GENDER REACTIONS TO GAMES FOR LEARNING AMONG FIFTH AND EIGHTH GRADERS

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ABSTRACT

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The focus group results of same-gender and same-age grade school students revealed gender and age differences in preferences for educational and commercial computer games. Both genders liked the elements of customizability and personalization of the game content, open-ended game worlds, non-linear game flow, in-game tutorials, and gradual learning curves. Preferences for player avatars and game themes conform to traditional gender roles. Other aspects girls emphasized include storylines, multiple difficulty levels, and sufficient instructions. Older girls preferred trivia types of games than the younger girls did. Elements boys emphasized include action, weapons, challenging difficulty level, controlling ships using complex interfaces, and game balance issues. More influence from commercial games emerged when boys designed games themselves. Boys also have a preconceived notion about edutainment games being boring. Although both genders enjoyed online chatting and collaborating with other players, older boys did not appear as fascinated with these elements as younger boys did.

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CHAPTER ONE: INTRODUCTION

This thesis compares gender and age reactions to game play experiences during the Space Pioneer Learning Adventures Game Design Camp and research project. The thesis is part of Girls As Designers, a National Science Foundation funded research project directed by Carrie Heeter, Punya Mishra, and Rhonda Egidio and being conducted by faculty and students at Michigan State University in the Communication Technology Laboratory, Department of Telecommunication, and College of Education.

1.1 RATIONALE

Games are increasingly being called upon to advance science learning. But are they effective in promoting science learning among girls? Computer games, usually designed by young men for boys and other young men, epitomize technology's exclusion of girls, their interests, and values. Less obvious but more devastating, this technological estrangement exacerbates girls' lack of interest and self confidence not just in computers specifically, but about science in general. Technology itself, and even the design of technology-enhanced science experiences, may disadvantage girls, turning them away from science, math, engineering, and technology fields instead of engaging them.

This thesis examines the assertion that girls are disadvantaged by today's games, reacting negatively to science and technology as well as to the games themselves. The thesis looks specifically at reactions to playing six different

games during a two week space-learning camp. Commonalities and differences in reaction between girls and boys, and between 5th and 8th graders, to game play are examined in response to game features such as genre, goals, play style, suitability for learning, and motivations for space exploration, based on researcher-observers' notes on focus group discussions across six game-related events.

1.2 SPACE PIONEER LEARNING ADVENTURES

Space Pioneer Learning Adventures was a two-week camp in which 40 boys and girls came together to learn about space exploration by playing six computer games, watching video clips, and participating in diverse technology-mediated space learning activities. They participated in guided brainstorms to create a space-related educational game designed to motivate children like themselves to want to become space scientists. The camp took place in Michigan in the summer of 2003.

Camp setting

Ten 5th grade girls, ten 5th grade boys, ten 8th grade girls, and ten 8th grade boys were recruited from the greater Lansing area of Michigan. Participants worked in teams of five of the same sex and same grade (e.g. two 8th grade boy teams, two 8th grade girl teams). Each team was assigned a teacher-facilitator who led discussions, and two researcher-observers who took notes of everything that occurred and was said, each of the same sex as their assigned teams. Participants, teacher-facilitators, and researcher-

observers remained with the same teams throughout the camp. The teams discussed their reactions and ideas in focus groups after each major event.

The 5th grade girl teams are the Angel Girls (AG) and Solar System 6 (SS6); the 5th grade boy teams are Frozen Eclipse (FE) and the Rocket Lions (RL); the 8th grade girl teams are Desdemona (DE) and Kalisti (KA); the 8th grade boy teams are Challenger2 (CH2) and Da Neptune Jihad (NJ).

Two researcher-observers for each of the 8 teams took notes throughout the camp. Observations have been painstakingly coded and the rich data is being analyzed to address many design process research questions. Focus groups were held and surveys were administered after each learning activity.

Focus groups

The participants remained on the same teams for the focus chats, as the same teacher-facilitators functioned as moderators. An outline of major topics to be addressed and specific questions to be asked for each topic were prepared for the moderators to read out to and ask the team. Improvised follow-up questions were asked when deemed appropriate.

The following introduction was read at the beginning of each focus group:

> Now let's talk about ____ [game title]. The discussion will be audio tape recorded for the researchers, to help them remember and be able tell NASA what you liked and didn't like.

> Remember, there are no right or wrong answers. Each of you is an expert critic. We want to know what you think. Let each person have time to say what they think. Please be honest, but respect the opinions of others, even when you do not agree with them.

Initially, the researchers planned to ask mostly the same focus group questions after every camp experience. The 8th grade boys rebelled so strongly that the male teacher-facilitators requested the camp organizers change the focus group questions to make the experience less repetitive. Girl teacher-facilitators did not report problems with the repetitive focus group discussions. But changes were made for all groups to accommodate the boys but retain consistency of data collection across the 8 groups.

Four common questions were retained. Specifically, for every game experience, the focus group discussion asked about likes and dislikes regarding the game, whether it seemed like a good way to learn, and what ideas were inspired in thinking about their own game design. Other questions related to the particular game were also asked, often related to motivations and personal interest in different aspects of space exploration.

Each team played games on the same day and in the same activity order as the other teams. Games were scheduled on different days during the camp. The context of game play may have some impact on the children's experience. For that reason, the chapters about the games appear in the order in which they

were played at camp. The chart below shows specific days and surrounding activities for each of the 6 game play experiences.

Table 1.1: Order of game events and surrounding activities

Game	Day ? of 10	Preceding Activity	Game Classification
The Great Solar System Rescue	2	Robotics guest speaker	Educational game
Space Academy GX-1	3	Video about Triton and Io	Educational game
Liftoff	6	1st game brainstorm: freeform	Educational game
Neopets	7	3rd game brainstorm: backstory and game world	Online commercial game
Atmosphere	8	First activity of the day	Online chat room
Galactic Civilizations	8	5th game brainstorm: navigation, interface, and interaction	Commercial game

Teams played the games in their team groups. The teacher-facilitator introduced each game by reading a short prepared script. For complex games, particularly *Galactic Civilizations*, the participants were given printed instructions developed specially for the camp. Each game session was scheduled to last one hour, including the time to complete a written survey and conduct the focus group interview.

Throughout the game sessions, one game expert from the research team stayed with each group to help solve game play problems or technical difficulties.

CHAPTER TWO: LITERATURE REVIEW ON GENDER AND GAMES

Considerable research has been conducted on gender differences and games. This chapter intersperses a literature review of this domain with expectations of how girls and boys in the research experiment will compare in their reactions when they are required to play six different space-related games in same-sex, same grade, small group settings of fifth and eighth graders. Throughout this chapter, “game” is used to refer to digital forms of games, including ones played on computers and consoles such as PlayStation, unless otherwise noted.

2.1 GENDER GAPS IN NATURAL SCIENCES

The computer culture gender gap mirrors adolescent female and male attitudes toward science and math. The National Center for Educational Statistics documents achievement gaps related more to attitudes than to course taking (Bae, Choy, Geddes, Sable, & Snyder, 2000). Female high school graduates have taken as many or more upper level classes in math, biology, and chemistry. However, 8th and 12th grade females were less likely than males to like math and science, and less likely to think they were good in math and science. Elementary school girls and boys have comparable perceptions of their own abilities. By ninth grade and throughout high school, girls gradually lower their perceptions of their own abilities compared to boys (Phillips & Zimmerman, 1990). Girls at age 8 and 9 report feeling confident, assertive, and authoritative

about themselves and their abilities. But they emerged from adolescence with poor self image, constrained views of their future and their place in society, and much less confidence in themselves and their abilities. (American Association of University Women, 1991). Since the early 1970s, women have made dramatic gains in postsecondary education in terms of enrollment and attainment, and are successful relative to men in aspirations, enrollment, and bachelor's degree completion. Gender differences in college majors persist, however, with women still concentrated in fields like education and men more likely than women to earn degrees in engineering, physics, and computer science (Bae, et al., 2000).

The fundamental goal of science education is to communicate scientific information and to encourage a deep comprehension of scientific concepts, reasoning and problem-solving skills (Kim et al., 2000). In an effort to reach this goal, many science education reforms have occurred over the past decades—all in the name of preparing the next generation by making science learning more applicable and pertinent (Yager, 2000). However, many of the customary science learning activities, such as lectures and labs, do not adequately and effectively promote the learning of science; students are either required to passively accept textbook- or teacher- provided knowledge, or must attempt to reconcile discrepancies between their flawed experimental results and the expected outcomes based on established scientific ideas (Nott & Smith, as cited in Kim et al., 2000).

Many authors have recommended that new technologies, specifically computer simulations of natural science phenomena, the Web as a "virtual classroom," and the inclusion of multimedia among others, melded with proven pedagogies such as experiential learning, constructivism, collaboration among students, and teachers' role as facilitator of learning instead of provider of knowledge, might provide a feasible alternative to previous ways of learning science (Kim et al., 2000; Moor & Zazkis, 2000). Due in great part to the generous support of the National Science Foundation, this essential transformation in science education is presently underway. One way NSF is supporting this transformation is by seeking $200 million to initiate a new partnership project—the President's Math and Science Partnership—which is part of the President's initiative No Child Left Behind (http://www.ehr.nsf.gov/mathandsciencepi.asp). The reality behind the initiative is complex: too many children are not receiving the math and science education they need to succeed in an increasingly technological society; too many girls, students with disabilities, and minority students are underserved and underrepresented in science classes and fields (Directorate for Education and Human Resources, 1999; Monhardt, 2000; Swiatek, 2000); teachers are inadequately prepared to teach math and science; and not enough U.S. schools offer demanding and challenging science courses (http://www.ehr.nsf.gov/mathandsciencepi.asp; Kumar & Libidinsky, 2000). The consequence is that not enough students are pursuing science study that will equip them for future opportunities and contributions in science areas.

New technologies hold great promise for enhancing science and math education. Teachers reason that if designers can make computer games so entertaining as to be termed “addictive,” why can’t some of that talent be used to design equally compelling educational materials (AAUW, 2000)? A proposed remedy to achieve gender equity in the computer culture is to get more girls and women involved in the creation of hardware and software and thus themselves participate in the evolution of computer culture. To wait only compounds the problem; it is far better to involve females in the creation of this culture now than to try to reshape it later.

2.2 GENDER GAPS IN COMPUTING AND PLAY

Technology holds great promise for advancing science education. However, there exists a troubling computer game culture gender gap. In contemporary culture, the computer is no longer an isolated machine: It is a centerpiece of science, the arts, media, industry, commerce, and civic life (AAUW, 2000). As AAUW Commission on Technology, Gender, and Teacher Education co-chair Sherry Turkle writes, the computer culture has become linked to a characteristically masculine worldview, such that women too often feel they need to choose between the cultural associations of “femininity” and those of “computers” (AAUW, 2000, p. 7). Most computer games often have subject matter of interest to boys, or feature styles of interaction known to be comfortable for boys (AAUW, 2000). Statistics on girls’ participation in the culture of computing are of increasing concern, from the point of view of education,

economics, and culture. We need a more inclusive computer culture that embraces multiple interests and backgrounds and that reflects the current ubiquity of technology in all aspects of life. As the AAUW report describes, girls assert a “we can, but I don’t want to” attitude about participating in computer activities.

Almost all the sex differences documented in electronic game studies conform to social gender roles. People are under social pressure to act in accordance with their gender roles, and their play activities are also governed by such pressure. Studies suggest gender-stereotyped toy preference is established as early as 18 months of age (Serbin, Poulin-Dubois, Colbourne, Sen, & Eichstedt, 2001). Males play with machines that stimulate motor activity while females play with dolls that induce nurturance (Eisenberg, Murray, & Hite, 1982). As they grow older, boys are more likely to be sent to computer classes and have new computers. Girls are more likely to receive productivity-oriented software (i.e. “Learn to Type”) and “hand-me-down” computers (Ray, 2003, p. 3), reinforcing that mastering computers is not important to a girl’s life. Gradually, girls learn to see computers as tools that facilitate work, instead of a source of entertainment (Ray, 2003; Turkle, 1988). As a result, using computers to have fun is less natural for females than for males.

2.3 GAMING IS MASCULINE

There is fundamental gender-inequity in computer gaming today. Playing computer games is still considered a masculine activity and it has been well

established that game play is more popular among males than females (Bryce & Rutter, 2003; Colwell, Grady, & Rhaki, 1995; Funk & Buchman, 1996a, 1996b; Griffiths & Hunt, 1995; International Hobo, 2004; Roberts, Foehr, Rideout, & Brodie, 1999). Not only have academics found this to be true, representatives from the industry generally share the same view. Laurel (2001) comments that computer gaming is a culture dominated by young males. Falstein (1997) points out that the industry is male dominated, from production to distribution channels. Ray adds that the software publishing industry has not encouraged women to see computers as an entertainment medium (2003).

How many females play games?

In today's market, if a game has a female player population of 15% or more (as in the case of *EverQuest*), it is classified as being "girl-friendly" (Falstein, 1997; Taylor, 2003a; Yee, 2001). However, some research contradicts evidence that males play more than females. ISDA industry research has reported a female gamer population of nearly 50% (Interactive Digital Software Association [IDSA], 2001, 2002). Another source documented 60% of college females playing computer games compared to 40% of males (Jones, 2003). However,, this study categorized operating systems' built-in games such as *Solitaire* as computer games. Indeed, solitaire on a computer is a computer game, but it exists outside of the realm of the game market. If a female had ever played Solitaire, although far from the current notions of a "gamer", she would be part of the 60% female gaming population in the study. This exemplifies the

importance of clarification of key terms in game studies. The original surveys by the IDSA and their methodology have never become fully available to the public. Therefore, the precision of their data cannot be determined. Very similar issues have also been noted by veteran game designer Chris Crawford (n.d.), questioning another set of results regarding player demographics published by the Entertainment Software Association (2003).

Females do not play games as much as males

Numerous studies related to games have found that males not only comprise the majority of the gaming population, they spend more time playing than females (Colwell & Payne, 2000; Funk & Buchman, 1996b; Ivory & Wilkerson, 2002; Phillips, Rolls, Rouse, & Griffiths, 1995; Roberts et al., 1999; Woodard & Gridina, 2000). In a survey of 900 fourth to eighth graders, boys reported significantly more time playing games than girls, at home and in the arcade (Funk & Buchman, 1996a). Several extensive U.S. national surveys sampling children across age groups, consistently found that boys spend more time on video games than girls (The Henry J. Kaiser Family Foundation, 2002; Rideout, Vandewater, & Wartella, 2003; Roberts, et al., 1999). Quite a lot more boys consider gaming as their favorite activity while girls did not give it as much importance (Funk & Buckman, 1996b; Thomas & Walkerdine, 2000). Likewise, many girls in another study preferred other activities over playing games, although they did express an interest in gaming (Inkpen, et al.,1994).

2.4 GENDER STEREOTYPES REFLECTED IN GAMING

Researchers focusing on game content have indicated that most titles on the market are designed by males to please males (Chaika, & Groppe, 1996; Gorriz & Medina, 2000; Klawe Inkpen, Phillips, Upitis, & Rubin, 2002; Miller,). In one experimental study where educators with programming experience were instructed to design software to teach 7th-grade girls, 7th-grade boys, and 7th-grade students in general, the software designed for girls resembled “learning tools” whereas those for boys and for general students were highly similar – they were game-oriented, emphasizing eye-hand coordination and competition (Huff & Cooper, 1987). The result reveals perhaps unconscious programmer assumptions that the software meant for students as a whole was designed only with boys in mind, and that boys play games but girls use learning software.

Some academics suggest that it is not “socially rewarding for females” to identify themselves as gamers because gaming is considered a male dominated area (Griffiths, 1997, p. 235). Funk and Buchman (1996b) found that it is more socially acceptable for boys to play a lot of games than for girls. Other researchers proposed that females tend to have psychological barriers when gaming in public, while private domains provide more comfort for such activities. (Bryce & Rutter, 2003).

When boys play games, girls step aside

However, even within domestic gaming settings, girl gamers often take on the role of watcher while male family members act as the expert, even when the females own the gaming equipment (Schott & Horrell, 2000). In a study focusing on both children and adult females gaming in home environments, researchers concluded that girls' gaming rights existed under conditions of "social dynamics and gender hierarchies"(Schott & Horrell, p.42).

It is difficult to determine whether it is the girls' "stepping aside" from their opportunity (Schott & Horrell, 2000, p.42) or it is the boys "crowding out" (Ray, 2003, p. 4) the girls. Nonetheless, this aggressive-passive chemistry seems to exist between males and females pervasively when it comes to using gaming machines. Inkpen, et al. (1994) made available ethnographic data collected from an exhibit where gaming consoles and computers were available to all visitors. According to the observation,

> When a particular station was filled with a group of boys, the girls were very hesitant to approach. If they did approach, they would usually watch for a few minutes and then walk away. (1994, Presence of Others section, para. 1)

Researchers also noted that:

> Many girls would enter the exhibit, look around, and then leave. Some would stay if they saw a free machine or if a group of girls were playing a game. Few girls would approach if a large crowd of

children were clustered around a particular game. (1994, Girls' Interest in Electronic Games Section, para. 5).

Additionally, the researchers indicated that girls often “waited to be offered a turn” (1994, Ways of Playing and Watching Electronic Games Section, para. 2), while boys usually approached the current player to request turns.

Is it a “large group” of people or a “large group of boys” that makes girls hesitate to approach the games? Is it gaming in public that makes them uncomfortable? Or is it that they feel uneasy to encroach into boys’ territory? Are they too shy to ask for a turn? Do the findings reveal what a previous study described as “a sense of female inferiority in relation to gaming competence” (Schott & Horrell, 2000, p.42)? Does that attitude apply to the general use of computers, or even technology in general?

Are girls less confident with games/computers/technologies?

Laurel’s research may offer an answer. She suggests that playing computer games makes boys more confident with technology (Laurel, 2003, 2001) and that girls tend to blame themselves when they encounter computer difficulties. Research indicated that the performance of females who lack experience and confidence with computers is dramatically influenced by the instructors’ expectations about how well they will perform (Robinson-Stavely & Cooper, 1990). Those with more computer experience are generally unaffected by external expectations about their performance. Inkpen et al. noticed that girls

often started with games they already knew when they first entered the exhibit. What is more, when trying out a new game, girls often commented to themselves “Oh, I am terrible at this” even before playing (1994., Confidence and Challenge section, para. 2).

Gender-neutral games for both genders

Some psychologists argue that the context of games can dramatically influence how girls perform on them. Researchers have been urging the development of gender-neutral entertainment software for both boys and girls to play. In an experimental study where children played the same piece of software, when it was introduced as a test there was no difference in boys’ and girls’ performances. However, when it was introduced as a game, girls performed significantly worse than when they were told it was a test, whereas boys were very little affected by the context (Littleton et al., 1999). In another experimental study, boys and girls played two versions of a game that were fundamentally identical, with the exception that one version was gender-neutral, the other masculine-associated. The results indicated girls performed better in the gender-neutral version whereas boys again were very little affected by the context. (Littleton, Light, Joiner, Messer, & Barnes, 1998). Similar findings were reported by Culp and Honey (2002).

2.5 MASCULINE AND FEMININE GAMEPLAY STYLES

Perhaps there are basic gender differences in handling tasks. In a study observing children playing video games, when girls' characters were chased by a creature, the girls tended to react dramatically, giggling, swinging their bodies, and even screaming, while boys were more likely to stay quiet and focused on the tasks (Thomas & Walkerdine, 2000).

Risk-taking

Turkle (1988) has pointed out that males adapt a trial-and-error approach when using computers and playing games, which is a good computer learning strategy. They are willing to take the risk of failing before they can succeed. However, many females find it difficult not to take failure personally, and prefer games that they can understand the rules of before starting to play. Needing to know how to play before they start becomes a hurdle to learning games. The researcher infers risk-taking is a masculine trait.

