieve a common goal. From what I saw in the classroom, they engaged in problem solving, sought expertise, and they informally documented some of their project decisions (Wenger, 2002). In one of my visits to the C++ class, I heard James asking Scott about how to use the gravity function. Since Scott had helped Mark with gravity previously, he said out loud that he helped others with a similar problem and that James should pay attention and learn it once and for all. To me, they seemed to be a game community, which had the practice of game design as their trade. Shaffer et al., (2005) have said that, "Game communities bring together ways of knowing, ways of doing, and ways of caring. Effective social practices, powerful identities, and shared values that makes someone an expert" (p. 33). Perhaps, having peer support made all participants experts in a certain area. This could be the reason why Mark supported some guidelines in the design process. Another possible explanation why Mark seemed to want guidelines was because of the current assumptions imposed by our educational system. When students attend a class in public school, there is a set of guidelines given by the teacher to

accommodate the capitalist nature of the U.S society (Bowles & Gintiss, 1976). Without them, some learners feel unmoored.

Perhaps, having the power to design a game was difficult for Mark because he is used to being told what to do in his classes. It was possibly also why he perceived his colleagues to be of great help. Hsiao (2007) seems to believe that being an active participant in game communities assists others to learn from one another.

James was more descriptive than his counterparts in how and why his colleagues helped him to complete his tasks. He even mentioned how Robert played a major role in assisting him when designing graphical interfaces.

> *Yeah… Well, if someone is stuck on a problem, a lot of times everybody would look at it a try to help to solve it. Like, when I first came in, I didn't even really know what to click on first to like, to create a sprite or… an object, and then they just need to click on the buttons on the top to get… to create an object… to create sprite… then after that, I find out stuff on my own. And, today, I know how to draw a path and nobody knew that before I knew it then (James, interview #2).*

> *This week, my fellow classmates helped me a lot. Robert helped me create a background for my upgrade/ammunition screen. Scott helped me to figure it out how to fire weapons. I have helped others learn how to create a path and a timeline (Reflection paper, James).*

Throughout my study, I rarely heard students asking the teacher for help. Ms. Shoemaker was requested a few times. However, participants' preferred asking questions to other students. It seemed evident that students were in control and that the majority of questions were answered by the students. I interpreted their behaviors as a clear sign of a shift in power dynamics (Carr-Chellman, 2007) and recognition of mutual "expertise" among the participants. Being an active participant in game communities assists users to

learn gradually from each other (Hsiao, 2007). Indeed, James benefited from his game community as others benefited from his inputs and suggestions. Robert was the only participant who preferred asking Ms. Shoemaker for assistance but nonetheless, he frequently consulted his peers for advice as well.

> *I like to be able to consult with other people sometimes since they are trying to make a different game and they have already dome something that I need to do at times so I would be able to ask them for some help and also ask their opinion on my game or I would ask Ms. Shoemaker (Robert, interview #2).*

Robert went into more detail about how he received assistance from his colleagues in his written reflection. At this point, I was convinced that the participants were helping each other out and that my class notes were accurate.

> *Throughout my Gamemaker programming experience, I have given and received a good amount of help. The first help I received was when I tried to make it so only one part of the game was displayed on screen at a time. I couldn't make the screen follow the player's object so I asked a fellow programmer that had already done it for help. From a different classmate, I got help making paths because I could not find out how to make the path in the proper positions. From the third student making games with Gamemaker, I received help in trying to find out how to make projectiles because he had been experimenting with them for a couple of days (Reflection paper, Robert).*

> *I found out how to make my game in one continuous screen with the help of Mark so the game is more fun, and discovered the number you place in the gravity function to make the gravity pull down (Reflection paper, Robert).*

In an informal occasion, Ms. Shoemaker told me that Robert was an "A-student" who understood the system. Perhaps, Robert asked his teacher for help because this was the system he knew and he suspected that asking her was the most probable way to good grades. Fullan (1999) tells us that we should look at change with open arms and we

should treat change with a positive attitude rather that believing it is the enemy. I would argue that Robert was probably resistant to change because he's been successful in the existing system. This could have explained why he preferred asking Ms. Shoemaker for guidance over his colleagues.

User-design is a tool for problem solving

Scholars have said that user-design is the engagement and empowerment of users to design their own systems (Banathy, 1991; Carr, 1996), that user-design is not to be confused with user-centered-design (Hurley, 1980), and that in order for authentic user-design activities to occur, a major shift in power dynamics must occur (Carr, 1997; Reigeluth, 1999). User-design is a model (Carr-Chellman, 2007) that can be used to solve ill-structured and systemic problems. This section of my study presents a novel dimension to the literature on user-design. Although one can argue that User-Design (Banathy, 1991) can be used as a tool to solve problems at a macro level, e.g., an educational system or as an avenue for systemic change (Carr-Chellman, 2007), I found that user-design could also be helpful in small-scale problem solving. There were a multitude of accounts among participants in this study that suggested that user-design was a problem-solving tool. Two of the participants' experiences included accounts pointing to an association between problem solving and user-design. Based on my observations of Tom and Scott, they were solving problems to seek recognition from their peers.