Beating the game

It seems important for boys to be able to beat the games. Klawe et al (2002) found that when girls were first exposed to the game in their study, they spent more time on the story plot while boys rushed to complete the game. Documented in various studies, boys were quick at figuring out strategies to score and exchanged notes with each other (Klawe et al., 2002; Subrahmanyam & Greenfield, 1998). On the other hand, girls took their time exploring without

hurrying to finish the game, and appeared lukewarm about hidden clues and secret tips, let alone further conversation about game magazines or trading games (Gorriz & Medina, 2000; Inkpen, et al., 1994; Klawe et al., 2002; Miller et al., 1996). Laurel argues that mastering a game is a “social plus” for boys, while for girls it is a “social taboo” (2003). Supporting findings indicate that boys place emphasis on mastering the game to prove their skills, while girls play to enjoy the emotional experience and social occasion. Thus boys’ play styles may fit what Taylor (2003b, p.301) described as “Power Gamer”, while girls’ play style may qualify them as “Casual gamers” or “Role Players”.

Non-linear game flow

Girls value “free play” (Laurel, 2003), non-closure game flow (Miller et al., 1996), and like to explore the game world. One may argue that boys do as well, but it appears that girls have less tolerance toward linear game flow. In Kafai’s study (1998), the games that boys designed were mostly goal-oriented, whereas games girls designed were more “activity-based” (Ray, 2003, p.8). Games boys designed tended to punish the players who gave wrong answers with “game over”, forcing the game to end completely so the players had to start over from the beginning. Girls seemed more flexible about their consequences, allowing the game to continue.

Gorriz and Medina (2000) supported the above finding, stating that girls do not appreciate starting games over each time the character “dies”, which is a main characteristics of the games on the market that are mostly played by boys.

One may argue that males do not like starting over either, however the degree of disliking does not seem to be strong enough to stop them from playing.

Genre preferences

Across age groups, males generally like Shooters, Fighters, Sports, Racing/Speed games Fantasy/Role Playing, Action-Adventure, Strategy, and Simulations more than females like those genres. Females favor traditional games such as Classic Board Games, Arcade, Card/Dice, Quiz/Trivia, Puzzle, and Kids games (Roberts et al., 1999; Sherry, Lucas, Rechtsteiner, Brooks, & Wilson, 2001). However, Sherry et al.'s survey study reveals that Racing games are embraced by both genders, which is an anomaly among the literature. The researchers attribute the interest in Racing games to the experience of learning to drive during high school.

Girls perform better on verbal tasks (Berk 2003) and pattern-matching, which may explain why quiz-trivia or puzzle games such as Tetris are favored by females (Laurel, 2003; Sherry, Holmstrom, Binns, Greenberg, & Lachlan, n.d.) Developmentally, Miller et al. suggest that older girls tend to prefer educational games while younger girls seek more entertainment-oriented content (1996).

Exercising reflexes

In terms of game genre preference, it has been found that girls prefer solving puzzles more than exercising their eye-hand reflexes (Gorriz & Medina, 2000), which is boys' favorite. Kafai's research indicated adolescent girls prefer

games that do not require quick-paced interactions (1996). Likewise, college males reportedly favor games that require fast reactions (Sherry et al., 2001) while females prefer games they can play quietly such as puzzle solving and trivia games.

Action content

Across age groups, it is believed that boys are more likely than girls to play action content games, while girls prefer puzzle, quiz-trivia or classic board games (Roberts, et al., 1999; Sherry et al., n.d.). With regards to females who play action games, Buchman and Funk (1996) found that girls play less fighting games as they grow older, as gender roles become more firmly entrenched Funk & Buchman, 1996b).

According to one survey, not only did three fourths of children agree that in general boys prefer fighting games, but the sampled boys tended to consider violent games inappropriate for girls to play (Funk & Buchman, 1996b). Some researchers suggest content such as fighting, competition, or sports is a turn-off to girls (Bryce & Rutter, 2003; Greenfield, 1994; Kafai, 1996; Provenzo, 1991). Among girls who like violent content, Buchman and Funk indicated that they usually prefer fantasy or cartoon violence while boys prefer realistic, human violence (1996, p.31). In general, girls do not especially enjoy “shooting bad guys and monsters” (Klawe, et al., 2002, p.211). In Kafai’s study involving children designing games, boy designers tended to provide violent feedback to the

players when they gave incorrect answers, whereas girls provided non-violent feedback (Kafai, 1998).

Role playing games: social interaction, story, characters, adventures

Researchers have found that the elements girls enjoy in games include role playing (Brunner, Bennet & Honey, 1998), social interaction (Gorriz & Medina, 2000; Klawe et al., 2002; Thomas & Walkerdine, 2000), narrative (Gorriz & Medina, 2000; Laurel, 2001), and adventure (Falstein, 1997; Gorriz & Medina, 2000). Girls like to construct narratives and hence, need complex characters to develop narration (Laurel, 1998). Littleton et al. (1998) reported that girls in their study identified with the characters in the gender-neutral version of game. Role Playing Games with a single player is a genre with an extensive female audience, with a complex story line and adventures. Some predict that Massive Multi-Player Online Role Play Games may encourage female gaming in domestic settings because they provide social interaction and anonymity, perhaps reducing gender stereotyping from other players (Bryce and Rutter, 2003).

Creation and destruction, or themes?

Gorriz and Medina suggest girls prefer creating content than destroying (2000). Examples of this play style include *The Sims* and *Tycoon* series of games. However, this concept may not be universal. The themes of the games also have an important effect on their popularity among genders. For example, the goals of *Sim City* and *The Sims* are identical: to build the given subjects into

prosperity. Fast reflex reactions are not needed, nor do they involve combat or competition with other players. Both games are all about creating, not destroying. Yet *Sim City* was not as successful as *The Sims* in attracting female players. A likely reason is that the themes of the games that matter: in *Sim City* the player is a mayor building and running a city, while in the home-oriented *The Sims* one maintains a home and the characters' relationships with each other.

Platform

Girls prefer playing games on the computer than on video game consoles (Gorriz & Medina, 2000; Klawe, et al., 2002; Thomas & Walkerdine, 2000). Video games have larger male gamer populations (60%) than female (21%), while the gender difference for computer games is much smaller (29% to 24%) (Roberts et al., 1999). The reason for this is undetermined. It may result from the basic difference in the input devices between that of consoles and of computers. Many console games, especially the fighting genre, require reflexes and hand-eye coordination. It may also be that the themes of the console games do not appeal to females. Many popular console games belong to the genres of sports, action, and strategy/RPG, while computer games' bestsellers are strategy, child, and family (IDSA, 2002).

2.6 BIOLOGICAL SEX DIFFERENCES IN SPATIAL SKILLS

Biological sex differences in spatial skills may help explain the different preferences for game genres between the genders. Psychologists believe that

females are disadvantaged in certain spatial skills such as mental rotation and spatial perception, and this sex difference exists by age four, emerges by mid-childhood, and lasts throughout one's lifespan (Berk, 2003; Kerns & Berenbaum, 1991; Levine, Huttemlocher, Taylor, & Hangrock, 1999; Provenzo 1991). Research has indicated that playing action video games improves spatial skills (Okagaki & Frensch, 1996; Subrahmanyam & Greenfield, 1996), which is likely to be a key component of sex differences in mathematical reasoning (Berk, 2003). Playing action video games also improves one's visual attention (Green & Bavelier, 2003) and other visual intelligence skills, which may be "training wheels" for computer literacy (Subrahmanyam, Kraut, Greenfield, & Gross, 2000). Laurel (2003) argues under time pressure, boys perform better on mental rotation. When time pressure is removed, girls' performances equal to boys'.

2.7 GAMING FOR COMPUTER LITERACY?

Psychologists point out that both genders can improve spatial skills by practicing video games. Many imply that girls are disadvantaged in the long run by playing far less games (Cassell & Jenkins, 1998; Ray, 2003). Regardless of the element of violence, games have been envisioned as potentially effective tools for learning. Furthermore, researchers believe that gaming opens a door to computer literacy leading to potential technology careers (Cassell & Jenkins, 1998; Ray, 2003; Subrahmanyam et al., 2000).

2.8 RESEARCH QUESTIONS

1. Do girls and boys and 5th and 8th graders play games differently?
2. Do 5th and 8th grade girls and boys respond differently to playing games for learning? Do they like and dislike different things? Are there differences in whether and to what extent they think particular games are good for learning?
3. Are there gender and grade differences in how the space camp games inspire participants about their own game designs?
4. What gender or age differences exist in interest in space science?

CHAPTER THREE: METHOD

This thesis analyzes the focus group discussions conducted by the teacher-facilitator for each team after each of the 6 Space Pioneers game play experiences. With 8 teams and 6 game experiences, the data for this thesis include a total of 48 focus group discussions. Two different researcher-observers for each team took notes throughout the camp, including notes on what was said, by whom, during the focus group discussions. Although the focus groups were audio taped in case a need arose to check actual wording, this thesis is based on analysis of the researcher-observers notes from the focus group discussions.

This thesis does not include analysis of researcher-observers' observations during game play. It also does not include survey data collected after each game play session. Eventually those analyses will be integrated with the focus group findings, but that is beyond the scope of this thesis.

3.1THESIS STRUCTURE

The chapters for each event begin with descriptions of the game's content, particularly elements that the participants discussed. Screenshots of the games are included. Each chapter provides a cross-group comparison section discussing overall observed trends. A chart of side by side gender comparisons, separated by grade and divided into the focus group questions for that game, records the focus group discussions.

Then grade and age specific commonalities and differences are summarized, followed by in-depth reports on each groups' focus chat. The in-depth reports include extensive quotes from participants.

Participants and teams are referred to by the space names that they chose for themselves on the first day of camp, from a list of galaxy names. The actual quotations of the participants were derived from the researcher observers' notes. Some notes were more extensive and verbatim than other notes. Where necessary, for coherence missing words were added by the author to facilitate the flow and flavor of the report. Every effort was made to retain the intent, style, and flavor of children's comments.

CHAPTER FOUR: THE GREAT SOLAR SYSTEM RESCUE

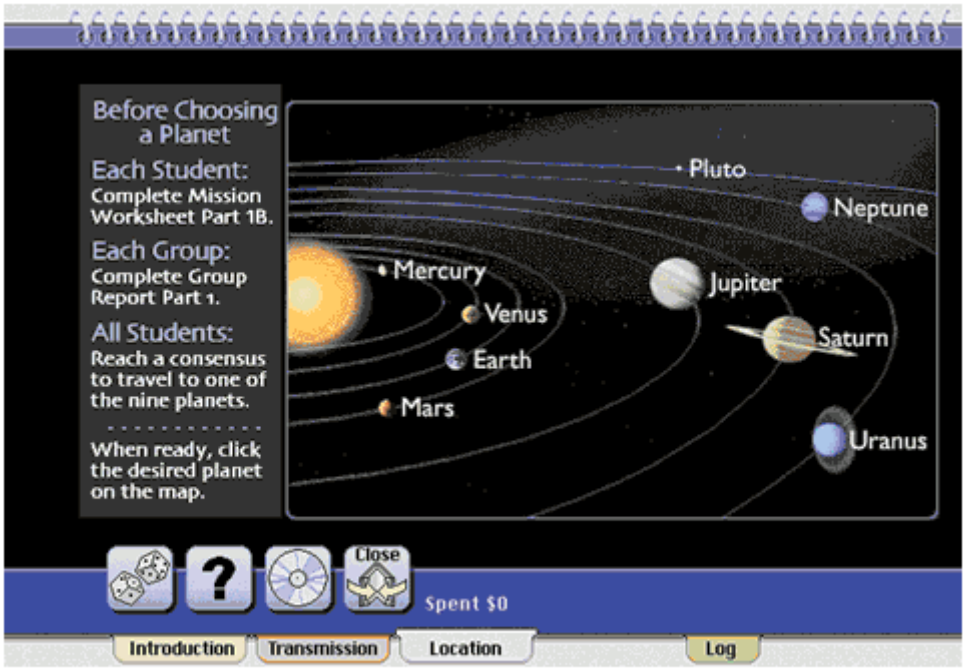
4.1 ABOUT THE GAME

The first game the participants experienced at the camp was *The Great Solar System Rescue*, a collaborative, educational role playing game created by Tom Snyder, and targeting children grades 5 to 8. Each group member role-played a different character – one Commander (Captain) and four experts: Astronomer, Geologist, Meteorologist, and Space Historian. Each expert read their own player manuals that included data exclusive to that expert's assumed knowledge base and shared their specialized information with the group while the Commander made the final decisions at various choice points. Each team shared one computer and the Commander controlled the mouse.

The game starts on a spaceship as a robot-voiced computer assistant guides the team through the game. The five scientists are gathered by Starfleet to rescue four probes lost throughout the Solar System. Clues revealed in video clips are the last transmissions from the probes. By analyzing the clues, the team must identify and travel to the location of each lost probe (Figure 4.1), and decide on a proper rescue plan after conducting the necessary experiments to help evaluate the local conditions. The players are told that everything has a cost, and are reminded to spend as little money as possible (though, in fact, the game imposes no limitation on the budget). After the team selects their rescue plan, the

computer assistant or the probes verbalize the confirmation and describe the outcome, along with video clips displaying the results.

Figure 4.1: Great Solar System Rescue



Students must find and rescue probes lost in our solar system.

4.2 CROSS-GROUP COMPARISONS

Attitudes toward the Game

All groups collaborated and made only one or no mistake to rescue the first probe, except for one 8th grade boy group, who didn't work as a team to make decisions nor did they read the player manuals. The teamwork element was enjoyed by most participants, as well as the learning aspects.

Gender

Most boy teams rescued their first probe faster than most girl teams. However, most girl teams didn't make any mistake while most boy teams made one.

Although all teams but one seemed happy at completing the missions successfully, disapprovals were still heard from both groups of 8th grade boys, dismissing it as "a boring educational game for kids, not us". The 8th grade boys didn't like the fact that they had to take notes and read through the player manuals to play, while other groups had no such complaints. Probably related to their attitudes toward the game, the 8th grade boys were the only groups that didn't consider it as helpful in learning.

A common theme among both 5th and 8th grade girls was including the concept of finding or rescuing something in their game while boys did not mention this. Coincidentally, both grades of girls wondered if there was a real-life probe or ship out there to be rescued.

Crossing gender stereotypes, 8th grade boys and 5th grade girls not only proposed controlling their spaceships or vehicles with a keyboard or the game interface, but they also wanted to see more action on the screen, with 8th grade boys expressing eagerness for more action scenes. The 5th grade girls would have aliens chasing after players, while the 8th grade boys would have aliens guarding the probes and players being able to shoot at them.

Boys noticed and commented that the graphics and video clips were cool, yet 8th grade boys still wished for more video simulations and action, whereas a 5th grade girl asked for a better-looking probe. In terms of character design, a couple of 8th grade boys and a 5th grade girl liked the robots for their artificial intelligence or voice acting, while one 8th grade girl didn't like it.

Grade

The 5th graders expected it to be boring, but were surprised to actually enjoy it. However, the 8th graders wanted a more complicated game: the girls would lengthen the game and ask more questions; the boys would increase the challenge by requiring keyboard controls, having a bigger game world, and developing a more complex storyline.

Although most participants liked the teamwork aspect, some of the 8th graders, especially boys, still preferred playing games on their own. The boys even suggested simulating the other team members on the screen so that each person can play individually. Likewise, although 5th grade girls liked the teamwork, they also complained that the group was slowed down because of one member.

While the 5th graders took the budget limit of the game seriously and regretted having spent too much money, the 8th grade boys didn't find the rules about the budget convincing. However, the 8th grader girls considered integrating budgetary constrains into their own games.

Attitudes toward Space Sciences

Both 5th grade girls and boys loved being part of a science team. The girls preferred collaboration over competition. The boys liked conquering the challenge. Most 8th grade boys liked working as a science team while half of the 8th grade girls did.

Half of the 8th grade girls are interested in careers in NASA or Starfleet, compared to slightly less than half of the 8th grade boys. This trend was reversed for the 5th grade. More than half of the boys in the 5th grade would work for NASA or Starfleet compared to only one 5th grade girl.

The most pronounced difference in role preference is interest in leadership. Many boys in all groups wanted to be the Captain both when picking a game role to play or as their future careers. Some reasons offered were the power of decision-making, “I’m a natural leader”, and not being required to read. After playing the game, the role of Geologist was considered useful by 5th grade boys, hence became a popular desired role in the game; for 8th grade boys it was Meteorologist. Preference for the different roles in the game as well as future careers was diversified among the girls, with no one role standing out as a clear preference.

Gender Comparisons

The Great Solar System Rescue Side by Side 5th Grade Gender Comparisons

5th grade girls	5th grade boys

Game Play Likes and Dislikes	
Likes - researching and learning facts - working as a team - the robot's intelligence	Likes - learning facts about planets - teamwork: everyone contributing - being realistic - the graphic and video presentation of the clues
Dislikes - getting lost - the video talking too fast and too much - the NPC not helping - the probes not looking good - the group being slowed down for one person	Dislikes - glitches - navigation flaws
Regret - having to spending too much money	Regret - spending too much money - balloon getting destroyed - not using the Squat Lander
Expectation - thought it was going to be boring - expected to see action scenes	Expectation - didn't expect it to be that cool because of stereotyped impression of educational games
Implementations	
- make it more challenging by having aliens try to kill the players - include pop-ups to make it more appealing	n/a
Is This Game Good for Learning?	
All 5th grade girls regarded it as a good way to learn	Most 5th grade boys considered it a good way to learn - astronauts' jobs - planet facts - spending money wisely
Favorite Team Member Scientist	
Favorite Role in Games Geologist: 1 - know info about cold, distances Meteorologist: 1 - know temperatures Captain: 1 - cool to be the leader Historian: 1	Favorite Role in Games Geologist: 4 - "he looks at planets and finds volcanoes and rocks on them" Meteorologist: 1 - knowing the temperatures is useful Captain: 1 - made decision, not required to read

- "had a little bit of everyone's data" <u>Future Career</u> A meteorologist: 1 - parents encouragement; but didn't want to work in space An astronomer: 1 - make money A historian: 1 - "dig stuff up, look at clay" A forensic scientist: 1 A vet, herpetologist, or marine biologist:1 A doctor: 1 A dessert chef on TV: 1 An architect: 1 Music business: 1	Historian: 1 - learned about planets' histories <u>Future Career</u> A captain: 3 - "I'm always the leader" A historian: 1 A meteorologist and geologist:1 A game designer: 1
Interests in Working for Starfleet/NASA	
Yes: 1 - because it would be "extraordinary" No: - already had a dream career in their mind - worried about safety Maybe: 1	Yes: 6
Being Part of a Science Team	
All 5th grade girls liked to work as a team - preferred collaboration over competition	Almost all 5th grade boys liked being part of a science team - liked conquering the challenge
To Actually Rescue a Lost Probe, the Following Would Make It Difficult	
- locating the probes - no clues given - long distances - getting the probes on the ship	- locating the probes - no clues given - spending money - recruiting the crew - making the right decisions - way more dangerous
Wonders	
- will we have to go out and find lost space ships? - is there something in need of rescue?	- would we have done better playing again? - how much money did the other team spend?

	- how did the probes get off course? - wonder about the meteorology job
Inspiration for Their Game Design	
- themes of rescuing or finding targets - adding sound effects to space ships - requiring players to go through different levels to find aliens or robots and get them home - "an alien or robot to look through planets to find a human" - a robot driving to Mars to make a colony of robots - allowing players to control vehicles through interface - like *Magic School Bus* - like *Star Wars* - a game world in a "tropical island planet" - a probe gets lost but at the end the character comes home and gets rich	- incorporate different types of missions - allow players to customize characters' features like in Sims - the hints and the application of the facts are cool
References to Pop Culture	
- *Magic School Bus*: cartoon, game - *Star Wars*: movie, game	- *The Sims*: game

The Great Solar System Rescue Side by Side 8h Grade Gender Comparisons

8th grade girls	**8th grade boys**
Game Play Likes and Dislikes	
<u>Likes</u> - teamwork - finding out information about planets from booklets <u>Dislikes</u> - didn't explore individually - didn't do much - didn't like to be tricked by the	<u>Likes</u> - teamwork - artificial intelligence and voice acting of the robots - cool graphics - a sense of achievement when located the probe - easy - "cool to waste government money" - "blow up expensive equipment" <u>Dislikes</u> - preferred to play individually - boring: not much to do - "It only shows how boring

computer assistant - the robots talking with a male voice	educational games can be" - lack of violence - lacking incentive to restrain players from spending money - shouldn't involve money - not interactive enough - taking notes; everything was written down - had nothing to do with astronomy
Implementations	
- "should be longer and have more questions"	- more video simulations and action when locating the probes - have aliens guarding the probes - wanted to shoot aliens - allow individual play while simulating other roles on the screen
Is This Game Good for Learning?	
Yes: learned about planets from the booklets	No: - not fun enough - may be good for kids or science classrooms, but not for us - would not even use it in the classroom - learn from mistakes: it teaches "testing different hypotheses about what could be wrong"
Favorite Team Member Scientist	
<u>Favorite Role in Games</u> Meteorologist: 1 "There is information about the temperature. It gave clue that it was not close to the sun." Geologist: 2 Astronomer: 1 <u>Future Career</u> A Geologist: 2 An Astronomer: 1	<u>Favorite Role in Games</u> Meteorologist: 4 - "I can find the temperature of the planet" - "got to do the most" Commander: almost all NJ - "because he got to push buttons" - " I'm a leader" Historian: 1 - only thing could relate to <u>Future Career</u> All CH2 would grow up to become commanders
Interests in Working for Starfleet/NASA	
Yes: half of the girls	No: More than half Yes: 3 - "love to do difficult flight maneuvers" - it might be easier to go to space than

	working for NASA
Being Part of a Science Team	
Yes: half of the girls	Yes: most boys - “like recording all the stuff” Preferring solving problems as individuals: 2 - It takes too much effort to coordinate
To Actually Rescue a Lost Probe, the Following Would Make It Difficult	
- staying safe - staying mistake-free - long distance - money	- time consuming, depending on the conditions on the planet
Wonder	
“Are there lost probes in space and people are actually trying to find them?”	n/a
Inspiration for Their Game Design	
- a theme of finding targets - trivia type of questions - transmission clues - budget	- make it longer to explore - bigger storyline: a dune buggy and aliens coming out and we shoot at them - fly a spaceship around individually and walk around - requiring players to “push more buttons on the keyboard to fly a spaceship” - a “simulator that floats”

4.3 FIFTH GRADE GIRLS

5th grade girls strongly enjoyed playing the game. They liked working as a team. They liked learning facts and following clues. They thought the game was good for learning. Ultimately one of the two fifth grade girl team games turned out to be highly related to this game: The Great Probe Mission. Most girls weren’t interested in working for NASA or Starfleet although when asked about their career aspirations, six 5th graders who answered proposed careers heavily based on science.

Angel Girls Report

Game Play Likes and Dislikes

AG worked as a team, had thorough discussions, and only made one mistake in the first mission. All girls gave the game a “thumbs-up” for fun. Aquarius “liked when we found out what the robot thinks.” She nodded when asked if she liked going to planets. Auriga “liked that we worked as a team. I liked everything except that we had to spend money and got lost”.

Thinking to improve the game, Hercules suggested, “Make the probe look better. It was all dark. The spaceship dude [the NPC computer assistant] could have been more helpful and given us clues.” Indus told her, “There could be 5 clues every time you get stuck and click clues for each person.” Hercules responded, “We could have made our own person. Aliens could have stopped us and tried to kill us. Make it more challenging.” Columba thought the game was interesting. To make it more appealing, “you could have pop-ups”.

Game Learning Value

AG considered it a good way to learn.

Favorite Team Member Scientist Contrasted with Dream Job

Indus role played the Historian, but she hopes to be a forensic scientist: “I never knew that Mars had channels on it and there was probably life”. Columba was excited being the Commander. When she gets older, she “wants to be a vet,

herpetologist, or marine biologist." Hercules was the Astronomer. For her future, she "wants to set up a record deal with my cousin". Auriga was the Geologist. Her career goals are mixed: "I want to be a doctor and I want to do hair." Aquarius played the Meteorologist. When she grows up, she wants "to be on TV and make desserts".

Interests in Working for Starfleet/NASA

Columba is considering a career with NASA. "I think it would be interesting. People can say 'I have a job. I work for NASA'. It's extraordinary. It's different. It's exciting." None of the other 5th grade girls expressed interest in working for NASA in the future. Auriga wanted to be a doctor in a hospital or medical office. Hercules worried about safety: "If I get killed [in the space], I'll get my dad to sue". Indus changed her answer from "no" to "maybe" after being asked about forensic science.

Being Part of a Science Team

All 5th grade girls liked being on the science team.

Rescuing a Lost Probe

If an actual rescue of a probe were carried out, Aquarius said it would be hard because there would be "too many places to check".

Wonders

Auriga said “I thought it was going to be boring”. Hercules thought it was going to be exciting: “I thought someone would got shot- he would get killed and then we would have to put him back together. The game had a tacky name”.

Inspiration for Their Game Design

Talking about their game ideas, Hercules suggested, “It could be like a Star Wars game”. Indus talked to about a game idea regarding “a town with robots”. Aquarius proposed that in their game “the player could be an alien or robot and have to look through planets to find a human”. Hercules brought up another idea: “The probe gets lost. At the end of the game the space dude is chillin’ – he comes home and gets rich. It could be like a tropical island planet”. Columba said, “There’re no tropical island planets”. Indus considered including “a robot driving to Mars. Sort of like you have to make a colony of robots. I thought more about it last night.”

Solar System 6 Report

Game Play Likes and Dislikes

Girls had a lot of group discussion and didn’t make any mistakes. It only took them 20 minutes to rescue one probe. They replayed the video clip three times so as not to miss any details.

Ursa Major, Draco, and Leo liked teamwork. Ursa Major, who liked everything, said she liked that they “work as a team instead of fighting over

what's best". Leo also liked "learning new facts". Hydra considered it "really fun because we had to research and find clues. It was a good learning experience". Lupus said it was cool that "I got to be Captain; got to ask questions and be the leader".

Leo complained, "When someone was not paying attention, they didn't have an opinion when it was needed and it slowed us down." Leo also said the "computer [video clips] were too fast so we had to play it over and over". Draco explained for herself "I didn't understand some of the stuff, so that's why I was slow". Leo replied that she wasn't talking about Draco in her previous comment. Hydra also said "Some people are slow". Lupus commented, "The computer kept on talking and talking".

Game Learning Value

All SS6 girls agreed it was a good way to learn.

Favorite Team Member Scientist

Discussing who had an interesting job in the game, Leo said "The Historian because it had a little bit of everyone's data". (This is not true. There is exclusive information for each expert.) Ursa Major "liked the Geologist – because it had information about cold and distance". Hydra liked "Meteorologist because I got to see all the temperatures".

Hydra would like to become a “meteorologist, my parents say I’d be good at it--but I do not want to be out in space”. Ursa Major wanted to be an “architect – oh, out of the scientists in the game – Astronomer because you get whole bunch of money”. Leo picked “Historian – you get to dig stuff up, look at clay”.

Interests in Working for Starfleet/NASA

The SS6 girls didn’t show interest in working for Starfleet or NASA. Leo said, “I want to be a nurse but it can be with NASA”. Hydra wanted to be a veterinarian. Ursa Major said, “No, what does architecture have to do with space?”

Being Part of a Science Team

All of the girls liked being part of the science team. Ursa Major bragged “We did very, very good”. Leo “wants to do it again”.

Rescuing a Lost Probe

Thinking about actually rescuing a probe, Hydra said it would be hard because it “takes a long time to get there, and we don’t know how to get it in ship”. Ursa Major said, “You don’t know where it is – you have to get information by yourself, not have it given to you by computer”. Leo also expressed concern that there would be “no clues like in the game”.

Wonders

Thinking about the game, Ursa Major wondered if “we would have to go out and find a lost space ship”. Leo asked, “Is there something out there in need of rescue?”

Inspiration for Their Game Design

Talking about their ideas for designing a space game, Lupus thought about adding “how a space ship zooms and sounds”. Draco proposed to “rescue somebody or something”. Hydra wanted to “have controls in front of you and have to do something, driving”. Ursa Major added, “We could have different levels like Hydra said before, have a robot in it, instead of finding aliens, would have to find the robot and get it home”. Draco added, “Maybe one level rescuing somebody, another finding something, something new each time”. Draco would make their game “like ‘Magic School Bus’”. Leo said she had “thought about a game like this before I came here”.

4.4 FIFTH GRADE BOYS

Most 5th grade boys had fun playing the game and considered it a good way to learn about astronauts’ jobs and planet facts. Four boys liked the role of Geologist “because he looks at planets and finds volcanoes and rocks on them”. When they grow up, three boys wanted to be captains. More than half of 5th grade boys would be interested in working for Starfleet or NASA. Almost all 5th grade boys liked being part of a science team where everyone makes his own

contribution. Thinking about their game, boys wanted to incorporate different types of missions in it.

Frozen Eclipse Report

Game Play Likes and Dislikes

In the first mission, boys read their manuals and seriously discussed their decisions. They only spent 20 minutes and made one mistake. In the second round they didn't use the manuals anymore, mostly guessed their answers and made more mistakes than the first time.

Octans and Pisces liked teamwork. They liked that "everyone has different jobs". Volans commented it was "realistic and the game had a lot of facts". Taurus "liked how they gave us clues with graphics and videos". He "didn't think it would be that cool because many educational games are all blocks".

Talking about dislikes, Octans said "If you didn't pick the right one, people couldn't participate". Volans "didn't like how with all these probes, if you chose the wrong thing, you were stuck and couldn't do anything".

Game Learning Value

Volans and Octans considered it a good way to learn "because that's what people actually do sometimes, so kids know what its like to really do those things".

Favorite Team Member Scientist

When picking roles to play, Octans, Taurus, and Volans all wanted to be the Captain, but the first two didn't insist. Volans: "I'm good with computers, so I'll be captain".

Taurus named "the meteorologist, because he actually knew the temperature of Neptune, which is useful". Octans thought "the geologist had an interesting job and I'm not saying this because I was the geologist". Chameleon liked the geologist too because "when we were on Neptune he knew what to do".

Volans wanted to grow up to be a captain. Taurus would first want to be "mostly myself, then the meteorologist and the geologist".

Interests in Working for Starfleet/NASA

All FE except for Volans raised hands to reveal interests in working for Starfleet.

Being Part of a Science Team

All boys liked being part of the science team. Pisces said, "You get to do important stuff that helps everyone". Taurus added, "I also like the challenge, conquering the challenge".

Rescuing a Lost Probe

Thinking about actually rescuing a probe, Chameleon concerned: “What if you didn’t have transmissions of clues”. Octans suspected “it could be way more dangerous”.

Wonders

After experiencing the game, Chameleon “wondered about the whole meteorology job”. Taurus “wonder if we could have done better”.

Inspiration for Their Game Design

All boys thought they were inspired with ideas, though not many ideas were described. Some said that hints and the application of the facts were cool.

Rocket Lions Report

Game Play Likes and Dislikes

It took RL 45 minutes to finish one mission, the longest among all boy groups. No one seemed enthusiastic about reading the manuals, but the Captain made efforts to keep everyone focused. They had thorough discussions and made only one mistake.

Sextans liked everything, saying that it was good to “get to learn about Venus, Saturn, Earth, Mars, Neptune”. Scorpius “liked the whole thing except that the balloon got destroyed”. Canis Venaciti commented: “We should’ve used squat lander”. Scorpius also liked the teamwork in that “everyone had a part in it

and had something to do with the mission". Pluto liked teamwork too, "it was good that everyone was included. If one person didn't read their lesson, we couldn't have gone to the right planet".

Horologium regretted that they spent too much money. Pluto and Canis Venaciti complained about "glitches in the game… it stopped for 5 seconds… we couldn't hear anything".

Game Learning Value

Sextans thought it "teaches a lot about all the planets". Scorpius said, "If you're the Captain, it teaches you decision making, if you're the Astronomer, it teaches you about stars (…named the all roles)." Horologium remembered the "temperatures on different planets". Pluto said it "taught us about everything: what planets had what temperatures and the types of jobs astronauts have". Horologium learned "how to spend money wisely".

Favorite Team Member Scientist

Sextans "liked them all: Historian because you get to learn about history; Geologist because it's a cool name; Astronomer, because it's me; Captain because he doesn't have to read; meteor (can't pronounce it) because it's a big name and I can't pronounce it". Scorpius "liked the Geologist because he looks at planet and finds what's on them like volcanoes and rocks". Horologium favored "the Captain because he got to choose what we did and didn't have to read".

Canis Venaciti preferred “what I did (Geologist) because I had it”. Pluto liked “Historian because I got to learn about the histories of the planets”.

Sextans and Scorpius both wanted to be the Captain when they grow up. Scorpius said “I’m always the leader at school and with my friends”. Canis Venaciti said none of those but he wanted to be a game designer. Pluto said, “If I had to be one, I’d be the Historian because I like to learn about history and what people did”.

Interests in Working for Starfleet/NASA

Scorpius and Pluto would be interested in working for Starfleet or NASA.

Being Part of a Science Team

All boys except for Horologium liked being part of a science team. Sextans liked it for being fun. Canis Venaciti did because he “got to play games”. Scorpius did for a different reason: “I was the leader. I got to sort out what people said and make the right decisions”. Pluto “got to explore planets”.

Rescuing a Lost Probe

Sextans and Horologium were concerned about how much it would cost to rescue real probes. Scorpius thought the problem would be to “find them on the planets. You can’t tell you exactly where they are”. Canis Venaciti was afraid it would be hard “finding people who’d want to do it”. Pluto said the hardest part would be “making the right decision, like with the balloon. If someone was on it

and if it went off course, you took a life away". Horologium protested, "No one was on it. It was just a robot". Pluto replied, "You took a robot's life away".

Wonders

After playing the game, Sextans was eager to know "how much money did the other team spend". Scorpius wondered "How to get it at my house. If I play it again, what different decisions I'll make". Pluto wanted to know "how the probes got off course".

Inspiration for Their Game Design

Thinking about their game, boys wanted to incorporate different missions in it. In addition, Scorpius suggested allowing players to "design your team like *The Sims* – add facial hair".

4.5 EIGHTH GRADE GIRLS

The 8th grade girls liked the game but had many complaints and suggestions to improve it. They liked the teamwork and finding out information about planets from the player's manuals and considered it as a good way to learn. Half of the girls would like to work in the field of space exploration in the future. Half of the 8th grade girls liked being part of a science team.

Desdemona Report

Game Play Likes and Dislikes

It took DE 50 minutes to accomplish one mission, without any mistakes. Girls spent extra time filling out the worksheets.

Carina felt “it was fun to find clues and details”. Provo also liked “finding out details about other planets”. Libra didn’t like “when the computer first said the probe wasn’t there, when it was there”.

Game Learning Value

Carina “learned about more things because of the books and because you had to know about planets”. Andromeda added, “You had to know about the planets to find out about the probe”.

Favorite Team Member Scientist

When picking roles, Carina seemed to want to be the leader but she didn’t speak up as she usually did, waiting to be assigned as the Commander.

Andromeda regarded Astronomer as an interesting job. Aquila said, “They were all interesting in their own way”. Andromeda “thought about being an Astronomer”.

Interests in Working for Starfleet/NASA

Asked if they would be interested in working for Starfleet or NASA in the future, a girl said, “Sure—it’s cool to be involved in something like exploring space”.

Being Part of a Science Team

Carina considered that “it was fun that you had to work with other people” on a science team.

Rescuing a Lost Probe

Thinking about actually rescuing a lost probe, Aquila thought it would be hard to avoid making mistakes. Provo said, “Traveling so far, high costs, and failing” would make it difficult. Andromeda said distance might be a problem: “It takes 3 years and we will be done by that time. Jupiter is even farther”.

Wonders

Provo asked if “there are lost probes in the space and people are actually trying to find them?”

Inspiration for Their Game Design

As for designing their game, Carina said, “We could have someone lost and you could have a budget and use transmission clues”.

Kalisti Report

Game Play Likes and Dislikes

Girls spent 30 minutes to finish one mission without mistakes, although they had good luck guessing the rescue plan, thinking time was up.

Cygnus, Apus, and Equileus explicitly expressed liking the teamwork: “Each of us has to put something in as a group.” Perseus and Equileus commented that it was a cool game. Fronzel liked “the questions and lots of information in the packets. But one question is weird that is about the canals.”

Cygnus talked about the downside of teamwork: “We wanted to search around by ourselves.” She also complained “the game did not like that we didn’t do a lot of stuff”. Perseus “did not like all the people [robots] talking with male’s voices.” [It is not clear whether she disliked the robots because of their comments, or simply their voices.] Equileus and Apus said the game “should be longer and have more questions.”

Game Learning Value

Cygnus and Fronzel thought it was a good way to learn, as Cygnus said “the booklet provides all the information about the planets.” Fronzel was disappointed that “we did not have time to read through it.”

Favorite Team Member Scientist

Girls had different opinions regarding which job was most interesting. Apus voted for Meteorologist: “There is information about the temperature. This gave a clue the planet was not close to the sun.” Fronzel and Perseus both wanted to be the Geologist. Fronzel thought “There is a lot of information about geology”. Perseus said “that probably helped the most” during the game.

When they grow up, both Cygnus and Fronzel want to be geologists. Cygnus “likes the characteristics and setting”. Perseus told the group that “my dad is a Geologist. So I already know a lot, but I do not care about it.” Equileus said, “Astronomers need to adapt themselves.”

Interests in Working for Starfleet/NASA

All girls except for Fronzel would like to work in space exploration in the future. Fronzel wasn’t sure if she would.

Being Part of a Science Team

When given the choice to work by themselves or on a team, all girls chose teamwork. Perseus added, “On a team, we can share our ideas.” Apus added, “Like [sharing] different temperatures and different features or figures.”

Rescuing a Lost Probe

Imagining what would be hard about an actual rescue, Apus said, “Being safe in different temperatures, and not running into land features”.

Inspiration for Their Game Design

Thinking about creating a game, Perseus said it needs the element of “finding stuff”. Apus suggested “trivia type of questions will give you more clues.”

4.6 EIGHTH GRADE BOYS

Although criticizing it as boring and meant for younger kids, the 8th grade boys could still point out a few advantages of it, such as the character design. Eighth grade boys didn't think it was good for learning mainly because it wasn't fun enough. They didn't like to take notes or read the manuals.

Most boys wanted the commander role. Four boys also liked the Meteorologist because he was useful to the team. All of CH2 wanted to become commanders. More than half of 8th grade boys were not interested in working for NASA. Most 8th grade boys liked being part of the science team while several of them preferred solving problems individually. Planning their games, boys would allow players to fly spaceships.

Challenger2 Report

Game Play Likes and Dislikes

After finding the probe, all the boys showed satisfaction and were smiling and laughing. They all worked well as a group, make decisions quickly, finished one mission in 20 minutes, and only made one mistake. Overall, they had a lot of discussion as each one tried to pitch in what they had found in the manuals, although Phoenix, the Commander, said "Lets just click and die".