> *Well, its nice to be able to think through your troubles when designing games and try to solve them. Ha, it probably helps me with like, some reasoning skills… some problem solving too (Tom, interview #1).*

> *I think it helped me with problem solving... ha, in the way that if say your game is not working it right you have to go through it figure it out what was wrong and solve the problem. I think it helped me with my problem solving skills (Scott, interview #3).*

This result might be a surprising finding for user-design scholars. However, gaming scholars have been reporting that problem solving is a consequence of game playing and design for some time (Katz, 2000). Prensky (2000) suggest that game playing might assist with kids problem solving and critical skills. However, the motive for why designers solve problems isn't clear. It appeared to me that players reported that their experiences resulted in them solving problems because they had to figure out possible solutions either by asking classmates or through trial and error so that they could come up with a superb design and be competitive with one another. This possible conclusion has theoretical justification. Prensky (2003) called this kind of learning "discovery learning" which he defined as learning the ability to solve problems and searching the data for clues. From what I saw in the classroom, this was indeed what the participants did.

Tom and Scott were not alone in reporting that user-design was a problem solving tool. In a third interview with James, he stated that individuals could solve problems through empowerment and that user-design could be conceptualized as a tool for problem solving.

> *You can use to solve problems and stuff like that. You can make it a calculator or make solve like certain problems (James, interview #2).*

James also reported an experience where he had to critically analyze a situation and overcome challenges through problem solving, when designing his game. It was

evident to me, as I was observing him, that he was able to solve problems and reason with ease. James placed his hand on his chin and scratched his head. He was constantly "thinking" about how to make his game work. These were just a few behaviors I observed as he was designing his game. Perhaps, he was trying hard to make his game the best to gain prestige among his classmates. He also provided the following account:

> *But like, but if the computer, like if I can't make the computer do something, then I try to strategize and think out and solve that problem and make it work. Hmmm, well, I guess definitely, I would say, helps you to problem solve, like… it helps… I seems that C++ helps more with math without completely understanding but Gamemaker helps you more with like, your like, problem solving skills (James, interview #3).*

His descriptions of these experiences were similar to what he reported in one of his reflection papers and from my observations. He was often focused and interacting with the computer. He would ask others for help only if he needed it. I suspected that James didn't want to keep asking questions to his classmates to avoid making him inferior to them. However, he was the type of designer who would think through his problem first. In fact, he reported the following experience in one of his reflection papers. He basically figured out, for himself, how to fix a complicated scoreboard issue. In James's case, problem solving expressed in his reflection papers could be an indirect way he was communicating with his teacher that he deserved some sort of recognition. Perhaps, this was why he provided this level of detail in one of his reflection papers and not in the interview.

> *I am going to make more puzzles and allow the user to choose if they want to do easy, medium, or Hard Puzzles from the start menu. I have also recently figured it out how to make it so that the player can't change the original numbers that were displayed on the board at the start. When I return to school, I will bring in my game on a flash drive to show you (Reflection paper, James).*

Clegg (1991) theorizes that the context in which games are developed is a better predictor of learning than the game itself. Perhaps, because James was in an environment where he was fully immersed and had the power to design his own system, he could reason and solve problems. Squire (2004) argues that when students create games with Sim software, e.g., SimCity, students tend to think more deeply. Reiber (1996) also argued that games assist students in producing play through manipulations or playing games. Gredler (1996) raised an important question when asking how educational technologies should use games to foster learning. Perhaps the answer is through constructionism (Papert, 1993) and user-design (Banathy, 1991). This is a small suggestion that User-Design has powerful impacts on responsible learners with aroused minds. Because the participants had aroused minds, they were inquisitive about learning the capabilities of Gamemaker, which consequently resulted in informal learning.

Other students also indicated that user-design was indeed, a problem-solving tool and that it assisted them with reasoning skills. Tom reported that user-design helped him to think logically and solve problems. He even provided two concrete accounts of what he meant by user-design being a problem-solving tool. What he didn't do was to indicate why user-design was a problem-solving tool. Robert was a perfectionist. It was evident to me that his game had to be stellar. To me, his way of designing the "perfect" game was to

mastering all Gamemaker functions and user-design was the means by which he could make this happen. In the end, it was a matter of competition.

> *I think it is rewarding because it helps me to think more logically and to get around… like ha, if I, just today, Ms. Shoemaker ask me if I wanted to be in a math competition since we are in programming so we use logic… we have to be able to think logically in order to solve problems (Robert, interview #2).*

> *Yes, it does help with problem solving skills; maybe not as much as with C++ but still. It help you think things through ahead of time to see... to try to see if they work (uh hum) and you really have to try to understand what the different functions do in order to make your games work (Robert, interview #3)*

Robert talked about how creating games helped him with his problem solving skills in one of his reflection papers. He found the answer to a small but critical problem. To me, the reason why he was solving problems was because of competition. Of all participants, he was the only one who asked my opinions of what constitutes a great game, which made me believe that he was using all his resources to come up with a competitive game.

> *I found that the problem was in where I was putting the image; I had thought you were supposed to put the image in the same folder as the program but discovered that the JPEG is meant to be put in the same folder as the project. After I found this out I started inserting images on my game from last year called Pakman Planinum (Reflection paper, Robert).*

As I was hearing participants repeatedly indicate that user-design was a problem-solving tool, I had to relate to an old study conducted by the Cognition and Technology Group at Vanderbilt (1992). In an empirical study conduced by the group, they found that

students who learn algebra through problem solving tend to solve more problems than if they were taught through traditional means. My study's participants were solving problems through design. Could it be that they were better problem solvers because they were being empowered? (Freire, 1968) Of course, this is a topic for another study. What seemed obvious to me was that the participants were invested in their own game creations and had the power to make decisions. Two months into the study, I observed a participant thanking his classmate for his assistance but in the end, he said "it is my game." Prensky (2001) argues, like Banathy (1991), that it is moral for kids to develop games because they are unlikely to respond to traditional instruction. This was also an argument made by Katz (2000). Perhaps, "moral education" could result in students being better problem solvers. Tom explicitly indicated that user-design was a trial and error tool that helped him to design his own game.

> *Because I figured that if I had to put everything on paper at once, and you try to ha, put it on the screen, you might have errors with it and you wouldn't be entirely sure where they are and where you should go, step by step on the way to planned to. I use trial and error a lot. I usually do my game all in Gamemaker I don't do much typing up much (Tom, interview #2).*

El-Nasr & Smith (2006) argue that, "design activities provide meaningful engaging contexts for students to explore skills and concepts and understand how they can be applied in the real world" (p.2). They also argue that, "when people engage in constructing products, they are personally meaningful" (p.2). Perhaps, Tom was solving problems through trial and error because he was given an environment to explore his own skills and better understand how it applies to his own life. Because Tom was in charge of

designing his own system (Banathy, 1991), it could be argued that the experience was personally meaningful for him. This meaning making could theoretically produce both powerful learning environments and more investment in learning outcomes or by-products of responsibility and empowerment. Perhaps Tom was doing what Kafai (1994) argues in one of her earlier papers; when students are given the chance to develop their own games, they create, evaluate, and revise their designs constantly. I would argue that Tom's trial and error activities were part of the create/evaluate/revise design process and the reason why he engaged in trial and error activities was because he was in a positive design environment.

Challenges of user-design

User-design is difficult, time consuming, and inefficient (Carr-Chellman & Savoy, 2002). In fact, design is difficult as an enterprise. Scholars at Carnegie Mellon University have said that design Human Computer Interaction interfaces are difficult because of graphical design issues, performance, multiple levels of detail, and lack of guidelines (Myers, 1993). In the 'design of everyday things', Norman (2002), provides several reasons why design is difficult, first among them the idea that "to err is human" (Norman, 2002, p. 105). Norman argues that most modern products are too complex, demand too much time and yet, they need distinctiveness. The scholar also talks about the challenge that we can't design for the "average person" (p. 161) because the one-size-fit-all mentality does not work when a significantly large amount of individuals are expected to use the product (Norman, 2002). Another reason why design is difficult is because most designers are not users (Norman, 2002). Kafai goes further to state that "Conventional

school assignments rarely give students the opportunity to spend six months on a complex project such as making a game" (Kafai & Resnick, 1996, p. 71).

Therefore, challenges should be expected, especially in terms of design. When I started my study, I had a bias about user-design. I thought that giving power to the users alone would result in absolute satisfaction, regardless if the participants were going to experience technical and/or design problems. Perhaps, my naïve belief was a result of my own experiences as a student in Brazil. My educational experiences could be categorized as first generation education (Banathy, 1991). They were, for the most part, what I call "mandated education." During the course of this research study, students repeatedly reported in interviews and in their reflection papers that User-design wasn't a perfect model and that they encountered challenges, especially technical problems. Different from other similar constructionist studies (Hooper, 1998) where the researcher helped the participant 'Keanna' to use the Logo language to design, my study's participants took almost complete control of their own designs and "taught" themselves the necessary concepts to design their games. This fact in itself is a major challenge because most students have little experience in design, i.e., planning, problem solving, researching, dealing with time constraints, modifying expectations, and bringing everything together into one project (Norman, 2002). It is true indeed that the software itself prevented the participants from being fully empowered, but they were in charge of their own designs, which mean that the participants had some form of power.

At first, participants were not aware of the constraints that Gamemaker posed on them. At least, I did not hear them complaining about the limitations of Gamemaker in the beginning of the study. A possible explanation for that is because they did not know

what they wanted to do, in the first place. Gamemaker became, later in the study, an obstacle. They were empowered but yet, Gamemaker limited their power. Participants faced both technical problems. A few months into the study, I realized that the user-design model was not a panacea. The evidence, at least in the C++ gifted class at Clarion Area High School, was clear-cut. As an open-minded aspiring scholar, I have to admit that I changed my mind throughout this dissertation. I am not as biased as I once was against the challenging aspects of user-design because of the overwhelming challenging interview responses given by the participants.

One of the participants, for example, provided a brief yet powerful account about the challenges he experienced when designing his game. Tom and Scott had both technical and design problems. Creating a game, even for students with an average IQ of 130, wasn't a simple talk. Part of the problem was due to tool limitations and because design is difficult (Norman, 2002). Gamemaker Lite did not offer all tools available to design. I heard students complaining about the how they could not do exactly what they wanted because the software did not allow it. This might explain why most participants ended up using similar sprites and their games incorporated concepts of gravity, simply because it was available. Tom, Robert and Scott indicated that there were technical limitations when designing his game.

> *...Because you are still limited by the capabilities of the computer and the teacher that is teaching (Tom, interview #1).*

> *I don't think I can make anything but... [Do you like to design your own games?] Yes, very much Just because I can do whatever I want and... Well, its nice to be able to think through your troubles when designing games and try to solve them (Tom, interview #3).*

> *When you are making your game, it's your own. Essentially, you might be limited by like, what you can do with the tools you are working with (Scott, interview #1).*
>
> *Power to control the game but not completely. When designing sprites there was that you could not create anything but a square sprite or rectangle so didn't have a curve edge ever yeah. Power is control over som aspect of something. I had control of most aspects of my games, yes (Robert, Interview #3).*

Although they had the power to design whatever they wanted, they were still dependent on the tools given. Therefore, building external artifacts, such as a game (Papert, 1993) was difficult because of technological impediments. Tom wasn't completely clueless about Gamemaker. He entered the study with a limited knowledge of Gamemaker. For this reason, perhaps, he was able to identify Gamemaker's limitations early in the process of design. During my observations, I heard Tom say, "I can't believe it. I can't use this function."