Phoenix thought it was "cool to waste government money" and "to blow up expensive equipment". Capricornus said, "Voice in the ball was really cool [The

computer assistant]". Orion added that the "artificial intelligence in probes" was good. Apollo and Delphinius "felt smart about finding the probe". Delphinius felt the "graphics were cool". Orion added, "I did not have to pay too much attention to achieve the goals", and that was good about the game because "anyone can play it".

Talking about dislikes, Orion said that the game had "no violence. Violence makes it fun". Phoenix "didn't like it; it was boring because there wasn't much to do, you only got to click some buttons". Apollo "wanted to go to space and shoot aliens". Capricornus said "this mission had nothing to do with astronomy". (He was the astronomer).

Phoenix revealed his attitude: "It only shows how boring educational games can be" while Orion offered his solution to improve them: "they need to have killing".

Game Learning Value

CH2 didn't assess the game as good for learning. Phoenix said, "No, because everything was written down". Orion said "For little kids yes, but not for us". Serpens said, "For school maybe but not for space camp". He further clarified: "For science classrooms". Apollo responded: "I would not put it in the classroom." Delphinius said, "If there were aliens guarding the probe and we have to rescue it from them, then it will be cool". Apollo added, "It needs to have something that captivates you".

Favorite Team Member Scientist

When the boys were picking roles, Orion and Phoenix both wanted to be the Commander. Orion said, “I will fight you for it”. The group eventually voted on Phoenix.

After playing the game, asked which player had an interesting job, Phoenix said “Historian, only thing you could really relate too. People were wondering what was up there”. Capricornus, Delphinius, Orion, and Serpens chose “Meteorologist because I can find the temperature on the planet” or “because he got to do the most”. Capricornus and Delphinius preferred Commander “because he got to push buttons”. Apollo commented that the game “didn’t really do much with the aspect of being scientists”.

Asked which role in the team they would like to be when they grow up, all said the Commander.

Interests in Working for Starfleet/NASA

None of CH2 would be interested in working for NASA in the future.

Being Part of a Science Team

All CH2 liked being part of the science team. Orion liked “recording all the stuff”.

Rescuing a Lost Probe

Delphinius imagined that to actually save a lost probe “would take a long time, maybe it would depend on the conditions on the planet”.

Inspiration for Their Game Design

Orion proposed to “fly a spaceship around by yourself and walk around”. Serpens suggested including a “simulator that floats”. Delphinius recommend requiring players to “push more buttons on the keyboard to fly a spaceship”. Apollo again referred to the Rescue game as “too short and boring”. He would “make it longer to explore, with a bigger storyline like a dune buggy and aliens coming out and we shoot at them”.

Neptune Jihad Report

Game Play Likes and Dislikes

The boys were mostly blurting out answers without consulting the manuals, not responding to, or building on the contributions of others. They only spent 20 minutes on one mission and made several mistakes.

Telescopium complained, “It was horrible, boring, and didn’t ask for any of your own opinions. There is no incentive because the money is fake and you can spend as much as you want”. Hydrus thought it was cool to work as a team, but the game itself wasn’t interactive enough. He thought that “the only problem with this is that we haven’t had the chance to get to know each other. You can’t just become a team, when you don’t even know the other”. He also criticized the

budget limit: “When I do something, I like to do it for real. If it’s about space it should be about space, and not money.” He saw a need for improvement: “I want more action to see satellites, more simulations.”

Game Learning Value

Regarding learning values, Telescopium “didn’t really learn anything educational about space in this game”. Hydrus said, “Games aren’t fun if you have to take notes on everything.” Monoseros suggested a possible improvement of the game: “Stuff should be on the computer, so it can be a one person game, like simulations of the other people right on the screen, so it can be individual”.

Favorite Team Member Scientist

All boys wanted the Captain role except for Sagitta. Monoseros explained, “I’m a leader”. Hydrus repeated what he claimed earlier, “I need to get to know people better before I can work as a team”.

Interests in Working for Starfleet/NASA

Three NJ boys would like working for NASA or going to Mars as a possible future career. Lynx would: “it would be easier to go to space though”. Monoseros would too, “Mostly because I just love to fly; But I like it the hard way: craters, mountains, whatever. Bring it all on because I love to do difficult maneuvers”.

Hydrus said no, “I wouldn’t really care to work for Mars; it’s just not what I want to be when I grow up”. Telescopium felt “it might be interesting”.

Being Part of a Science Team

Asked if they enjoyed being part of the team on this mission, Hydrus thought it was all right. Monoseros thought “it was fun, but the way we play, we’d put NASA into bankruptcy”.

Talking about being a part of a group that solves problems, Telescopium said “it’s better and easier to solve problems as individuals. You can’t control everyone else very easily.” Hydrus felt “It takes too much effort; first you have to put a bunch of effort into getting people on the same page and so on. You can’t control anything this way.”

Rescuing a Lost Probe

Asked what the boys found hard about flying the probe, Telescopium said, “The meteors were most difficult”. Monoseros thought “the money part was hard”. Hydrus said, “It provided good information on the functionality of testing, you know like testing different hypotheses about what could be wrong. You have to learn from your mistakes.”

CHAPTER FIVE: SPACE ACADEMY GX-1

5.1 ABOUT THE GAME

Space Academy GX-1 is an educational, single-player computer game created by Riverdeep. It targets children aged 8 to 12, or grades 2 to 6. In the intro animation, the Academy is depicted as “out in space in orbit around the Earth”. Upon initial log in, the players can decide to name a cadet, or accept the default identity, Admiral. There is no representation of the players in any form throughout the game except for names in the text. There are, however, non-player characters (NPC) dressed in uniforms who appear on the right-top corner of each screen. NPCs give verbal feedback about player performance.

The game consists of three mini games. The space camp participants were advised to try the mini-games in the following order: Gravity Pilot Trainer, Earth Sun Moon Simulator, and lastly the Planetary Data Center. In Gravity Pilot Trainer, the player adjusts angle and thrust to launch rockets or satellites to attempt to achieve the goals in each scenario. If angle and thrust are incorrect, you lose them in a crash or they drift away into the space. The game provides feedback by saying “try another angle” or thrust after a few failures occur. If the player still makes mistakes, the game blinks the right answer for 3 seconds, and then reverts to the incorrectly chosen setting.

In the Earth Sun Moon Simulator, players can change the rotation and revolution of Earth and other planets to find out how those worlds would change under different rotation speeds and angles.

The third section is Planetary Data Center (Figure 5.1) where facts about the Solar System are provided, then players are tested with multiple choice questions. The feedback for a correct answer is always an animation of a spaceship setting out to the destination planet.

Figure 5.1: Space Academy GX-1 Planetary Data Center

5.2 CROSS-GROUP COMPARISONS

Attitudes toward the Game

Despite not overwhelmingly liking the game, most groups still talked about possibly incorporating *Space Academy*'s training element into their own games. Most of the groups dismissed the NPCs for being too talkative or trying too hard to speak in a "cool" way.

Both boy and girl 8th graders liked the idea of requiring players to answer questions in order to proceed in their own games. Both female and male 5th grade groups would allow players to choose from among different activities to do in their games.

Grade

Not surprisingly given that *Space Academy GX-1* is targeted at grades 2 to 6, the 8th grade boy and girl groups complained it was too easy and boring. In addition, although within the age target of the game, some of the 5th grade boys considered it too educational and easy. They would like their own games to be more challenging.

Gender

Gravity Pilot Trainer and Planetary Data Center were the two favorite sections among girls, with more 5th graders preferring the former and more 8th graders the latter. They liked reading the facts and answering questions in the Planetary Data Center. Gravity Pilot Trainer was good for learning, but it wasn't the first thing they thought of as fun.

Girls liked that the game offered different levels of difficulty to accommodate different player abilities, and hoped their games would include this aspect too.

On the opposite end of the gender spectrum, a few boys liked the Sun Earth Moon Simulator but most boys liked that they could shoot rockets in Gravity Pilot Trainer and did not like much else about *Space Academy*. They wanted to see more action and weapons incorporated into their game. Rockets and missiles were so important to them that these would be part of their own games. They did notice they could learn facts from reading, but that was the game's learning value, not something that made it fun.

Interest in a Real Space Academy

Most 8th grade girls and half of the 8th grade boys would like to attend a real space academy. Eight of the ten 5th grade boys would attend a real space academy if there was one, compared to only one fifth grade girl who definitely would do so and three others who said maybe. More 5th grade boys would consider pursing a real-world job doing what they did in the game than 5th grade girls, mainly for the Gravity Pilot Trainer. 8th graders weren't interested in those specific jobs.

Most groups imagined a real space academy would focus its training on space sciences. Students would still have to do homework and learn math and the natural sciences. The 5th graders worried a real space academy might be

dark or cold because it would be in space. 8th graders were concerned that they might not see family and friends often.

Gender Comparisons

Space Academy GX-1 Side by Side 5th Grade Gender Comparisons

5th grade girls	5th grade boys
Game Play Likes and Dislikes	
Likes - good directions - well planned out - adventure-like - exciting - go to different levels Dislikes - NPCs - directions not helpful - music Implementations - needs more levels - prefer to shoot asteroids	Likes - shooting the rockets up in the air to reach the targets Dislikes - NPCs: dumb, talk too much - too educational - needs action, guns - easy
Game Learning Value	
Yes: - "learned about planets, what's on the planets"	Yes: "reading all the facts" No: didn't like "reading any of the facts"
The Most Interesting Section	
Gravity Pilot Trainer: 5 Planetary Data Center: 3 Earth Sun Moon Simulator: 1	Gravity Pilot Trainer: 7 Planetary Data Center: 1
Have a Real-world Job Doing What They Did in the Game	
Yes: 1 - "fun, first had to try to figure out questions, get things to take with us to planet" No: most girls - may "have to start over if have the wrong stuff" - it is just a game, "why would you want to do it for a job?"	Yes, in Gravity Pilot Trainer: 4 No: 4 - "too easy"

Maybe: 1 - “as long as I make money”	Want to make games: 2 - but make harder games
Attending Real Space Academy	
	There will be and should be a Space Academy to train scientists: 6
Wouldn’t attend Space Academy: most girls - “be scared to go out there” Would: 1 Maybe: 3	Wouldn’t attend Space Academy: 2 - “don’t like space” Would: 8
<u>Compared to regular schools:</u> Dissimilarities: - space academy would be more fun - only need to learn about space - would have to wear a uniform - it “would be dark because you’d be in outer space”	<u>Compared to regular schools:</u> Dissimilarities - “won’t have to do math, spelling - “math is going to be harder” - “space [academy] teaches astronauts, regular school teaches kids” - “five million times more fun and five million times more expensive” - “learn different things like how to survive in space” - artificial gravity - freezing, no fire
Similarity: “both have teaching”	Similarities: - “math and science would be taught” - they have teachers” - “we will still have to learn” - boring - there’d be pranks
Wonders	
- “If stuff in the game is true; how do people gather info—is it real?”	- “if things in space school would be really like that”
Inspiration for Their Game Design	
- require players to “be trained for awhile before they get to go to outer space” - “see some different kinds of equipment, choose tools based on where you’re going” - “have different games” - “shrink self so they can go over mountains”	- include “training mission before the actual game starts” - allow the players “to figure out what job you would be most comfortable doing” - “have kind of difficult but not too difficult controls to the game” - “have rockets to try and hit stuff” - “have a hint system”

- "Intro, then sign in sheet – put in name and it calls you "Cadet whatever" – insert name you entered"	- need "creative ways to present the facts" - "less character talking, and use modern slang, not old"

Space Academy GX-1 Side by Side 8h Grade Gender Comparisons

8th grade girls	8th grade boys
Game Play Likes and Dislikes	
<u>Dislikes</u> - too easy - "boring after 5 minutes, especially the thrust" - the example presentations were too long: "fewer examples would be better" - NPCs make corny comments <u>Likes</u> - the facts in Planetary Data Center - propulsion was interesting, and wish it were longer - interacting with it - "different levels"	<u>Dislikes</u> - boring - lacking interaction - too easy: "it was like 4th grade" <u>Likes</u>: Gravity Pilot Trainer only - got to "shoot at something" - "how they explained" - "get to control everything" - "the power crane" - "gave me something else to do and not just blowing up stuff" <u>Implementations</u> - the intro animation: "should be able to control the speed of the ship"
Game Learning Value	
Yes: - "It gave you information; second part had a lot of facts" - "it showed how to pay attention to gravity, thrust, angle of rocket; different gravity for different planets" No: it was so boring that they didn't remember anything Not this one but "computers games in general" were good learning tools	Yes: 3 - angles, thrust, and trajectories in Gravity Pilot Trainer
The Most Interesting Section	
Planetary Data Center: several girls - more action	Gravity Pilot Trainer

- read information to figure things out Gravity Pilot Trainer, Earth Sun Moon Simulator: 2	 Earth Sun Moon Simulator
Have a Real-world Job Doing What They Did in the Game	
No - prefer arts and music	No Maybe: 1 - “depends on the money”
Attending Real Space Academy	
There will be a space academy - perhaps created by NASA or International Space Station - it may not be in Earth’s orbit - “need to colonize first, it would be easier if there were people in those colonies and they could go to these academies” Would attend: most girls - see sights, learn more about planets - a good place to train scientists or astronauts <u>Compare to regular schools:</u> Dissimilarities - space academy would be in space - learn more about certain subjects such as rockets and planets - more information available to students - like a boarding school, don’t see family often - do not have teachers Similarities - still sit in chairs, listen to teachers - still have “homework, science, history and math”	Monoseros didn’t think there would be a Space Academy built within his lifetime because it would be too costly Would attend: half of the boys - could float around - get trained - “use all your senses in space” - if school work is not required there Wouldn’t: - eat space food - do school work - be monitored by teachers - leave friends on Earth
Wonders	
- How long will it take to begin a space	- “Why would somebody want to be in

academy? - “How hard is it to shoot a rocket in real life”	a space academy?” - the consequences of the missile missing the target
Inspiration for Their Game Design	
- different levels for different people - “a trivia game–get something right before move on” like Planetary Data Center - less repetition	- “train and research your skills” - require players to answer questions to kill people or to continue - shoot missiles at aliens using fuel-efficient angles - hellfire missiles that follow targets up to 30 minutes and blow everything away

5.3 FIFTH GRADE GIRLS

The Girls seemed enjoy the game. All 5th grade girls agreed that it was a good way to learn. Gravity Pilot Trainer appealed to half of the 5th grade girls, while Planetary Data Center was considered the favorite of three. Most girls wouldn’t want a job doing what they did in the game. Most girls didn’t want to attend Space Academy if there was one.

Angel Girls Report

Game Play Likes and Dislikes

Aquarius and Auriga “liked all of it.” Columba liked it too “because it was interesting how it was planned out.” Indus thought it was good overall and “liked how they worked”. However, she had a comment on the game directions: “All the games gave you directions but the directions are not a lot of help.” Aquarius, on the contrary, liked the directions. Indus “didn’t like the music [because it] gets stuck in your head”. Columba too “didn’t like the music and annoying people [NPCs]. They were like ‘Good job’”. Hercules thought “it was all right. It wasn’t the

best space game. We have better space games at home where you shoot asteroids."

Game Learning Value

All the Angel Girls thought *Space Academy* was a good way to learn.

The Most Interesting Section

Four AG girls named Planetary Gravity Pilot Trainer the most interesting part of the game. It was good because you "start going to different levels," Columba said.

Angel Girls would not like to have a job doing what they did in the game. Indus said, "the game is just for fun. Why would you want to do it for a job?" Hercules provided an answer: "Because you get paid". Aquarius said jobs should be fun. Columba said, "As long as I make money. It's fun when you get money."

Attending Space Academy

Both Auriga and Indus said "maybe" about going to places like the space academy. Auriga "liked the first thing when we had to do the angle. It was funny when it was laying in the ground". Aquarius and Indus liked setting angles, like "90 degrees". Auriga clarified: "When it was laying flat". Aquarius: "oh underground".

Indus and Hercules both said that the *Great Solar System Rescue* (not *Space Academy*) was their favorite game up to that point of the camp.

Solar System 6 Report

Game Play Likes and Dislikes

Hydra judged this game as “really fun, people explained it well enough in the game so I can understand”. Lupus too thought it was fun. She said it was like “an adventure you’re having”. Ursa Major said it was a “good way to learn, exciting, I want to do more”. Leo was “glad the sound got fixed”. She thought it was a “good experience, I learned”.

Hydra thought that the game “needed more levels”: “Some of it was way too easy, some questions were too hard”. Ursa Major reported that she “couldn’t find the date”. Some girls complained about having computer difficulties so that they didn’t have enough time to play. Leo regretted that she “couldn’t get to play right away because the sound wasn’t working”.

Game Learning Value

Girls all agreed that it was a good way to learn. Hydra said, “It would be if there were more levels”. Leo liked that they “learned about different planets and what’s on the planets”. Ursa Major liked that it “had questions about planets, and had a spaceship”. Hydra said you “had to plan ahead of time”. Lupus thinks the game “helps you learn more about space”.

The Most Interesting Section

The Planetary Data Center seemed to be the most interesting section for three girls. Lupus liked the Earth Sun Moon Simulator while Draco picked Gravity Pilot Trainer.

The majority of SS6 girls didn't want to have their *Space Academy* game job as a real job. Ursa Major commented, "You have to start over when you do the wrong stuff". Lupus was the exception. She said the job would be fun, "first to try to figure out questions and to gather things to take with us to other planets".

Attending Space Academy

Most girls didn't want to attend Space Academy if there was one. Ursa Major would "be scared to go out there". Lupus would like to go and Hydra said, "Yes…well, maybe".

Space Academy vs. Regular Schools

As to how space academy would differ from their schools, Draco said, "My school is a math and tech program – it's boring – space academy would be better because it's not my school". Hydra thought it'd be "more fun because we would be learning just about space, not [subjects like] geography". Leo said that "it would be different because in regular school you learn about all topics, but in Academy it would just be space. It would be the same because both have teaching." Ursa Major said they would be "the same because both teach you

something; and different because at space academy you would have to wear a uniform". Lupus said "it would be more fun, but Academy would be dark because you'd be in outer space."

Wonders

Ursa Major wondered if "stuff in the game is true; how did people gather the information —and is it real?" Draco was glad to "know that I'm good at this stuff".

Inspiration for Their Game Design

Draco said their players should "be trained for a while before they get to go to outer space". Hydra wanted to include training too: "you should have to go through this school thing – not very long, not a game but only training". Leo proposed for their game "you could see different kinds of equipment and choose tools based on where you're going". Ursa Major got her idea exactly from the game. Let's have an "intro and a sign in sheet – put in your name and the game calls you "Cadet whatever" – it inserts the name you entered". Ursa Major also suggested "having different mini games". Draco wants their game to let you "shrink yourself so you can go over mountains".

5.4 FIFTH GRADE BOYS

Most 5th grade boys liked shooting rockets in Gravity Pilot Trainer. A couple of boys didn't like the NPCs because of their comments. Almost all 5th

grade boys would like to attend a space academy someday. Thinking about their game design, boys would include rockets and training sessions, as well as difficult interface controls.

Frozen Eclipse Report

Game Play Likes and Dislikes

Volans and Pisces said that “shooting the rockets up in the air to reach the targets” was fun. Regarding elements they didn’t like, Chameleon said, “Questions about planets in the Data Center was sort of fun, but not as much fun as shooting rockets”. Volans and Taurus commented that “the characters were dumb; they talked too much”.

Game Learning Value

There were split opinions on whether it was a good way to learn. Some said “spending time reading all the facts” was a way to learn, while others said the game was not really good for learning because they “didn’t like reading any of the facts”.

The Most Interesting Section

All five Frozen Eclipse boys rated the Gravity Pilot Trainer as the most interesting section.