Kafai (1995) argued that constructionists have focused their efforts on allowing students to construct their own games rather than embedding lessons in the games with the belief that students would construct knowledge patterns in the process. I would argue that having freedom to design has it limitations also because the current system doesn't necessarily expect students to take on anything other than subordinate roles (Illich, 1971). Tom's response above clearly reveals that designing his own system wasn't an easy task and that perhaps, being empowered to design his own game isn't a simple process.

I had to admit that Tom's response had a significant impact on my perceptions about user-design as a model. As I said, I thought very highly of user-design as an approach and could not find reasons to believe giving power to the users themselves would be fallible. Obviously, participants' accounts did not change my mind regarding

the positive aspects of user-design and how it can be used as a possible tool for education reform and curriculum development. However, I certainly recognized that empowering users has its limitations especially because the system is discouraging to user-design practices and because it might be limited by the tools designers use.

Tom clearly reported that he struggled to make progress with his game even though he liked the process of design. I had the impression that Tom was struggling with Papert's concept of technological fluency (Papert, 1996). Perhaps, he was having a difficult time expressing himself in computational environments, such as Gamemaker. By the end of my interview with Tom, it appeared to me that his ability to control his own destiny overcame his initial dissatisfaction with the difficulties of being empowered.

Robert reported a similar account. Robert enjoyed his user-design experience but recognized that in order to achieve perfection, he needed to work long hours. He understood and realized that having the power to make his own game had its benefits but also some limitations, especially inefficiency. Norman (2002) would ague that time constraint is one of the main challenges of design. He goes further to say that "modern designers are subject to many forces that do not allow for the slow, careful crafting of an object over decades and generations" (Norman, 2002, p. 142).

In several of my class observations, I heard Robert complaining about how long it takes to fully design a functional game. I had the impression that Robert wanted to be fully in charge of his endeavors but he recognized that being in power comes with a price and the price is time.

> *Yeah, it was fun but it take [sic] a while to get everything perfectly right to get the movement right but... (Robert, interview #1).*

> *Design is making of to me. The thoughts that do really count. The playing is rewarding the making is frustrating. I would say that other people playing that game is rewarding (Robert, interview #2).*

Perhaps, Robert's experiences indicated that his design efforts were paying off, that playing his game was rewarding but the experience of designing the game was frustrating. Perhaps, it was frustrating because they were in charge of solving their design problems on their own and it ended up being more difficult and inefficient. Hooper (1998), reported a similar finding in her study, where she investigated the experiences of 'Keanna,' when learning to program. In that case, 'Keanna' was frustrated because of a lack of understanding about a process where Robert's problem was about lack of understanding about a function. Even though they participated in different projects, the core issue of their problems were similar. They both could not make a program work the way they wanted it to. In both cases, they had to engage in major problem solving.

Solving problems through design is foreign for students in public schools because the current system rewards achievement on standardized tests rather than problem solving and the power remains in the hands of the teacher (McLaren, 1992). It is perhaps, a similar reality for private schools, since Hooper's (1998) study was conducted in a private school.

Robert's challenging experiences with user-design had an effect on me. I paused and tried to make sense of his lived experiences. I questioned if the participants were empowered to design their own game after all, after hearing that they experienced

technical problems. It appeared to me that they had been encouraged to be followers of established mandated rules (Bowes and Gintis, 1976) rather than being emancipatory beings (Freire, 1968). It even made me remember of how my life as a high school student was in Brazil, with the exception that Robert was given the tools to design.

Mark's user-design challenge was an interesting one. He did not report a difficulty with being empowered per se. His challenge was primarily related to the outcomes of his creation. He was concerned if his experiences would bring him fame or make him infamous. His concerns were not in terms of game development challenges but instead, the challenges he could face as a result of a poor game design outcome. We spoke about this topic for a while because this wasn't an experience others had reported to me. The interesting fact about Mark's report is that this concern never came up in his interactions with other students and the teacher. He only mentioned this in one of his interviews. In one of our conversations, I asked him to elaborate on his response and this is what he said:

> *Yeah... hmmm. If you do well when creating your game and if it's only you making so its.. So essentially make you more... ha... famous I guess or if you don't do it well it makes you infamous so... if you want to do well so that you can do well in the future with your game (Mark, interview #1).*

I wondered how his beliefs impacted his own game creation. To me, he was conscious about how power is interrelated to other aspects of his life. After his elaborated response, I started to consider the possibility that Mark was becoming technologically fluent and using knowledge from his successful problem solving activities to find knowledge outside his domain (Papert, 1996). Even though he had the opportunity to control his destiny, he quickly realized that his design would have an impact far beyond

his game. This might be why creating his own game was challenging to him. Perhaps, he was concerned if his game would affect his credibility among his classmates. Mark was constantly looking for recognition. Perhaps, showing that he had problems could have been problematic.

I would argue that Mark was a systems thinker (Hutchins, 1996) because he could make connections between his design and how it would impact other areas of his life, such as his reputation. To me, what Mark experienced was, primarily, a natural reaction to what Elliot, Adams and Bruckman (2002) refer to as motivational perspective. These scholars argue that young students have a very high expectation when it comes to evaluating what is a great game because their standards are based on longitudinal commercially developed games. It was perhaps for this reason that Mark was anxious about responses to his final game from the broader gaming community. Mark also wrote in one of his reflection papers that he experienced other challenges when designing his game. This one, however, was related to game design rather than outcomes.

> *In my game making, I have had a bit of difficulty. It is very hard to get anything done in the first game I had tried making. As of the eleventh I have tried to find an alternate course to accomplish the goal of my game, but so far it's quite frustrating. Aside from the "Windman" game in which I couldn't get the stupid enemies to actually try to attack the character, I've made a few escapades into different territories (Mark, interview #3).*

Kafai (2006) said that when pupils construct games they are to be involved in every design decision and should develop technical competency. She goes further to state that, "Just a fluency in language means much more than knowing facts about the language, technological fluency involves not only knowing how to use new technological tools but also knowing how to make things of significance with these tools. Also,

knowing how to make things of significance with those tools and most important, develop new ways of thinking based on use of those tools" (p.39). Perhaps, Mark's challenges were related to not being "fluent" with the technology (Papert, 1996), even though he was quite motivated. Perhaps, the motivating nature of games alone does not make learning easier, as Kafai (2001) would argue, especially if there are challenges with the tool itself. It appeared to me that building games seemed to be a *fun* activity (Hooper, 1998) for him. Indeed, students can express their creativity through empowerment (Hooper, 1998) but assuming that it will result in an *easier* experience without scrutiny seems to be a premature assumption. In a later interview with Mark, he reported that his experiences were "fun in a way." He mentioned that the lack of guidelines, however was a challenge. To me, it was clear that Mark wanted some sort of guidelines. He even said in class that he was missing some guidance on how to use the program, one week into the study.

> *I like that there is no one else there telling you what to do, how to do it... no one can yell at you about the outcome... I don't like slightly tough for the same reason because without the guidelines, you have to think about everything yourself... sometimes, that's hard for me (Mark, interview #1).*

As I heard student's experiencing difficulty with Banathyan user-design, I started to think and reflect on why they were reporting a "need for guidelines" periodically. Could it be because even gifted students are being scrutinized by the current educational system which seems to be Fordist (Carr, 1996) and anti-liberatory (Freire, 1968)? Maybe this was the case. Perhaps, providing guidelines can be a way to control and mold students into a "product" (Bowes and Gintis, 1976). Perhaps they are merely more

comfortable with some boundaries because the educational system rarely trains students to be problem solvers and "planners in multiple ways, but in the design process they are the ones who identify the problems and plan how to solve them" (Kafai & Resnick, 1996, p. 73). Other scholars argue that students often have difficulties designing games because of their inability to plan and deal with complex tasks (Brown & DeLoache, 1978; Friedman, Scholnick & Cocking, 1987). User-design studies are liberatory and therefore, it removes the "mold." I would argue that students lose track of what to do because they have become familiar with operating within a given rules, guidelines and boundaries but our educational system is failing to prepare them for these tasks.

Mark also reported his frustrations designing his game because it was time consuming. A possible explanation for Mark's frustrations could be because design can be a "never end" activity. In fact, Schon (1983) gives the example of creating an artifact. The process of creating seems to cease when an artifact is created but in reality, it never ends because design solutions are frequently used and reused by other designers. Most students did not report their experiences as frustrating, due to inefficiency, but Mark did. A possible explanation for that was because Mark was often helping and looking for recognition from his classmates.

> *Well, sometimes is frustrating, it doesn't work but then you see examples where it does work quite obviously and that's sort of saying that it can be done, that you can do it (Mark, interview #2).*

His experience concurs with user-design theorists who argue that user-design can be difficult, inefficient and time consuming (Carr-Chellman, 2007). One of James's

experiences was an interesting one. He stated that the convoluted reality of his empowering experience was a challenge. Perhaps, what both Mark and James really felt were that they had limited knowledge about the situation and what was expected.

> *You have to kind of learn everything at the same time to be able to make a game (James, interview #2).*
>
> *The challenging part was creating objects of the actions that I have done. It's like if I had to press space to create an object to make it to move in a certain direction, you know what I mean? So it wasn't there where I started the room. I had to figure it out a way to get into the game after the game started. It was more like a technical challenge. It was challenging figuring out how to do it at first (James, Interview #3).*

In a follow-up interview with James, he confirmed what he had stated previously. I interpreted what he stated as if he had ups and downs when designing his own system, a result I confirmed from my observations about James.

> *You feel good after you make the game but during the game, you can feel it down, like you can't figure something out but then if you work, you kind of think like, hey… that's really cool. And then, it is really rewarding (James, interview #2).*

It was evident to me that most participants experienced challenges when creating their own games. This finding concurs with empirical studies conducted by a multitude of scholars (Hooper, 1998; Kafai, 1999).

Chapter 5

Conclusions and Recommendations

This research study explored the experiences of rural, gifted high school students engaged in designing their own games. They all engaged in a constructionist activity, which ended up being an important piece of this study because it gave students the opportunity to express themselves through Gamemaker (Harel & Papert, 1990) and because it was an attempt to give the learners an opportunity to construct (Papert, 1980), a belief held by scholars to be paramount for learning to occur. Phenomenology was used to answer three questions. What is it like for rural high school students to have the power to design their own game? How does the process of user-design in the cases explored diverge or support Banathyan user-design? Is there any evidence that innovation adoption is more likely to proceed smoothly as a result of engaging users in powerful ways in the creation of their own games?