Pisces, Chameleon, and Octans would like to have a real job doing things in Gravity Pilot Trainer, specifically, to be “the driver” from this section of space Academy. Volans was not interested in any of the jobs in the game.

Attending Space Academy

All boys were interested in attending a real space academy.

Create a Space Academy

More than half of the FE boys believe there will be a space academy in Earth’s orbit some day, “so astronauts can be trained”.

Space Academy vs. Regular Schools

Chameleon thought that a space academy compared to schools would be “five million times more fun and five million times more expensive”. Taurus said that “math and science would be taught” there. Octans added, “The math is going to be harder”. Volans said, “We will still have to learn”.

Wonders

Having played the game, FE boys wondered “if things in space school would be really like that”.

Inspiration for Their Game Design

As for ideas for their game, Octans, Chameleon, and Taurus suggested “we could have rockets to try and hit stuff”. Octans proposed their game should allow players “to figure out what job you would be most comfortable doing”. Volans thought they should come up with “some creative way to present the facts”. Taurus said they should have “less character talking and use modern slang, not old slang”. Someone also suggested to “have a hint system”.

Rocket Lions Report

Game Play Likes and Dislikes

Sextans and Horologium didn’t like the game. Sextans said it was “the worst game I ever played in my life”. Scorpius thought “the questions were easy”. He said that overall it “needs action and guns”. Canis Venaciti “liked the gravity button” and “loved” *Space Academy*. Pluto also liked the Gravity Pilot Trainer, but thought it was “too educational”.

Game Learning Value

Asked if it was a good way to learn, Sextans and Horologium said no. Canis Venaciti said yes, while Pluto and Scorpius remained neutral. Scorpius said, “Yes and no.” He thought that “trying to play was interesting.”

The Most Interesting Section

The most interesting section of the game to Canis Venaciti and Pluto was Gravity Pilot Trainer. Scorpius liked Planetary Data Center, while Sextans and Horologium didn't find any section especially interesting.

Sextans and Horologium would not like to have a job doing what they did in the game. Canis Venaciti said yes, that he "wanted to test and make games". Pluto "liked to do a job like in the games" but wanted his real job to be harder than the game. Scorpius echoed a similar sentiment, saying, "No, the job would be too easy". Pluto would like a job in Gravity Pilot Trainer.

Attending Space Academy

Canis Venaciti, Scorpius, and Pluto would like to attend Space Academy while Sextans and Horologium would not. Horologium said that he "doesn't like space".

Create a Space Academy

Canis Venaciti, Scorpius and Pluto believed that there will be and should be a Space Academy to train scientists. Scorpius said, "I'll make it to the academy one day". Pluto said, "Scientists will obviously be in space, they will get trained in space like we saw here". Sextans did not think so.

Space Academy vs. Regular Schools

Imagining similarities and differences of a Space Academy from a regular school, Sextans said that they "won't have to do math, spelling… but they will

teach science". A similarity would be "like regular schools, they have teachers". Horologium said it wouldn't be the same "because space academy teaches astronauts, regular school teaches kids". Canis Venaciti pointed out "in space if they turn off artificial gravity, how would school be the same there". The only similar thing is there'd be pranks there: "Pranks would be turning off the artificial gravity. If library is on fire we just open the door, the books will go away but it is space; it's freezing there, no more fire". Scoripius and Pluto said it would be like normal school "the same thing -- boring." The difference would be they "learn different things like how to survive in space".

Inspiration for Their Game Design

Thinking about their game design, Scorpius suggested including "training missions before the actual game starts" and "adding controls to the game". Pluto agreed on the training mission too: "I would like to have kind of difficult controls but not too difficult".

5.5 EIGHTH GRADE GIRLS

8th grade girls had more criticisms than compliments about *Space Academy*. They were split on judging its learning value. Several girls liked Planetary Data Center the best. They weren't interested in a job doing things like in the game. 8th grade girls pictured a space academy existing someday, perhaps created by NASA or an International Space Station. Most of the girls thought it would be cool to attend a real Space Academy.

Desdemona Report

Game Play Likes and Dislikes

Andromeda liked to “interact with” *Space Academy*. Libra liked “the different levels to go to”. Aquila criticized that “the examples took a long time; fewer examples would be better”.

Game Learning Value

DE girls thought it was a good way to learn. Carina said, “It gave you information; the second part had a lot of facts”. Provo added, “It showed how to pay attention to gravity, thrust, and angle of rockets. And it showed different gravity for different planets”.

The Most Interesting Section

Several girls thought the most interesting section was Planetary Data Center. Aquila and Libra both liked Gravity Pilot Trainer and Earth Sun Moon Simulator.

DE girls would not like a job doing things like in the game. Andromeda had other things she was interested in. Aquila would rather do arts and music, “but if I have to, I would still enjoy it”.

Attending Space Academy

DE girls all thought it would be cool to attend a Space Academy.

Create a Space Academy

Girls believe there will be a space academy in the future. Libra suggested, “We need to colonize first, it would be easier if there were people in those colonies and they could go to these space academies”.

Space Academy vs. Regular Schools

Girls said that Space Academy “would be in space, you’d learn more about rockets and planets than other school stuff”. It would be the same as regular schools in terms of, as Provo said, “homework, science, history, and math”; Andromeda said, “We will still sit in chairs and listen to our teachers”.

Wonders

DE girls wondered, “How long it will actually be before there is a space academy?” and “How hard is it to shoot a rocket in real life”.

Kalisti Report

Game Play Likes and Dislikes

Cygnius liked the facts in Planetary Data Center. Fronzel mentioned “Information on propulsion was interesting, I wish it were longer”.

Perseus didn’t like the game. She said “It’s boring and too easy.” Fronzel said, “It’s explaining and explaining. That takes a long time.” Cygnus complained that it “kept repeating instructions. Apus said that it was “boring after 5 minutes,

especially thrust. It should be more challenging. You should be able to learn more from it".

Game Learning Value

Asked if it was a good way to learn, Perseus answered, "Not the game, but computers games in general". Equuleus said that it was "so boring I don't remember anything". Fronzel commented, "It was corny – what the characters were saying". Perseus added, "When you use good reasoning in the game, then you find it too easy".

The Most Interesting Section

To Apus, Planetary Data Center was the most interesting section: "it has the most action, you get to actually read information to figure stuff out".

KA girls weren't particularly interested in working in these jobs.

Attending Space Academy

Some girls thought attending a space academy would be a cool thing to do. Apus said, "You can see sights and learn more about planets, actually see eruptions". Perseus would if it were more challenging than this game. All the girls laughed.

Create a Space Academy

Girls felt there would be a space academy someday, perhaps created by NASA or an International Space Station. Perseus contended it may not be in Earth's orbit. Apus said: "It should be a good place to train scientists or those interested in being an astronaut."

As for how it would be different from regular schools, Apus thought one could learn more about certain subjects. She also said, "There is a lot of information. In normal school, student interests are there, but there is not much information." Equuleus said, "Maybe like a boarding school, students might not see family as much. Or maybe, they do not have teachers." Apus said she "would be interested in finding out what things grow on certain planets".

Inspiration for Their Game Design

For their game, Cygnus wanted to "make sure there are different levels for different people." Fronzel said there should be "less repetition". Apus said she "still likes the idea of having a trivia game – like Planetarium – you have to get something right before you move on".

5.6 EIGHTH GRADE BOYS

Eighth grade boys didn't enjoy the game too much. They considered it boring, lacking interaction, and too easy. Dismissing two of the three games, they only seemed happy with Gravity Pilot Trainer because they got to "shoot at something". Only one of 8th grade boys would like to have a job like those in the

game. Half of the 8th grade boys said it'd be cool to attend space academy, so they could float around and get trained.

Challenger2 Report

Game Play Likes and Dislikes

CH2 only liked the Gravity Pilot Trainer and not the other two mini games. Once they learned to navigate the menu, they wanted to go back to the first game and did not play the other two.

Talking about what they found fun in the game, Phoenix and Delphinius answered "rocket simulation and how it was explained". Delphinius and Orion said, "It was easy, not too challenging". Serpens liked "the power crane". Apollo said: "I liked it because I get to control everything. We got to shoot at something". Orion: "the game gave me something else to do and not just blowing up stuff".

Capricornus complained, "It had too much stuff for younger kids". Orion too, said, "It was easy, good for younger kids". Phoenix commented it was "kind of boring".

Game Learning Value

Most Challenger2 boys didn't think it was a good way to learn: "No, we already knew everything…it was like 4th grade". Apollo offered a different opinion: "I haven't thought about angles and thrust and what happens if it misses the target".

The Most Interesting Section

Most CH2 boys would not like to have a job like those in the game, except for Serpens. He said, “Depends on the money”.

Create a Space Academy

Most CH2 boys believed there would be a space academy in Earth’s orbit some day. Phoenix said, “You can get actual training experience in space”. Serpens said, “You can float and get the experience”. Capricornus’s reason was “you can touch, see, and use all your senses in space”. Orion questioned, “Why do it over in space when you can do it on the earth?”

Wonders

After experiencing the game, Apollo wondered “how to adjust angle and thrust and what will be the aftermath of missing the target?”

Inspiration for Their Game Design

Phoenix proposed including the ability to “shoot missiles at aliens using angles”. “Some angles are more fuel efficient than others, that will help to save fuel for the missile and reach the target”. Orion said, “I want to use hellfire missiles”. “If you use hellfire missiles, you just drop it and everything blow away, it will follow its target up to 30 min”. Apollo suggested they should include some kind of training. Orion said their game “should have one part to train and research your skills”.

Neptune Jihad Report

Game Play Likes and Dislikes

Most NJ boys didn't like the game. Sagitta "didn't like it at all". Telescopium complained that it was boring, not challenging, and had no interaction. Lynx added, "You're just clicking, that's all."

Hydrus had a suggestion: "When the game starts and kids leave Earth, you should be able to control the speed of the ship".

Game Learning Value

Hydrus and Sagitta learned about angles and trajectories.

The Most Interesting Section

The most interesting section to Sagitta was "the rocket game" [Gravity Pilot Trainer]. For Monoseros it was Earth Sun Moon Simulator.

Attending Space Academy

None of the NJ boys would like to have a job doing what they did in the game.

Sagitta and Monoseros thought "it's just cool" to attend a real space academy: "We could fly around". Lynx added it would be good "as long as you don't have to do school stuff". Telescopium responded, "You wouldn't want to go

there for regular school". He said, "I would never go there. They have no real food and I wouldn't have my friends there".

Creating a Space Academy

Boys seemed to think that there will be a space academy some day, but Monoseros reminded the group: "Remember, everything costs money, so for that reason it probably won't happen in my lifetime." Sagitta asked: "Would we have to eat their food?" (Freeze dried pizza, strawberries, and ice cream were served at space camp. Most kids did not enjoy the taste.)

Space Academy vs. Regular Schools

Imagining a space academy, Monoseros said, "It's cold. If you don't have your homework done the teacher can be with you all day until you complete it." Sagitta worried "we would have to live close to our teachers".

Wonders

Lynx wondered, "Why would somebody want to be in a space academy?"

Inspiration for Their Game Design

For game ideas, Sagitta suggested "you have to answer questions in order to kill people". Monoseros supplemented "or in order to continue."

CHAPTER SIX: LIFTOFF

6.1 ABOUT THE GAME

Liftoff is an educational computer game created by Entertainment Technologies Inc. and targeted at children grades 4 to 7. The player's assigned role is a trainee in an astronaut training program. The game includes various mini games, but participants were encouraged to start with the "Launch Simulator" first. They were also told to feel free to explore other sections such as "Assemble Spaceship", "3D Crew Area", "Space History" or "Astronaut Nutrition".

Launch Simulator (Figure 6.1) has 11 training sequences where players must follow steps in order to operate a space shuttle successfully. Directions are provided, and executions must be carried out at precisely the right moments during the launch sequence to perform each required action. An Event Timer keeps track of task times. There are no avatars for both the player and non player characters (NPC). All the instructions given and tasks performed are communicated via computer voices.

The entire Launch Simulator's interface, which represents a shuttle's control panel, consists of buttons, switches (Figure 6.2), a keypad, and CRTs (computer screens). If players are lost, clicking on a "Show Me" button will rapidly flash the correct series of operators as a visual hint.

Figure 6.1: Liftoff Launch Simulator

The player acts as the Commander, with an unseen NPC Pilot sitting to the right. There is frequent 3-way communication among Houston, the Commander, and the Pilot. The Pilot reads aloud the flight plan (step-by-step instructions appear on the lower part of the screen) and the Commander (the player) executes the steps.

The main NPC, a male Training Supervisor, gives a detailed briefing of the interface at the start of the game and is available afterwards even if initially skipped. The Training Supervisor also judges the player's actions for accuracy.

Figure 6.2: Liftoff Launch Simulator Switches

6.2 CROSS-GROUP COMPARISONS

The focus groups mainly talked about the Launch Simulator component of *Liftoff*. Among its features that most groups complained about were the long periods they had to wait between commands, although several mentioned appreciated this time aspect.

Another common complaint across all groups was that the instructions could not be repeated. In fact, the instructions were displayed in a separate screen at the bottom of the interface. So even if the players had not

comprehended or listened to the verbalized instructions the first time, they should have been able to read them.

Among those who considered *Liftoff* a good way to learn, the experience of launching a space shuttle was mentioned as the key reason.

Gender

Both grades of boys expressed preference for 3D graphics.

Among the girls who didn't think of *Liftoff* as a good way to learn, the main reason was a lack of educational values, while for boys it was due to boredom.

Boys paid a significant amount of attention to the operation of the space shuttle, and even proposed adopting switches and command keypads into their design ideas. Although using the same interface, girls didn't mention particularly liking any buttons or other means of control.

Grade

Eighth graders discussed the pros and cons of the way the Launch Simulator handled time. Players had to keep up with events following a real time clock and if they fell behind, the launch failed and they had to start over. Eighth graders felt the time pressure made the game more interesting; however, many other participants, including 5th grade boys, reported impatience at waiting for events to occur, while the 5th grade girls did not mention it.

Groups

Eighth grade boys differed sharply from the other three groups in their opinion of this event. Although they criticized *Liftoff* more than they complimented it, both groups of 8th grade boys agreed *Liftoff* was a good way to learn, while among the other groups there was disagreement on the game's learning values.

Again, all but 8th grade boys either explicitly hoped to make their game easier than *Liftoff*, or at least expressed dissatisfaction with *Liftoff*'s difficulty. In contrast, the 8th grade boys not only felt that it was not challenging enough, they hoped to make their own games more complicated.

Eighth grade boys did express disappointment that they were not able to kill or destroy something. They wanted more explosions, proposed a "Launch Crash Simulator", and imagined a scenario in which the characters might be sucked into the sun.

Instructions wise, 5th grade girls complained that the briefing by the Training Supervisor was too long and they would shorten their own game's instructions if it had any. Eighth grade girls expressed a need for more instructions before and while playing *Liftoff*. Eighth grade boys wanted to eliminate the instructions completely, forcing the players to memorize the steps with no assistance.

All but 5th grade girls talked about incorporating assembly of space shuttles or vehicles into their game designs.

Fifth grade girls seemed to encounter more technical problems than all the others.

Three boys and one girl (representing three of the 5th grade groups) independently wished there was a way for players to watch the liftoff from outside the shuttle.

Eighth grade girls emphasized the importance of understanding the mechanism behind the buttons. They were reluctant to offer a verdict as to whether they liked the game overall.

Gender Comparisons

Liftoff Side by Side 5th Grade Gender Comparisons

5th grade girls	**5th grade boys**
Game Play Likes and Dislikes	
Likes - hard before being assisted - assembling spaceships - the instructions - briefing is important Dislikes - briefing was too long - instructions: not enough; too many - the Training Supervisor: talked too much	Likes - being realistic and difficult - assembling a space shuttle - the 3D graphics - “cool” once the shuttle lifts off Dislikes - Event Timer: didn’t like to wait - too many buttons
Is This Game Good for Learning?	
Yes: experienced working on a spaceship No: just pressed buttons	Yes: trained to fly a space shuttle No: boring
Implementations	
- make instructions repeatable - make players actually lift off a spaceship and watch it	- add more fun games - make the launch viewable from outside of the shuttle - eliminate the history section

	- allow the players choose job roles
Inspiration for Their Game Design	
- make narrations shorter - include a “Show Me” button - offer space food as a bonus	- create an easier version of *Liftoff* - provide better instructions - players control different operators on the spaceship - cast the players as pilots - display split screen for each player - flip switches if something goes wrong - perform tasks in correct order - enable players build spaceships, rovers, or probes - incorporate mini games - show “a video clip from the outside when you launch”

Liftoff Side by Side 8h Grade Gender Comparisons

8th grade girls	**8th grade boys**
Game Play Likes and Dislikes	
Likes - Event Timer: fun to play under time pressure - being challenging and real - assembling a space shuttle - preferring challenging games over easy ones Dislikes - too hard to understand - Event Timer: boring when waiting - fine once get over learning curve Implementation - shorten the wait time - provide explanations of the buttons	Likes: the Launch Simulator - Event Timer - interface/graphics feeling real - having full control of the shuttle Dislikes - unclear directions - Event Timer: didn’t like to wait - not challenging enough - instructions not repeatable - interface/graphics not real, not 3D - didn’t kill anything - too childish
Is This Game Good for Learning?	
Yes: - learning about space shuttles - experiencing being an astronaut No: - no explanation of the buttons - not learning about the real space	Yes: all - learning how a shuttle liftoff off
Inspiration for Their Game Design	

- make their game easier - create a similar game but with more detailed information provided	- make it more complicated: must memorize instructions to proceed - create “Launch Crash Simulator” - play cool music in the background - adopt the keypad into their game - include more explosions and characters being sucked into the sun - want a real flight simulation in the museum

6.3 FIFTH GRADE GIRLS

Half of the 5th grade girls had fun playing *Liftoff*. Two girls thought it was hard at first, but enjoyed themselves after receiving assistance. Several girls said the briefing was too long. Some girls complained the instructions were insufficient, while some others liked them as they were fine. Three girls felt they gained experience of what it was like to work on a spaceship. A couple of girls didn’t think it was a good way to learn.

Angel Girls Report

Game Play Likes and Dislikes

Auriga and Aquarius gave it a “thumbs up”. Auriga loved “all of it”. Aquarius liked the instructions and didn’t think it frustrating at all. Columba thought it was ok. She liked that “it gave you training before you played – pre-training.”

AG had split opinions about the instructions. Indus thought they were insufficient: “It really didn’t give you a lot of directions, you just click on stuff to find things.” Columba seemed to agree with Indus: “All the voice says is ‘You’re

not very good at this'". Aquarius disagreed. Indus repeated, "They need to give more instructions."

The girls also commented about the training supervisor. Indus "didn't like the Oops-try-again guy." She said, "The guy shouldn't talk so much." Aquarius and Auriga "didn't like the lecture part" (the briefing). Auriga agreed the guy "talked too much".

Game Learning Value

Indus didn't think of it as a good way to learn: "No, we were just playing a game and pressing buttons".

Solar System 6 Report

Game Play Likes and Dislikes

Ursa Major, seconded by Lupus, said, "At first it was hard and difficult, but after [the on site game expert] helped, it was fun". Hydra "got to finish two parts, it was fun". Leo "liked building the spaceship".

Leo's major complaint was not being able to have the instructions repeated. "When people were talking, it was hard to hear. I couldn't hear directions and couldn't get them repeated. My 'Show me' icon didn't work, so I just played a different game. My computer kept freezing." Draco said "reading instructions was boring—it gave too many instructions; the computer froze and I had to start over". Ursa Major complained about technical problems: "The

computer was mean to me (laughter); computer volume was too loud, then I had to start over". Hydra too, disliked starting over, and didn't get to play the last five minutes because "the computer stopped me".