I observed participants, conducted in-depth interviews, and collected documents in the form of reflection papers and their final games in this study. Ongoing reading of the data was complemented by constant comparison (Glaser and Strauss, 1967) so that codes and themes could be generated. I moved in the levels of abstraction, in order to generate themes. I first collected the data. Then, I isolated meaning units to then generate condensed meaning units descriptions close to the text. After that, I came up with condensed meaning unit interpretations of the underlying meaning to then generate sub-themes and finally themes (Graneheim & Lundman, 2003). Throughout this lengthy and

systematic process of analysis, the data was broken down into pieces to explain and reveal the findings for this research study. Triangulation, member checks, thick description, and identifying researcher biases were the techniques I used to assist with the robustness of the findings.

In this chapter, I will summarize the findings of my research study and present the study's limitations. I will then, relate the results to theory and finish with my recommendations for further studies followed by my closing remarks.

Summary of the findings

There were five themes that emerged from the data. The themes were: User-design is achieved through authentic empowerment and ownership; User-design is a fun experience; User-design is a participatory activity; User-design is a tool for problem solving; user-design is challenging.

Carr-Chellman (2007) and Banathy (1991) indicate that true user-design has to be empowering and it must allow users to have ownership of the systems they make. This study confirmed these theoretical accounts. The students reported that they had the power to design their own game, which resulted in participants making final decisions about their own games. In addition, they took pride and ownership of their own creation. Overall, their experiences were fun. Some participants indicated that their overall experience was fun because it was challenging and due to the fact that they were in charge. A few reported that their experience was fun because they could experiment and be creative. McLaren (1999) has argued that the current educational system inhibits creativity and is anti-democratic because students rarely make decisions. Freire (1968) prefers to call the system oppressive. By having the power to design their own systems of

learning, the students were challenged and had a voice to decide what they thought was good design. The results were overwhelmingly positive.

Almost all students reported that receiving help from their classmates was necessary. A few indicated that the teacher could be a helpful resource in the process of design. A community of designers (Banathy, 1991) was formed throughout the course of this study. In addition to user-design being a participatory endeavor which assists students to achieve higher levels of sophistication in their games, this research study also presented the thesis that user-design could be used as a tool for problem solving in micro level investigations. Students reported that user-design could be an avenue for reasoning, in a form of trial and error tool or by simply being a model for problem solving. Participants solved problems to compete and built identity. This study confirmed the theoretical accounts made by Higgins (2000) and Hooper (1998), where the scholars argued that games support the development of logical thinking and problem solving.

The five students reported a multitude of challenges when doing user-designer related tasks. One of the reasons was because design is difficult as an enterprise (Norman, 2002). The experiences the participants reported indicated that the lack of guidance was difficult and that having a set of guidelines would be beneficial. This finding supports the argument made by a multitude of scholars (McLaren, 1999; Carr, 1996; Carr-Chellman, 2007; Carr-Chellman, A., Cuyar, C., & Breman, J, 1998; Ackoff, 1974). However, if they were to choose power over guidelines, they would opt for power. A few participants indicated that the teacher was not as helpful in assisting them in creating their games as they might have liked (Doll, 2008). Some students indicated that Gamemaker as a tool was challenging and that the process of design was frustrating.

However, playing games was among the most rewarding activities. Perhaps, this was the case because building motivating games for learning is fun (Kafai, 2001; Hooper, 1998). The students had the power to design what they wanted, under the circumstances. In the end, I feel comfortable asserting that these participants did reach the level of Banathyan user-designers.

Answering the research questions

This study hoped to answer the following questions. 1) What is it like for rural high school students to have the power to design their own game? 2) How does the process of user-design in the cases explored diverge or support Banathyan user-design? 3) Is there any evidence that innovation adoption is more likely to proceed smoothly as a result of engaging users in powerful ways in the creation of their own game? I will now take up each question, in turn, and reflect what I believe that data tells us about these issues.

1) The students' experiences of designing their own games were empowering, fun, resulted in the students recognizing that they were the owners of their own designs, and were participatory in nature. Although the participants reported high levels of empowerment and satisfaction, there were challenges, especially because of their limited abilities with the Gamemaker and for lack of guidelines, and due to the fact that design is difficult (Norman, 2002).

2) The process of user-design in which the participants engaged supported the theoretical accounts made by Banathy (1991). The participants, not the teacher, were in charge of their own design activities and served in a function beyond mere participants. They had

the power to decide, which resulted in a major shift in power dynamics (Carr-Chellman, 2007). The participants' games were designed *by* the participants rather than designed *for* them.

3) There was not enough time to completely judge whether or not user-design, as a process, would adopt faster than other models of instruction for the case of Clarion Area High School. Students' appeared to prefer autonomy instead of systematic guidelines. In approximately four months, students designed more than one functional game without appearing stressed or discontented. I would argue that the user-design model would be adopted smoothly if the users were involved in the overall process and had a chance to have a voice in decision-making. The results of this research study clearly indicated that user-design was well received by the students and built a high degree of ownership and responsibility, which perhaps are two good indicators of potential adoption advantages. Because they were the ones judging whether or not they wanted to use it, there may be better future adoptions. Yet, this question must remain partly unresolved.

Theory implications and praxis

This research study contributes to our understanding of the user-design (Banathy, 1991) model and systems theory and how both can be used for the creation of games. It also serves as a peripheral investigation on education reform through a bottom-up (Carr-Chellman, 2007) standpoint. The findings of this dissertation should not come as a surprise to scholars familiar with the literature of user-design and systems theory. According to Von Bertalaffy (1968), any part of a system influences other parts because of interdependency, interconnectedness and embededness. My study advances systems

theory in the sense that it provided descriptions of lived experiences of students impacting each other's projects as well as impacting the teacher's instructional strategies and the school's policy regarding student involvement in learning goals. I found that students influenced other students in terms of design, processes and adoption of innovations, which mirrors an argument made by Ackoff (1974). He has found that no problem exists in complete isolation and that every issue is interrelated with other problems and is therefore, a small part of a larger set of problems. It appeared evident that participants' user-design experiences resulted in a systemic effort to generate knowledge to inform the overall community, in terms of Gamemaker functionalities and design. Perhaps, their collaborative production of knowledge improved their experiences as user-designers. Users having the power to design their own systems impacted the way the teacher taught the class. She basically gave the power for students to design their own systems without scrutiny. These realities could be argued to be evidence that the Systems Theory concept of interconnectedness is at play in this context. I would argue that without peer participation, very few games would have been made, which, of course, is an example of the student's interdependencies on each other and the teacher. The C++ programming class was a system embedded within the Clarion Area School High School and school district as a whole. Although it is early to indicate whether or not the supra system (overall educational system) will be changed in any way as a result of a sub system (C++ Programming class), there are indications that some sort of change might occur. The fact that students had active roles in the classroom resulted in the teacher having to quickly adopt different teaching strategies. It would be premature to assume that a change would occur in the supra system. Only time will tell whether or not the

system will be changed as a result of this very short innovation. I would argue that the school district was, at the very least, affected in some way by this study. When power is afforded to a group who has not enjoyed powerful decision making roles, there are often significant, system-wide impacts.

Perhaps the case of Clarion Area High School, which is a strong, reputable and well-off school district with no history utilizing the user-design approach, makes my study somewhat unique. If Clarion Area School District adopts user-design as a model for its gifted classrooms, how might that influence nearby districts? Can it affect the overall U.S educational system?

It is indeed, important to be cautious about getting too hopeful or over-generalizing the results from the case of Clarion to other contexts. I would argue that my study provides some limited insights for the advancement of user-design as a model. The argument that schools must be reformed seems to be a reality of our field. User-design presents a major paradigm shift (Toffler, 1970) in that attempt. It has been stated by Hargreaves (2001) that administrators play a significant role in creating conditions for reform to occur and for technologies to be successfully implemented in public schools, administrators must be involved (Fisher & Dove, 1999). Fullan (2001) goes even further to state that principals are gatekeepers and usually determine if a change will or will not occur. Carr-Chellman (2007), however, argues that one cannot have any systemic change, such as a full-blown education reform, without empowering the system's users to a level of designer.

I recognize that my study is a small piece of a big and complex puzzle and it is only a case of user-design. It was a study, however, that demonstrates that gifted students

can design their own games with minimal assistance from the teacher. Despite the challenges they encountered, the students stand firm and were the owners of their own systems (Banathy, 1991). They created a learning community of practice and solved problems. They took responsibility for their own learning and built games. Perhaps, educational reform scholars should recognize the importance of empowering gifted students to a level of designer. This seems to be the primary conclusion from this year and a half long investigation.

Study reflections

After this yearlong study, I learned that allowing students to design games on their own is quite difficult. Not so much in terms of class dynamics but because design is difficult. Generating superb graphics, developing multiple levels of detail, maximizing performance, and time are just a few examples indicating why design is so complex (Myers, 1993; Norman, 2002). The students at Clarion Area High School had to do all of that in a short period of time. In an era where students rarely take charge of their own learning (McLaren, 1999), asking students to engage in complex domains adds another level of complexity to the task at hand. What I learned from this experience was that four months of everyday work isn't enough to produce a final product containing all elements of design, even with a gifted population. If I was asked to design a high school class using the user-design method, I would certainly require a year long class. Asking students to have completed game in four months is asking too much.

Although Gamemaker Lite is a great program to design games, I Gamemaker Pro should be used next time. The Lite version had a few limitations that impeded students to

be fully empowered to create their games. A few functions were only available in the Pro version of the software.

I would take from this study that game design expertise might be in the eyes of the beholder. The students' games were not the most sophisticated, especially if we compare with games in the marketplace. However, they designed games without any formal gaming training, which makes me believe that gifted students can be in charge of their own learning.

If I was to design a gifted classroom, my first requirement would be that students have the full opportunity to be creative. Based on my study, being creative meant being able to be a user-designer. Of course there would be implications of this shift. The most evident would be in terms of power. Most individuals in positions of power don't want to abdicate their positions (Carr, 1997). Therefore, having a user-design class in a district would not just have an effect on the school administration but on the parents and the school board themselves. We "expect" that the school will guide our kids to a better life. However, we don't expect our kids to be in charge of what is better for them.