Game Learning Value

Hydra, Ursa Major, and Lupus agreed it was a good way to learn. For example, Ursa Major said, "Yes, when you grow up and you want to do something on a space ship, you can say you did this when you were young". Lupus also said the game "shows you how to work a spaceship". Draco didn't think of it as a good way to learn.

Changes to Make

If they could make any change to future versions, Lupus would "let players actually travel (not just pretend)". Leo would like to "make it so you could repeat stuff, like the directions". Ursa Major suggested to "have push buttons and [a way to allow players to] watch the lift-off". Hydra brought up "repeating each one [instructions] so you can learn to do things quickly and right."

Inspirations for Their Game Design

Thinking about their own design, Ursa Major said that their game "could have a guy speak to us, but not for so long". Leo suggested it could "have a "Show me" button, give bonuses and people could decide if they wanted to do it

or go there or not." Ursa Major added, "When you get to where you are going, you could win space food rewards".

6.4 FIFTH GRADE BOYS

Half of the 5th grade boys liked *Liftoff* for being realistic and difficult. Specifically, they liked the 3D graphics and assembling the space shuttle. A couple of boys didn't like the time they had to wait to lift off. Half of the boys believed it would be "excellent training" to fly a shuttle. Several others said it was boring.

Boys were so inspired playing the Flight Simulator that they wanted to make their players control different things on the spaceship in their own games. They also wanted to make the players in their own games build vehicles, extracting ideas from the Spaceship Assembling section. They would also incorporate mini games.

Frozen Eclipse Report

Game Play Likes and Dislikes

Taurus and Chameleon liked everything. Octans and Pisces complained about it having "too many buttons". Chameleon responded, "If you really were a pilot, you'd have to know everything, what to do, what all the buttons did." Volans thought that it was just boring. Octans also complained, "We have to wait too long for liftoff".

Game Learning Value

Chameleon thought it was a good way to learn because “now you know what it’s like to really fly a shuttle”. Volans responded “yeah you know how boring the job is”.

Changes to Make

As for making changes to *Liftoff*, Taurus suggested the designers “make it more interesting”. Chameleon said they should “have different types of games instead of just simulations”. Octans suggested “they should not make it like you have to press buttons. You should be allowed to choose your job”. Chameleon regretted: “We never got to see the launch”.

Inspirations for Their Game Design

Regarding game ideas, Taurus suggested their game should “show a video clip from the outside when you launch”. Pisces wanted to “be able to control different things on the spaceship”. Octans proposed that in their game “you gotta do things in the right order”, and “assembling a shuttle could be a mini game”. Taurus seconded the mini game concept: “Yeah, you go to different parts”. Chameleon said, “You could build different things like rovers, probes”.

Rocket Lions Report

Game Play Likes and Dislikes

Scorpius liked the game for being realistic and difficult. Pluto added it had "good 3D graphics", seconded by Sextans and Horologium. Sextans also said, "I won the games… it was fun, fun, out of 1 to 5 I rate it a 4". Canis Venaciti liked everything. He especially emphasized, "Once you lift off it is cool, you just have to do one thing before you do the next thing; they give you 2.5 minutes you can wait 2 minutes and then do it".

Asked what they didn't like about *Liftoff*, Canis Venaciti responded, "After lift off, you get a whole different clock, I didn't realize you have 11 seconds after the launch begins before you lift off". Scorpius didn't like "the set time you have to wait".

Game Learning Value

All except for Horologium agreed it was a good way to learn. Scorpius said, "It would be excellent training".

Changes to Make

If they could change *Liftoff*, Sextans would like to modify "the commission part where you flip stuff on and off" [the switches]. Canis Venaciti wanted to "make it so you could see it when you lift off". Scorpius and Pluto would want to add more fun games and take out the history part.

Inspirations for Their Game Design

Thinking about their own game, Sextans wanted a section where one can "create your own spaceship, get different pieces then put them together, and fly to Mars." Scorpius would let the players "play the part of a pilot. Have a split screen for each player. You flip switches if something goes wrong". Canis Venaciti wanted to "put a flight simulator in it, except don't show everything. I will make it easier". He added that *Liftoff* was hard – they "need to explain things better…I was lost".

6.5 EIGHTH GRADE GIRLS

Eighth grade girls agreed that it was challenging and real. Some revealed a preference for challenging games rather than easy ones. Some said once you get over the learning curve, it was fine. However, it was too difficult for some of the girls to understand.

The timing was again a double-sided knife. Some girls liked executing tasks under the time pressure, but sometimes the wait intervals seemed too long. Girls had split opinions about its learning value. Some regarded it as a good way to learn about a space shuttle. Those who disagreed said the game didn't explain the buttons.

Desdemona Report

Game Play Likes and Dislikes

DE girls liked it for being challenging and real. Carina said it was “hard at first but once you got the hang of it, it’s fine.” Aquila liked the tight timings and having to perform tasks at the right times. Andromeda also liked building the space shuttle.

If there was anything they didn’t like, Carina said that “it was hard to understand at first”. Aquila followed, “Once you understood it you had to wait [for the right timing to push buttons].”

Game Learning Value

Girls generally thought it was a good way to learn. They said it was fun, and one could see the shuttle from the inside. It was cool to “get to be an astronaut”.

Changes to Make

If they could change *Liftoff*, Andromeda would modify the wait times so they would not be as long. Libra said everything else was pretty good.

Kalisti Report

Game Play Likes and Dislikes

Equuleus, Cygnus and Apus thought it was challenging. Apus said “I like stuff that is challenging rather than way too easy”. However it was too hard for

Perseus: “I like thinking about how to do it but can’t do anything when don’t understand”.

Game Learning Value

Regarding its educational aspect, Equuleus said: “It is a good way to learn about a shuttle”. Apus, however, thought “they did not give facts about real space. You just follow the instruction.” Cygnus “didn’t learn much about the buttons” either.

Changes to Make

If they could change anything, Fronzel and Apus would like to give “more examples of what’s going on, what happens when you push the button”.

Inspiration for Their Game Design

Thinking about designing their own game, Apus wanted to “do something like that but give more instructions, details, and facts”. Equuleus would make it “easier to understand what they are really talking about.”

6.6 EIGHTH GRADE BOYS

Most 8th graders thought the Launch Simulator was cool. The 8th grade boys were very sensitive to activities that seemed “childish.” Some fun components the boys enjoyed were the Event Timer and having full control of the space shuttle. They thought *Liftoff* was a good way to learn.

Boys complained about the instructions not being able to be repeated and the graphics being unrealistic. Two CH2 boys criticized the game as not being challenging enough. Eighth grade boys considered adopting the command keypad into their game. They wanted their own game to be more complicated.

Challenger2 Report

Game Play Likes and Dislikes

Most Challenger2 boys liked the Launch Simulator. Delphinius especially liked the Event Timer. Capricornus felt the game was pretty real. He said that "the buttons were close so you feel like being right there". One boy said that having full control of the shuttle was cool. Apollo disliked that the game "didn't tell me what to do". Phoenix told him "just click next".

Apollo and Serpens complained that it "wouldn't replay what the instructions said". Some boys thought that the "graphics were not that good", and the game "needs to be more lifelike" and more 3D. Phoenix complained about the simulator not being realistic enough, because the window on the simulator barely changes from a blue sky to night. Orion felt the need to kill something but "we did not kill anything".

Orion also said that "the 5th graders probably like it; that's why we don't". Delphinius commented, "It wasn't challenging for everyone". He believed the game should require the players to "think about what to do, not just push

buttons". Orion responded, "That is the main fun in a game, to be able to push buttons at will and not follow a set of instructions."

Game Learning Value

Challenger2 thought *Liftoff* was a good way to learn.

Changes to Make

Asked what changes they would make to the game, or if they had any other ideas, CH2 had an extensive discussion. Orion would like to "make more explosions". Phoenix would like a "big keypad with an actual simulator board to enter all the commands". Orion agreed, adding "yeah and that it would actually shake". Capricornus said, "It will be nice if they have a real simulation in the museum". Orion continued "It's not lifelike enough. You can't move in and out (to a close-up view on the screen). You could not zoom in to the CRT screen." Delphinius thought that the "event timers are good. It makes the game more interesting." Capricornus suggested they could modify the game so the players have to "play it without instructions; they would have to memorize the instructions". "I would like to see how adult people play this game without instructions and see how well they do." Apollo proposed it should have "cool music". Phoenix said, "We should have a launch crash simulator". Orion added that players "should be able to open up the space ship door and get sucked into the sun".

Neptune Jihad Report

Game Play Likes and Dislikes

The NJs said overall the game was cool, although Telescopium and Monoseros had minor complaints about waiting between events.

Monoseros was proud that they figured out the game without the written instructions. But Lynx interjected that Sagitta helped him a lot.

Game Learning Value

Monoseros: “Yeah we learned to lift off”.

Inspiration for Their Game Design

The boys would include modified elements of the game into their design. Lynx wanted to adopt the command keypad into their game. Sagitta suggested their game be more complicated and that the players would have to do other stuff.

CHAPTER SEVEN: NEOPETS

7.1 ABOUT THE GAME

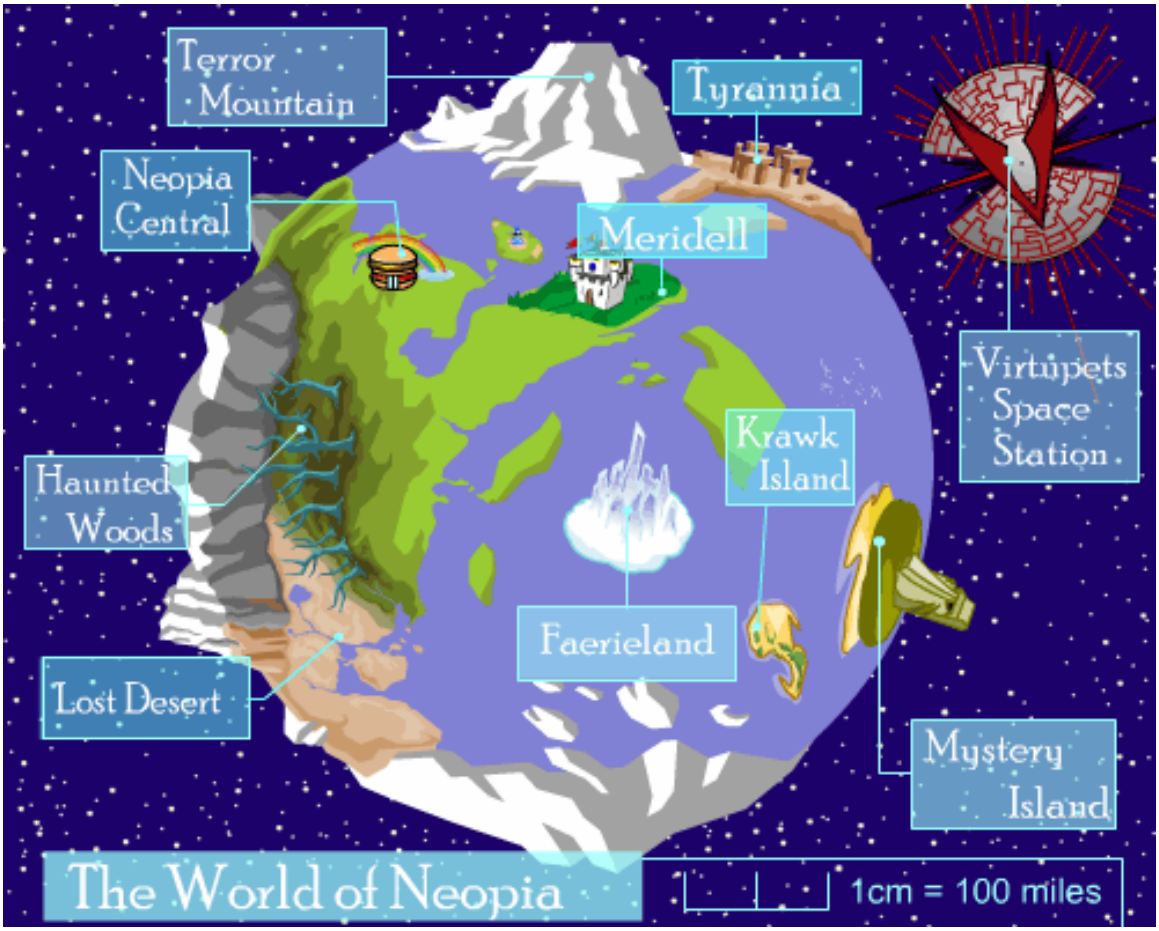
Neopets is an online multiplayer game with more than 50,000,000 subscribers world wide. It is aimed at youth, and subscribers are more than 60% female (Skertic, n.d.). Subscription is free, with the game being advertiser-supported.

Play begins with creating one's pets (Figure 7.1), including choice of name, species, color, gender, personality, strengths, and weaknesses. The owner is in charge of their pets' basic needs such as well-being, hunger, intelligence, and mood. If lacking proper attention, the pets can become sick.

Figure 7.1: Neopets Select Species

In the game world of Neopia (Figure 7.2), earning a decent amount of money is an initial goal to be able to fulfill the pets' basic needs. One of the main ways to make money is winning mini games. Earning extra money enables players to pursue other goals such as competing in the Battledome, entering contests, playing mini-games, and to make more money by investing. Other economic activities in Neopia include selling items in the stores, trading shares on the stock market, bidding on an item in the auction house, or exchanging items with other players at the trading post.

Figure 7.2: Neopets The Main Menu of the Game World



There are 10 sections to visit in the game world. Within those sections there are stores run by NPCs, quests assigned by faeries or witches, and mini games to play. In Battledome the players can fight with NPCs or challenge other players' pets.

7.2 CROSS-GROUP COMPARISONS

Neopets' popularity crossed grade and gender, appealing to most of the space camp participants. Some 5th graders had even played it prior to camp. No one voiced any real criticisms about the game except for a couple of 8th grade boys who thought it was childish.

An important feature that makes *Neopets* so appealing is the customizable characters. Secondly, all groups appreciated both the open-endedness the game world provides and the aspect of making money by playing the many mini games.

Gender

After initially attracting an overwhelmingly female audience, the creators of *Neopets* intentionally added male-targeted features to broaden their market such as Battledome and being able to give pets less friendly personalities.

Girls described taking care of their pets as fun, whereas 5th grade boys found it educational. The topic of taking care of pets wasn't included in the conversations of the 8th grade boys. In fact, all the other groups except the 8th

grade boys talked about incorporating pets into their own games, though ultimately not all groups did so.

Breaking gender stereotypes, a 5th grade girl talked about beating mini games as being fun, and two enjoyed the action or destruction types of games in *Neopets*. One of them suggested taking along war games on space trips.

When asked what games to bring on a long space flight to relieve boredom, girls altogether specified three actual titles, while boys made reference to nine; girls talked about games played on computers and Game Boys; boys brought up console games.

Grade

8th grade girls talked about playing card games and word games while 5th grade girls only mentioned computer games on space trips.

Gender Comparisons

Neopets Side by Side 5th Grade Gender Comparisons

5th grade girls	**5th grade boys**
Game Play Likes and Dislikes	
Some had played *Neopets* before Likes - choosing cute pets - playing games for money - variety of shops - taking care of pets - the “destruction game”, action games	Many had played *Neopets* before Likes - variety of pet species and features - money system - food variety - open-ended game world - too easy, but still fun to play

Dislikes - limited number of times a game can be played - having to find unique names that weren't already taken by other players	
Is This Game Good for Learning?	
Yes: 4 - "to take better responsibility of pets" No: 2 - only had fun	Yes: 5 - learned to take care of pets - learned the strategy to fight
Inspiration for Their Game Design	
- incorporate *Neopets* characters, perhaps as a bonus round - have pets as sidekicks - have little people play games or take care of pets - turn pets into humans	- good characters could have pets - pets wandering in the wild - a large variety of characters - Nicopets, a *Neopets* clone
What Games Would You Bring for Space Travel	
- *Neopets* - computer game: *The Sims* - Game Boy: *Spongebob* - war games - chat rooms	- *Neopets* - sports games: *NBA Street, NHL Hits* - action games: *Contra, Grand Theft Auto* - RPG: *Final Fantasy* - Shooter: *Space Invaders* - space games - PlayStation 3
References to Pop Culture	
- *Animal Cops*: TV show - *SpyKids*: mini game promoting the movie - *Freaky Friday*: mini game promoting the movie	n/a

Neopets Side by Side 8h Grade Gender Comparisons

8th grade girls	**8th grade boys**
Game Play Likes and Dislikes	
Likes - taking care of cute pets by playing mini-games - open-ended world - variety of mini games - good graphics and interface	Likes - a variety of character choices - the open-ended world - making money - feeling in control - interactivity - fighting - weapons

	<u>Dislikes</u> - childish like *Pokemon*; preferred realistic characters like *James Bond* - not understanding how to bargain
Is This Game Good for Learning?	
Yes - managing money - taking care of pets	Yes
Inspiration for Their Game Design	
- including numerous choices of pets - including animals - having pets follow the characters - allowing players to name their pets and choose their features	- including various types of characters - incorporating mini games where the players have other skills and are transported by teleport - sports games
What Games Would You Bring for Space Travel	
- card games - computer games - Game Boy - word games	n/a
References to Pop Culture	
n/a	- *Pokemon*: cartoon, console game - *James Bond*: console game, movie - *Mario Party*: console game

7.3 FIFTH GRADE GIRLS

5th grade girls enjoyed the game very much and some had played it before. They learned to take care of the pets, and liked shopping, choosing cute pets, and playing games for money. Two girls also liked the action games or "destruction games". Four 5th grade girls thought it was a good way to learn "to take better responsibility of pets". SS6 suggested people played games on computers and Game Boy during a space flight. The Angel Girls considered incorporating Neopet characters into their game, perhaps as a bonus round.

Angel Girls Reports

<u>Game Play Likes and Dislikes</u>

The Angel girls loved the game and wanted to continue playing it when they got home. Hercules liked the "[mini] games and pets". Specifically she liked the action games. She won the SpyKids game, a mini game in *Neopets* to promote the movie Spykids. Columba liked "adopting pets. She adopted 6 animals during the play session. She thought they were "cute when they were crying." Auriga "liked everything" and would play as soon as she got home. She had been encouraged to play *Neopets* by her friend before the camp but she never did because she "thought it was boring." Hercules asked if Auriga was going to sign up and explained to her what she would need.

Asked what made *Neopets* fun, Hercules said it was "how you can beat it". Columba said it was fun "because the pets are cute. I wanted a dog and haven't got one. Having a Neopet dog is sort of the same experience". Hercules pointed out "they sell *Neopets* at the store".

Game Learning Value

Auriga said "some of the *Neopets* mini-games are fun and good for learning". Hercules said it taught people "how to play games". Indus and Aquarius commented, "It was fun but we didn't learn anything."

Inspiration for Their Game Design

Thinking about incorporating *Neopets* in their own game, Indus proposed it "could be a bonus round". Hercules and Indus suggested, "They could be our character too".

Columba “would want to turn my pet into a human”, like in one video clip they saw earlier at the camp.

What Games to Bring for Space Travel

The Angel girls thought humans should bring games with them when they travel in space.

Asked which games they had played at camp that were both fun and educational, Hercules replied, “That probe game and solar system” [*The Great Solar System Rescue*]. Auriga said *Liftoff* was fun too. Hercules also brought up “the mission game” they played at the Challenger Center.

Solar System 6 Report

Game Play Likes and Dislikes

Leo, Ursa Major, and Hydra liked everything. Leo and Ursa Major said it “really taught me how to be responsible and take care of a pet”. Hydra liked “shopping, there’s a whole shop just for my pet.” She also liked “the Freaky Friday game”. Lupus “liked this one game in *Neopets* where you can get money”. Draco liked that she “got to feed my pets, give them a home, play games for money, and choose my own pet”.