It was quite important that this study was conducted in a gifted classroom, first and foremost, because of No Child Left Behind (NCLB) policies. Conducting a design study in a regular classroom would be nearly impossible because of the "*teach to the curriculum"* orientation. In fact, this was one of the reasons I decided to approach a gifted classroom, since gifted classrooms are not bounded by NCLB policies. Myers (1993) argued that design is difficult. Because all classrooms in high school are limited by time, using gifted students was quite important. In order or design an acceptable game, time is a premium. Gifted students process information faster, which helped the project

because they were able to conceptualize, design and develop their games in an acceptable timeframe. In fact, this was why using Gamemaker was so important. By using Gamemaker, students could focus their efforts on the design aspect rather than learning a particular code in C++.

Limitations of the study

This study was limited by availability of resources, especially time, money, and expertise. User-design is about power. The participants in this research study didn't have an objective definition of what power meant. This was also a limitation of this study. It was a year and a half long study. Therefore, my study was limited by the data I gathered in that period of time. Van Manen (2003) has indicated that the essence of a lived experience is grasped by reflection and writing. Without reflecting and writing about those reflections, one might not be doing phenomenology. I heard each transcript prior to transcribing them, in order to satisfy Van Manen's recommendations. However, the level of reflection and the quality of my writings, in relation to an expert's standards is not clear. I did my best to reflect and write about these reflections, however. I believe that the data I gathered reflects the rural culture of Clarion County. However, this study did not cover all there is about the rural culture of the region and therefore this is also a limitation.

Future questions and possible research studies

One question of this research could not be fully answered because of time limitations. Adoption of innovations in public schools in Pennsylvania tends to follow a top-down bureaucratic process. Further research on the adoption of the user-design model in a variety of public school contexts is highly recommended.

This study reported the lived experiences of a small group of male rural, gifted high school students when designing a game. A possible follow up study could involve female rural (or urban) gifted high school students designing a MMORP game, for instance. The need for a research study involving female gifted students seems paramount and urgent. While there is no reason to believe, on the face of it, that there will be significant gender related differences in similar studies, the fact that this study was gender-limited does support the need for a similar study with girls and women.

The evolving field of instructional systems technology has been pre-occupied with studies of design and development but rarely focuses on implementation issues (Carr, 1997). I highly suggest that further studies which investigate adoption and implementation of innovations will advance our. We are a living system (Miller, 2003) that cannot afford to stagnate. We are in need of change and we should take change as a useful event rather that a fear-inducing one (Fullan, 2001a). Fullan once said, “When things are unsettled, we can find new ways to move ahead and to create breakthroughs not possible. If you ask people to brainstorm words to describe change, they come with a mixture of negative and positive terms. One the one side, fear, anxiety, loss, anger, panic; on the other, exhilaration, risk-taking, excitement, improving and energizing” (Fullan, 2001b, p.4). I hope we move beyond any initial fear of change and advance to a stage where we focus on how we can solve the problems we have in our educational system today. I hope educators choose this route because it is only through the empowerment of the users will we advance humanity (Banathy, 1991).

Appendix A

Interview Protocol

Interview Protocol
Project: The phenomenological Exploration of user-design among gifted rural high school students when designing a game.

Time of Interview:
Date:
Place:
Interviewer:
Interviewee:
Position of Interviewee:

Introduction: Hello, my name is Luis Almeida. The reason why I choose you to be part of my study is because I am fascinated to know about your lived experiences regarding being the designers of your own games. The purpose of my study is to describe your experiences about being the designers of your own educational game. I want to know your experiences and what it means to you to design your own educational game. Do you have any questions? I really appreciate you taking some of your time to participate in my study.

Questions:

Can you talk about an experience you had in which you had to design something? i.e., for school, at home, for fun, or summer camp?

How would you describe your experiences as a user-designer?

Do you feel empowered when designing your own educational game?

What do you like and/or dislike about being a user-designer?

Appendix B

Observation Protocol

Focus: How are the students' experiences in designing the game in this classroom?
1. Does he/she attempt to involve the entire self to this design challenge?
2. Does the class end after he/she finishes his/her goals?
4. Does he/she ask questions to peers and/or the professor, which engaging in designing?
5. Does he/she ask relevant questions relating to design?
6. Does he/she experience confusion when designing the educational game or when he/she receives feedback when she asks?
7. Does he/she seem to be eager to design the game?
8. Does he/she draw lines or play with pieces of paper when designing the educational game (storyboard)?
9. Does he/she feel comfortable designing his/her own systems?

Appendix C

Data Analysis

Data Analysis

Meaning unit
Condensed meaning unit 1
Condensed meaning unit 2
Sub-theme
Theme

Meaning Unit	Condensed Meaning Unit description close to the text	Condensed meaning unit interpretation of the underlying meaning	Sub Theme	Theme
(Tom) 49.P. Because I figured that if I had to put everything on paper at once, and you try to ha, put it on the screen, you might have erros with it and you wouldn't be entirely sure where they are and where you should go, step by step on the way to planned to.	I figured if I put everything on paper you try to put it on screen you might have errors and would not be entirely sure where the errors are, where you should go step by step.	Explanation of effective general design	Empowerment is a tool for solving problems and reason.	User-design is a tool for problem solving.
(Tom) 57.P. I use trial and error a lot. I usually do my game all in gamemaker I don't do much typing up much.	I use trial and error a lot. I don't do much typing.	Approach to design revealed.	Empowerment is a tool for solving problems and reason.	User-design is a tool for problem solving.
(Tom) 63.P. Yeah. We help each other a lot…	We help each other a lot.	Collaboration account.	The participatory nature of design.	User-design is participatory

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TEACHING EXPERIENCE

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WORK EXPERIENCE

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AWARDS/LEADERSHIP

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