Lupus had played it at home, but “didn’t like it here today” because of her computer’s problems. She liked the “destruction game”. Leo and Hydra

complained that it was hard to find a unique name for the pets because many names were already taken.

Draco, Ursa Major, and Hydra complained that you could only play the mini-games a limited number of times. Hydra explained that “a pet home cost $1000 and you had to win the money in order to buy one. Since you could play each game 3 times, I had to stop playing ‘Freaky Friday.’ I got all the points — $900 —but it was not enough to buy a pet house.” Ursa Major “couldn’t play the Wheel of Excitement game as many times as I wanted to”.

Game Learning Value

Leo, Lupus, and Ursa Major thought it was a good way to learn. Leo and Ursa Major said they learned “to take better responsibility of pets”. Lupus said “games like this teach you to be kind to pets– people are cruel to animals!” Ursa Major talked about the TV show “Animal Cops”.

Inspiration for Their Game Design

As for ideas for their game, Ursa Major suggested they should “have a place to create all these little people, play games”, or “Go to a pet store, get a pet, know what it does – pet as a sidekick”.

What Games to Bring for Space Trips

Hydra suggested bringing computers to play *Neopets* and *The Sims*, and Game Boys for *Spongebob*. Lupus brought up war games and later suggested playing on “Nubonics – chat site where you can walk around”.

7.4 FIFTH GRADE BOYS

Fifth grade boys liked the variety of pet species and the features that they could create. They also liked the open-ended game world, money system, and food variety. Many boys had played *Neopets* before coming to the camp. Half of the 5th grade boys deemed *Neopets* a good way to learn to take care of pets and fight in better conditions in the battle dome. As far as game inspirations, RL would offer a large variety of characters. FE proposed that the good characters could have pets, or have some pets wandering in the wild. To relieve boredom on long space flights, the boys suggested many popular titles, most of which are played on consoles.

Frozen Eclipse Report

Game Play Likes and Dislikes

All the boys except Taurus had *Neopets* accounts already. Chameleon liked the fact that “you can create different pets”. Octans liked “all the different environments and places you could go”.

Octans and Taurus didn’t like “how the computers were screwing up” during the game session. Octans added, “Some of the [mini] games take a long

time to load, like there's this one game with a sloth that takes 15 minutes for it to load". Chameleon commented, "Some of the games I played were fun. Some of the games did not come up".

Game Learning Value

As for educational value, Taurus said, "You learn how to take care of pets". Octans "learned that in the battle dome the pets cannot fight when they are hungry".

Inspiration for Their Game Design

Thinking about their game, Taurus suggested that "the good characters could have pets on the worlds". Octans proposed that "there is a pet's pet page – there are *Neopets*' pets. So these could be some of the pets in the wild in our mini games".

What Games to Bring for Space Trips

Chameleon thought people should bring games when traveling in space "so that we do not get bored". Chameleon liked action games most, while Octans answered space games.

Rocket Lions Report

Game Play Likes and Dislikes

Sextans said “I like Ixi.. she was so cute”. Canis Venaciti thought it was really fun. He “had a lot of Neo points [monetary unit]”. He said, “Ice cream was fun. I got fudge, triple fudge, and I had to move pieces”. He asked if he could bring a disc the next day to copy his Neopet and take it home. Pluto liked the variety of characters to choose from.

Horologium didn’t like *Neopets*. Sextans and Pluto’s major complaint was that the computer kept freezing. Scorpius too, didn’t get to play a lot because his computer froze. To Canis Venaciti, the problems were that they played only 45 minutes, and he couldn’t break the codes to one of the games.

Game Learning Value

Canis Venaciti, Pluto, and Scorpius all agreed that *Neopets* was a good way to learn. Pluto’s comment was “kind of too easy but fun, so yes”. Scorpius said you learn that with a “real pet you have to feed him”. Horologium and Sextans didn’t consider it a good way to learn.

Inspiration for Their Game Design

As far as game inspirations, Pluto offered that their game should have a “large variety of characters…. we can’t just have a few”. Canis Venaciti suggested, “We should have our own Nicopets.. not *Neopets*…that’s already trademarked, but they’d be the same thing”.

What Games to Bring for Long Space Flights

Scorpius suggested bringing a PS3. Horologium corrected him, saying there is no PS3. Scorpius replied, “There is going be by the time we get to space”. Horologium said humans should “take everything” when traveling in space because “it will be boring.” Sextans suggested bringing “*Contra* 1, 2. *Grand theft auto 1, 2, 3… Vice City*, *Space Invasion*, *Neopets*… rest of the games in the world”. Canis Venaciti suggested “*Final Fantasy* 9,10, 11,12,13, 14,15” in addition to *Neopets*, and a DVD player. Sextans protested that a DVD player is not a game. Canis Venaciti said “they wouldn’t need it...my PS2 has one”. Pluto proposed bringing sports games and he started naming “*NBA Street 1, 2…NHL hits 2003*, 2004… [continued naming years in the future]”.

7.5 EIGHTH GRADE GIRLS

The girls had fun taking care of cute pets and still being able to play the mini-games. They liked the open-ended game world and the variety of mini-games. KA noticed there weren’t many directions so they had to figure them out on their own. Inspired for their own games, the girls would include animals, provide numerous choices of pets to be companions for the characters, and allow players to name their pets and choose their features. Eighth grade girls suggested playing cards and computer games for long space flights. Other options included Game Boys and word games.

Desdemona Report

<u>Game Play Likes and Dislikes</u>

All DE girls liked *Neopets* and they couldn't really think of anything they disliked about the game. Carina thought they were "cute". Libra said it was fun in that "you can take care of them and still play games". She added, "You can learn about money to get food and your pets' needs".

Inspiration for Their Game Design

DE would allow players to choose the names and features of the pets, which they had discussed previously.

What Games to Bring for Long Space Flight

Girls suggested bringing "computer games, a deck of cards, Game Boy, and word games". Girls also suggested bringing magnetic game boards so the pieces do not fly off in the zero gravity.

Kalisti Report

Game Play Likes and Dislikes

KA reacted quite positively to *Neopets*. Fronzel commented that the graphics and interface were good. Perseus liked the buttons. Cygnus said there were "lots of choices". Perseus agreed, pointing out there were "lots of games, too". Apus said it was "like you are taking care of a real pet, although you know it is not real".

Apus noticed there “weren’t many directions; you have to figure things out by yourself”. Cygnus thought “if you play a lot, you might get bored”.

Game Learning Value

Equuleus said that she didn’t learn much from the game, except “maybe how to take care of pets”. Apus suggested *Neopets* helped you learn to manage money and set up and run a store. She thought being able to sell things in *Neopets* was educational.

Inspiration for Their Game Design

The girls got a few ideas from *Neopets*. Cygnus and Apus said they should include animals. Equuleus suggested that their characters “should have pets and the pets should get along with people”. Apus further recommended allowing characters to choose whether their pets would follow them around.

What Games to Bring for Long Space Flights

Perseus was certain that if people don’t bring games when space traveling, “they will be bored to death”. She suggested bringing “lots of card games” because they are “small and can do a lot of stuff”. Equuleus recommended taking computer games along.

7.6 EIGHTH GRADE BOYS

Most boys had fun playing *Neopets*. They liked the open-ended world, the variety of character choices, the weapons, and the interactivity in general. They liked to make money, feel in control, and fight people. The main criticism from both groups was that *Neopets* was childish like *Pokemon*. CH2 would incorporate mini games into their game, where the characters have other skills and are transported by holoport [teleport]. Someone suggested including various characters to be selected.

In both 8th grade boy groups but particularly Challenger2, there was debate over whether or not to include sports in their own games, both in the *Neopets* focus groups and also during several of the brainstorm sessions. Those opposed to sports eventually won the argument, and neither 8th grade boys' games included sports.

Challenger2 Report

Game Play Likes and Dislikes

In general, Challenger2 boys liked *Neopets*. Capricornus thought it was fun. Delphinius liked that "you can choose your character". Phoenix commented, "It was interactive, not just a set of predetermined rules". Orion added, "You can choose your gender, pick everything" and "you get to make money". Apollo said, "We were in control".

Challenger2 boys' major complaint was they didn't understand how to bargain over prices at the store. One said, "My first and second choices were restricted". Capricornus didn't think they had "enough time to really know how to play it". Orion jumped up to tell the group how to bargain: "You just needed to click the guy twice and then he will give you a better price for the items you wanted to buy". Someone criticized *Neopets* for being "childish like *Pokemon*". Delphinius protested, "*Pokemon* is cool!"

Inspiration for Their Game Design

They were inspired by *Neopets* to incorporate mini games into their game. Orion first suggested the concept: "Have a holoport so you can play a game within a game". Some added that the players should have to use other skills in the mini-games. Some said "pick your own character". Another suggested "mini-games like *Mario Party*".

There was a split of opinions on whether sports are important for a space game. Orion said, "Sports games have nothing to do with space". Apollo disagreed, pointing out that many of the aspects that Orion liked in *Halo* would be considered a sport: "You practically do sports every day; hunting, archery…are all sports".

Orion tried to back track on his statement that sports are not important for the game, suggesting instead you would "be able to play mini-games or side games when you are on the space ship".

Neptune Jihad Report

Game Play Likes and Dislikes

Sagitta liked to “kill and fight people” and the weapon varieties in *Neopets*. He also liked that in the *Neopets* game world ”you can go to McDonalds.”

Hydrus didn’t like the game at all: “It was complicated and childish. It’s like *Pokemon*. It’s for children. I want to see real people like *James Bond*, not some fantasy pets.” Monoseros seconded him, saying it may “get annoying after a while”.

Game Learning Value

Sagitta said he learned that “I can kill people”. Monoseros said, “We learned what not to do.”

Inspiration for Their Game Design

Hydrus emphasized he liked sports-genre video games.

CHAPTER EIGHT: ADOBE ATMOSPHERE

8.1 ABOUT THE GAME

The participants experienced Adobe *Atmosphere* as a 3D navigating, avatar-based, multi-user chat room. Visitors choose an avatar from a collection of 17 pre-made entities to be their visual representation in the chat room. The players can chat via a text window with other participants, and command their avatars through the keyboard to walk, jump, or, when gravity is turned off, move horizontally and vertically in the air. A variety of male, female, robot, alien, and animal-like avatars are available. There are only three female avatars (Figure 8.1; Figure 8.2; Figure 8.3).

Atmosphere was the only event where the participants played from a 3-D perspective and communicated through a text chat channel, two elements very similar to commercial MMORPG games.

The play session lasted 30 minutes. During both the morning girls camp event and the afternoon boys camp event, the *Atmosphere* world was overloaded by the presence of 20 simultaneous participants, resulting in a delay between inputting navigation commands and seeing the response.

Figure 8.1: Atmosphere Female Avatar 1

Figure 8.2: Atmosphere Female Avatar 2

Figure 8.3: Atmosphere Female Avatar 3

8.2 CROSS-GROUP COMPARISONS

Most groups adapted naturally to the interface. Eighth grade girls were the only ones to complain that *Atmosphere* was hard to understand. One fifth grade boy group liked *Atmosphere* so much they negotiated with their teacher-facilitator to get to play it a second day as a reward for finishing their brainstorm.

All groups, except for 8th grade boys mentioned enjoying chatting with others.

Many of the girls chose the same female avatar, populating the world with many identical clones and making it difficult to tell who each avatar represented, as Leo and Apus pointed out. Clearly there was a lack of choice of female

avatars appealing to young girls. The boys had a wider range of avatar choices they could select from.

In general, girls wanted “cute” (*Neopets* or animals) or girlish (pretty, famous, not bold) avatars. Eighth grade girls specifically asked for girl avatars. Boys wanted “cool” avatars (dinosaurs, ninjas, robots, aliens, action game characters). Many children requested avatars that resembled themselves.

Thinking about the kinds of 3D worlds they would like to chat in, 8th graders suggested having *Atmosphere* worlds representing planets and moons. The 8th grade girls suggested a “star destroyer bridge,” which later emerged as part of their game. Fifth grade boys suggested under water, outer space, underground, Japan, and mountains.

Gender Comparisons

Atmosphere Side by Side 5th Grade Gender Comparisons

5th grade girls	**5th grade boys**
Game Play Likes and Dislikes	
Likes - communicating with people - exploring new rooms Dislikes - connection lag - limited amount of tasks to perform - the ugliness of a cat avatar	Likes - communication - exploring and flying in the air - variety of selectable avatars Dislikes - connection lag - limited tasks to perform - long loading times - dumb graphics, the zombie avatar was not religious
Is This Game Good for Learning?	
Yes: - learn speaking	n/a

- learn patience and navigation	
Is it a game?	
No - more a chat room than a game	No - a mature-rated team game - an instant messenger with avatars
Places to Explore in Atmosphere	
n/a	- under water or outer space - underground, Japan, and mountains
Inspiration for Their Game Design	
- no connection lag - chat - music room - dialogue bubbles, emotions, gestures	- no connection lag - communication - customizable characters - better graphics - an underwater world - explore mode
Ideal Avatars	
- self resemblance - someone famous or pretty - invisible man like in Terminator 3 - animal-like people - *Neopets* dogs - a cat	- self resemblance - characters they drew - a ninja with big weapons - a dinosaur person
References to Pop Culture	
- *The Sims*: game - *Neopets*: online game - Terminator 3: movie	n/a

Atmosphere Side by Side 8h Grade Gender Comparisons

8th grade girls	**8th grade boys**
Game Play Likes and Dislikes	
<u>Likes</u> - "picking weird characters" - chatting with people <u>Dislikes</u> - connection lag - limited amount of functions - no directions - hard to understand	<u>Likes</u> - choosing characters - 3D world <u>Dislikes</u> - connection lag - didn't get to kill things, just walk around - lack of goal
Is This Game Good for Learning?	
DE: yes KA: no	CH2: yes
Is it a game?	
Most girls regarded it as a kind of	Monoserous: it is not a game because

game just for exploring	there is no goal
Places to Explore in Atmosphere	
- planets or moons - “star destroyer bridge”	- planets and moons
Inspiration for Their Game Design	
- variety of characters - more tasks to perform - hidden passages leading to the next level	n/a
Ideal Avatars	
- a customizable girl avatar - self resemblance - variety of characters - Anime	- customizable - self resemblance - robots, aliens - the master chief in *Halo* - 3D
References to Pop Culture	
- Anime: Japanese cartoon style	- *Halo*: console game

8.3 FIFTH GRADE GIRLS

Most 5th grade girls enjoyed *Atmosphere*, liking communicating with people and exploring new rooms. Girls also brought up downsides: the characters were slow at responding to commands.

Most 5th grade girls didn’t see any learning value in *Atmosphere*. Some SS6 girls considered it more of a chat room than a game. Girls’ ideal avatars would look like *Neopets* dogs, someone famous or pretty, or animal-like, and invisible.

Angel Girls Report

Game Play Likes and Dislikes

Auriga loved the chat room, wishing for a game like it. Hercules specifically asked for the web site. Columba found it fun being able to talk to some of the 8th graders who were not in the same room as the 5th graders.

Indus did not really enjoy it, having not much to do except chatting. A cat avatar appeared “ugly” to her, “dressed in a Halloween costume”. Hercules and Indus complained about the computers being slow, thinking “my computer was broken”, said Hercules. Meanwhile Hercules noticed an Xbox machine on the table and asked if she could borrow it.

Game Learning Value

Indus and Auriga did not see chatting as having any learning value to it, but Hercules thought one could “learn how to speak”.

Inspiration for Their Game Design

Hercules suggested incorporating a chat room in their game design.

Ideal Avatar

Indus’s ideal avatar would look like herself or her cat. To Hercules it should look like some actors or various dog characters from *Neopets* with superpowers to “help you find the probe”. Columba wanted a Neopet dog too. Auriga imagined an invisible man like in Terminator 3 “where they have robots”.

Pop Culture

Hercules saw an Xbox machine in the classroom and asked if she could borrow it. *Neopets* characters were several girls' ideal avatars. Auriga wished for a character from the movie "Terminator 3".

Solar System 6 Report

Game Play Likes and Dislikes

Lupus, who rarely expressed any positive feelings, actually thought *Atmosphere* was fun. Ursa Major mentioned communicating with others. Leo liked to explore new rooms.

Almost every girl in SS6 complained about the characters being slow in responding to commands. Leo and Hydra reported that their computers did not work at all. Leo mentioned "there was not much information" [instructions] given when asked if the game was easy to figure out.

Game Learning Value

Draco did not see learning value in it. Hydra commented that it was a "good way to learn to be patient and navigate a character around".

Lupus and Ursa Major considered it more of a chat room than a game. Leo thought it seemed like "*The Sims*".

Inspiration for Their Game Design

Ursa Major suggested adding a music room to *Atmosphere*, and making the avatars move faster. Lupus wanted to have “voice bubbles, emotions, and more actions” such as dancing.

Ideal Avatar

Leo noticed that so many of them chose girl avatars that it was difficult to distinguish one another. Talking about ideal avatars, Lupus wanted “someone famous”. Hydra needed one to be “really pretty”, while to Leo it had to be someone not bald. Ursa Major wanted “animal-like people”.

8.4 FIFTH GRADE BOYS

Fifth grade boys liked its communication function and the variety of avatars to choose from. Some also liked to explore and fly in the air. The major complaints centered on the technical aspects. It took too long to load and froze frequently.

Fifth grade boys didn’t consider *Atmosphere* a good way to learn. Most boys didn’t even consider it a game. Boys talked about incorporating communication and customization of characters into their games. Some boys felt like the avatars should resemble themselves.

Frozen Eclipse Report

Game Play Likes and Dislikes

Talking about something good about *Atmosphere*, Pisces said, “You could communicate with everyone and go everywhere”. Chameleon said, “You could explore everywhere you want to go and chat with people”. Taurus: “I like how you choose the character you want and see each other and fly around”. Octans: “liked humans walking on air”.

Volans and Pisces mentioned the connection lag: “it was glitchy”. Taurus had complaints about the graphics and characters: “graphic was stupid and dumb, and a lot of the characters were too violent and strange and that stuff is not in the bible”. He “didn’t like zombies. It is non-religious”. Chameleon came back: “how is it non-religious?”

Game Learning Value

Asked if boys considered it a learning game or even a game at all, Taurus said, “No. It is like a team game…seems like a mature rated game to me”. Four FE boys didn’t consider it as a game. Chameleon protested, “It was kind of like a game because you can explore around and find people to help you and stuff”.

Places to explore

Pisces, Octans, and Chameleon would like to explore under water or outer space environments with *Atmosphere*.

Inspiration for Their Game Design

As for their game inspiration, Taurus and Octans would like "communication ability in an underwater world" in their game. Chameleon suggested, "You could have an explore mode or you can go wherever you want". Taurus said that "graphics are good, but we can have better in our game".

Ideal Avatar

Talking about ideal avatars, Chameleon said, "A dinosaur person". Pisces said, "Zombie or a character I drew myself". Octans also wanted a character he drew. Chameleon said, "A centaur or minotaur".

Rocket Lions Report

Game Play Likes and Dislikes

Sextans and Horologium liked "the whole thing" while Canis Venaciti liked nothing. Scorpius and Pluto liked the "variety of characters". Pluto liked that you "can chat with people".

RL boys' major complaint, like SS6 girls, was regarding technical problems. Scorpius disliked the "time it took… so long to load". Pluto said "it freezes up". Sextans complained it "too long to load and froze up. I couldn't walk when I wanted to". Horologium brought up a functionality issue: "You could only do a certain amount of things".

Game Learning Value

Boys didn't consider it a good way to learn as Pluto said, "No, nothing, just a game". Scorpius said, "Nothing to learn from". To Canis Venaciti it "didn't feel like a game". Horologium said "like an instant messenger but you have people [avatars]".

Places to explore

As for places boys would like to explore with *Atmosphere*, Pluto said, "Underground". Horologium answered, "Japan". Scorpius said, "Somewhere in the mountains".

Inspiration for Their Game Design

As for new game ideas, Scorpius said that *Atmosphere* "made me realize we need to have a variety of characters and customize them, choose different things, like elephant head or lizard head". Sextans said "you get to walk, float, talk to people, and pick the ones you want to talk. When someone asks a question, you can answer or not; if they get on your nerves you eliminate them from the game". Pluto agreed with the variety of characters, and suggested to "make the game better so it doesn't keep pausing". Horologium said, "Make it so we can talk to each other".

Ideal Avatar

Thinking about ideal avatars, Scorpius, Sextans, and Horologium would like one like themselves. Canis Venaciti wanted a “ninja with 2 big swords and many guns”.

8.5 EIGHTH GRADE GIRLS

Several girls had fun chatting with people. Girls pointed out that its problem were being “too slow” and limited amount of functions. Three girls said it was hard to understand. DE thought of it as a good way to learn while KA didn’t see any learning value in it.

Many girls asked for a general girl avatar with various customizable features. DE needed more tasks to perform other than walking around. KA considered including hidden passages which could lead players to the next level.

Desdemona Report

Game Play Likes and Dislikes

Andromeda said it was cool. Carina liked the chat. Libra thought it was “confusing”. Aquila said, “Some things were fun”.

Talking about dislikes, Carina and Andromeda complained that it was “kind of slow”. Some girls thought that they “didn’t get to do stuff, just looked around.”

Game Learning Value

Andromeda thought it was a good way to learn: “You get to experience” the world. Someone said, “You could stumble around and maybe find cool information”. Carina, Aquila, and Libra considered *Atmosphere* kind of a game “just for exploring”.

Place to Explore

They would like to explore the “star destroyer bridge”.

Inspiration for Their Game Design

Talking about their game, a girl said, “Definitely not a game where you just walk around, the characters would be better with more choices in their game—you would choose a person and then be able to change the features.”

Ideal Avatar

Many girls’ ideal avatars would “resemble a girl, but not be the same—everyone would get to choose.” Andromeda said, “A girl but with different features and characteristics”. Libra would like more choices. Carina said, “Maybe choosing a general person and change them”.

Kalisti Report

Game Play Likes and Dislikes

Talking about the positives of *Atmosphere*, Apus mentioned “chat with other people” and “good communication”. Perseus liked to “pick weird characters”. Apus regretted that “the time is too short”.

Girls’ major complaints were that it was hard to understand and a lack of goals. Equuleus said, “It is weird and hard to understand”. Perseus said that “it has no directions.” Apus followed, “I don’t know what we need to do.” Cygnus said it was “way too slow”. Apus and Cygnus said that they “did not do much”.

Apus said, “Each person can only be chosen for oneself. It should be indicated. But now it looks like everyone is the same. Others do not know who has been chosen.” (Many girls chose the same character).

Game Learning Value

Asked if it was a good way to learn, Equuleus and Cygnus commented it was “just a game”. Cygnus thought it was “not really [a game]”.

Places to Explore

Girls would like to explore “Mars”, “Jupiter”, “any planet”, or “the moons” with *Atmosphere*.

Inspiration for Their Game Design

As far as inspirations, Equuleus said, “I would go back to think about the characters, maybe design my own character”. Perseus said, “Find a hidden level

of something". Apus followed, "Yeah, like different passages or something. If you can find it, you win. And you can go to next level."

Ideal Avatar

A girl said that her ideal avatar would be "Anime". Cygnus said it should have "different options. You can choose whatever you like about the characters like hair, eyes". For Apus "characters should be made like you. You can choose it from the computer."

8.6 EIGHTH GRADE BOYS

Discussing its fun elements, 8th grade boys mentioned choosing characters and the 3D perspective. Boys found it disappointing that they didn't get to kill things, and could only walk. They also criticized the lack of goals and the connection lag.

More than half of CH2 considered it a good way to learn. CH2 would like to explore moons and planets such as Mars, Titan, and Europa. CH2 visualized their ideal avatars as robots, aliens, themselves, or the master chief, a character in the game *Halo*. They also desired the avatars to be customizable and 3D.

Challenger2 Report

Game Play Likes and Dislikes

Talking about something fun, Orion said “you can go into the world and choose your own character”. Serpens liked the 3D world.

As for something they didn’t like, Orion said, “We didn’t get to kill things”. Phoenix said, “Choppy…had to stop moving to interact” (referring to chatting). Delphinius said, “Just got to walk around”.

Game Learning Value

Orion, Serpens, and Phoenix said it was a good way to learn while Delphinius and Apollo said no.

Place to Explore

“Mars”, “moons”, places “like Io”, and “another planet” were what CH2 boys would like to explore with *Atmosphere* as Phoenix said: “It may be good to explore the moons like Titan and Europa”.

Ideal Avatar

Brainstorming an ideal avatar, Phoenix visualized one “that can fly, like a helicopter or that uses a vehicle to move around …robots”. Someone said, “Mix and match character’s parts”. Apollo said “make the avatar yourself”. Orion said “someone like master chief in *Halo*”. Phoenix, talking to Orion: “If you could make yourself tiny in *Halo*, like in *Atmosphere*, that would be awesome”. Someone suggested they can “make it more exciting by putting some aliens”. Delphinius and Apollo wanted to make it 3D.

Neptune Jihad Report

Game Play Likes and Dislikes

Monoseros thought *Atmosphere* “was a neat game.” Sagitta said: “It was interactive.” Sagitta didn’t like when “you get lost”. Lynx criticized that “it had no point”.

Game Learning Value

Monoseros echoed Lynx’s earlier point. He didn’t consider it a game, saying “no, it has no aim.”

CHAPTER NINE: GALACTIC CIVILIZATIONS

9.1 ABOUT THE GAME

Galactic Civilizations (*GalCiv*) is a single-player, commercial strategy game developed by Stardock, suitable for everyone (all ages) according to the ESRB. Players take on the role of the human civilization, playing towards dominating the other major alien races in the galaxy through four possible victory scenarios: cultural, technological, political, and military. It differs from the other games at the camp in requiring a great deal of strategic planning to be successful. It also has an interface complex enough that players without prior strategy game experience would likely find it hard to understand. Because of its steep learning curve, both the original game manuals and copies of step-by-step play examples developed specifically for the Space Pioneer camp were available to all the participants. Each group also had a game expert present to answer questions.

The criteria for each of the winning conditions directly relate to play style. For example, to win culturally one builds numerous star bases near opponents' star systems to spread human culture; to win by military conquest, one builds powerful ships to destroy the other sides' ships and invade opponents' planets.

The game starts with players customizing difficulty levels. Choices include abilities of the player's civilization, galaxy settings, winning conditions, and opponent intelligence and alliances (Figure 9.1).

Figure 9.1: GalCiv Opponent Settings

On the bottom of the main interface is the control panel, consisting of six buttons: Sector Map, Planet List, Star Ship List, Domestic Policy, Foreign Policy, and Research. With Domestic Policy (Figure 9.2), players make changes to economics or politics by adjusting the rates of taxation and spending, as well as the distribution of finances to military, social, and research projects. Foreign Policy enables players to exchange properties or negotiate treaties with opponents.

The game is time-based. Players make choices, then advance the game in time to see what happens based on the choices they made.

Figure 9.2: GalCiv Domestic Policy - Economics

Strategy-planning involves actions such as producing ships to colonize planets or defend territories, which are goals at the very initial stages of play. Players evaluate if the priority is finance or speed to determine whether to purchase or build ships. To purchase ships, on the Planet Management menu (Figure 9.3) players choose the type of ship and an installment plan among four; the ship is available in one month of game time through purchase but costs more than through building, and the civilization can easily go bankrupt if players over spend. Building ships, and depending on the quality of the planets, usually takes more than 15 months in game time but doesn't cost any money.

Figure 9.3: GalCiv Planet Management

9.2 CROSS-GROUP COMPARISONS

Attitudes toward Game

All groups liked naming the planets when colonizing them. The common theme of the complaints is that the game was too difficult or confusing to understand. However, one 5th grade boy managed to play so well he won a military conquest. One boy of each grade reported losing confidence, and feeling dumb or useless. Girls were less extreme in their reactions.

Gender

Fifth grade girls relied heavily on the game experts for help, while 8th grade girls relied heavily on the print documents whenever they ran into trouble. Girls in both grades wanted their own games to be less difficult and planned to have detailed accompanying documents to assist play. Boys not only ignored the instructions most of the time, the 8th grade boys were proud of having played well without having to read any instructions. Fifth grade boys didn't rely on the game experts as much as the same-age girls. They would try to solve problems themselves first then consult their peers.

More 5th grade boys developed idiosyncratic strategies; a few girls who did usually pursued a defensive tactic, building star bases and defense shield or trading with aliens. Boys not only took the initiative in attacking opponents, but also tried strategies of intentionally destroying their own colonies.

Alien Expectations

A common conception of what aliens would be like was odd-looking hostile creatures with advanced knowledge. Fifth grade girls didn't want to be in a galaxy with aliens. Some of them worried about potential wars. Fifth grade boys mostly wanted to be in a galaxy with aliens, even if they have to fight them. Eighth graders were less interested in sharing the galaxy with aliens. However, some of the participants believed that whether aliens are friendly or not depends on the species and that some aliens would look similar to humans, possibly as an influence from the game. Some aliens might even be cute. Some would be

intelligent, some stupid, some evil. More 5th grade boys were willing to cohabitate a galaxy with aliens than other groups.

Gender Comparisons

GalCiv Side by Side 5th Grade Gender Comparisons

5th grade girls	5th grade boys
Game Play Likes and Dislikes	
Likes: 4 - colonizing - being creative in naming the planets - difficulty - graphics	Likes: 5 - naming colonies - taxing people - managing civilizations - planning budgets - destroying opponents' ships - controlling ships - getting parts from other ships - cut scenes - better than *Neopets*
Dislikes: 2 - boredom - difficulty	Dislikes: 4 - losing money - feeling useless - "not as tight as *Atmosphere*" - wars - "the set price wasn't real" - when purchasing, having to pay up front
Play Style	
- traded with aliens - bought ships and lost them - kept ships together so they wouldn't get lost - used the ship finder to keep track	- declared war on aliens - destroyed all colonies - had a chance to fight aliens but chose not to - won a domination victory - owned 26 battleships
When Encountering Problems	
- relied heavily on the game experts - rarely used the instructions	- didn't ask much help from the on site game experts, except for Volans - consulted peers first - didn't particularly care about instructions, and hardly mentioned them
Is This Game Good for Learning?	

Yes: 2 - get ready for our game No: 3	Yes: 3 - economics, handling money - planning strategies - dominating the galaxy No: 3
Inspiration for Their Game Design	
- having stars in their game so players can investigate them - not being as difficult - more detailed instructions	- limit the amount of money players own - require enough population and military size to sustain civilizations - include multiple space ships - allow players to travel to the planets personally - enable warping to different places like in Star Wars - “have an alien help guy kill the other aliens that are mean”
Alien Expectations	
<u>Live in a galaxy with aliens</u> Wouldn’t: 7 - “they might get into a war with us” - it will be “just like getting into other wars”	<u>Live in a galaxy with aliens</u> Wouldn’t: 3 - they are bad and dangerous Would: 6 - “only if they were mostly good and mostly fools” - want to fight them
<u>Human-alien Interaction</u> Positive - “It’s not like alien’s faces will shoot out lasers” Neutral - “it depends on what kind of alien” Hostile - aliens will “most likely be mean” - humans would be scared - humans might make fun of aliens because of how they look - humans would be scared and it would cause a war like in “Men in Black” - aliens would destroy Earth - humans would win the war” because	<u>Human-alien Interaction</u> Peaceful - “they come in peace” - “in the future they’ll be peaceful with us” Hostile - “really stupid evil ones would be friendly; smart evil ones would be bad” - “they’ll be smarter than us, so they’ll have bigger weapons than us” - some will be friendly and some will be bad

we have the most technology in the world <u>Appearance</u> - like Tigger - like rabbits - Winnie the Pooh - “ugly and have a second eyelid” - different colors - some with small and some with big heads - all ugly	 <u>Appearance</u> - cute - look like humans - look like insects or alligators that are warm-blooded - “shiny green eyes, 8 hands” - look and act like Scorpius’s sister
References to Pop Culture	
- Men in Black: movie - Tigger: cartoon - Winnie the Pooh: cartoon	- Star Wars: movie, game

GalCiv Side by Side 8h Grade Gender Comparisons

8th grade girl	**8th grade boy**
Game Play Likes and Dislikes	
<u>Likes</u>: 2 - like it because it’s challenging Once got over learning curve it was easy: 3 <u>Dislikes</u>: 4 - lost ships easily - too hard to understand - noisy	<u>Likes</u>: 4 - exploring - controlling civilizations - naming planets - finding and claiming abandoned ships <u>Dislikes</u>: 4 - being killed, not being able to win - too complicated to understand; feeling dumb
Play Style	
- wanted to attack after being target of war, but didn’t know how - built star bases; sent ships to star base - built constructor ships	- looked for enemies but nearby aliens all appeared friendly - blew up colonies which aroused other’s interests
When Encountering Problems	
- frequently checked out instructions - asked teacher facilitator - rarely asked the game expert - consulted each other within small groups (2-3 people)	- NJ consulted the game expert - one boy emerged as the expert in the group - rarely used instructions - didn’t ask help from the teacher facilitator
Is This Game Good for Learning?	

No - all make believe Yes - it was a good way to learn strategy	No Yes - It might teach strategy
Inspiration for Their Game Design	
- should not be too difficult - should provide instructions - alien appearance - research labs - ships	- having a “giant meteor shower”
Alien Expectations	
<u>Live in a galaxy with aliens</u> would: 2 - “but scary” wouldn’t - “Weird – what do I do?” <u>Human-alien Interaction</u> Hostile - aliens would be mad at humans and start wars - aliens might be offended when humans start to explore Neutral - “they might know more about us than we do ourselves” - it depends on the types of the aliens <u>Appearance</u> - just like people - depends on where they live - intelligent ones would have bodies adapted to their environments - unintelligent ones would be microscopic like on Mars - If living underwater, they might breathe non-oxygen gas or have gills - change their shape or color based on their feelings - they “feel sluggish” or they could “turn into slug”	<u>Live in a galaxy with aliens</u> would: 2 - “only if I am a totalitarian dictator” wouldn’t: 1 <u>Human-alien Interaction</u> Hostile - “aliens will kill all humanity” - “one will completely dominate the other” - “It is going to be dangerous” - they would “eat our flesh” Friendly - “their reaction will be similar to ours” and quite positive - “probably be friends” - “part would be friendly and part not” <u>Appearance</u> - “tall and skinny, big eyes, small mouth cover with skin, face in the stomach and big fat stomach, and you can see their brains”

9.3 FIFTH GRADE GIRLS

Only one girl developed strategy by trading technologies with aliens. Nonetheless, a few girls seemed to like the game. A couple of others found it boring, confusing, and hard. Indus hoped the game they would make wouldn't be as hard as *GalCiv* and would include more detailed instructions. Fifth grade girls relied on the game experts to solve game play problems.

Most Angel Girls imagined aliens looking cute while all the Solar System 6 girls agreed that aliens will be ugly. Both groups of fifth grade girls talked about war between humans and aliens. Most girls were not eager to live in a galaxy with aliens.

Angel Girls Report

Game Play Likes and Dislikes

Some of the Angel Girls liked the game. Auriga even wanted to get a copy of it. She wondered, "Could you get this game in the stores? I want to get it." She also asked if she could get *Liftoff*, another game played at camp.

Indus thought it was good that she "got to colonize". Columba explained, "I was broke and then [after starting a new game] I got rich." Hercules said, "Aliens started a war with me". She continued, "I bought 15 spaceships, but I lost them". Indus told her "you could use a space ship finder".

Hercules said, “It was hard”, in a good way. Indus thought it was “confusing and hard”. “Everything besides the graphics” was bad, she said.

When AGs had questions, they did not hesitate to ask for help from the game expert in the room, instead of reading from instruction sheets or the game manual.

Game Learning Value

Asked if *GalCiv* was a good way to learn, Hercules responded: “Yup. It helps us get ready for our game”.

Inspiration for Their Game Design

GalCiv inspired one Angel Girl about what not to do in their game. Indus said, “I hope our game is not going to be hard like that…we need more detailed instructions”.

Alien Expectations

Indus and Hercules do not want to be part of a galaxy with aliens. Hercules worries, “They might get into a war with us”. Columba did not think war with aliens would necessarily be worse than human wars. She said it will be “just like getting in other wars”. She continued, “It’s not like alien’s faces will shoot out lasers”.

Columba predicted aliens will be friendly. Hercules said, “It depends on what kind of alien”. Indus expects aliens will “most likely be mean”. To her aliens will look “like I drew”. Hercules imagined they will look like “Tigger aliens”. Indus protested, “No, Tigger is cute”. Columba imagined aliens might look like a rabbit. Auriga suggested they might look like "Winnie the Pooh”.

Solar System 6 Report

Game Play Likes and Dislikes

Hydra said, “It was really fun”. Leo liked that she “got to be creative” naming the planets. Ursa Major “loved everything” and thought it was fun. She liked that she “could change the name of stars when I capture them”. Leo noticed that “Ursa Major was getting around better and faster than me.” Ursa revealed her strategy: “I tried my best to keep both ships together so I did not have to switch back and forth.” Draco disliked everything about *GalCiv*. She thought it was “boring and hard”.

Only Leo read the instructions a bit, but girls generally sought help from either the game expert or the teacher facilitator. Two SS6 girls complained about their computers being slow or unable to run the game. Leo complained, “My ship would not move, I had to wait for information and Ursa Major didn’t.” Lupus had problems too, “It logged me off, kicked me off”.

Game Learning Value

Lupus thought *GalCiv* was a good way to teach while the others didn't.

Inspirations for Their Game Design

Ursa Major suggested, "We could have little stars and fly to them to investigate".

Alien Expectations

None of the girls were interested in being part of a galaxy with alien cultures. Imaging aliens' appearances, Lupus anticipated they would be "ugly and have a second eyelid". Leo also thought they will "look like aliens in *Exodus Earth*", a video clip the girls watched earlier during the camp. Ursa Major imagined aliens would come in different colors, "blue, red, and green; some with small and some with big heads; all ugly". Draco concurred, "Some ugly, some uglier, some ugliest".

Asked how humans and aliens would get along, Ursa Major said they "would not get along, except boys will say 'oh, it's alien – cool!'". Lupus thought humans would be scared, "Humans might make fun of aliens because of how they look and then aliens would destroy Earth". Leo agreed and gave an example from the movie *Men in Black*, "We'd be scared and it would cause a war." Draco optimistically predicted humans would win the war because we have the most technology in the world". All of the SS6 girls agreed aliens would be dangerous. But they also felt aliens would be afraid of humans.

9.4 FIFTH GRADE BOYS

Half of the boys seemed to enjoy the game. A few boys developed strategies while playing, and one of them even won a domination victory. Four boys hated the game. Three boys agreed the game was a good way to learn about economics and strategies, even galaxy domination. When having questions, most of the 5th grade boys consulted each other, whereas the one who beat the game asked help from the game expert. Boys didn't consult the print documents.

Thinking about their own games, a couple of boys considered game balance issues. They would restrain the amount of money players could have. A couple of boys proposed ways of navigation such as warping.

More than half of the 5th grade boys were interested in living in a galaxy with aliens, even if some of them didn't think they would be completely. Imaging their appearance, some pictured aliens would look similar to humans, while some said they would be monster-like in appearance.

Frozen Eclipse Report

Game Play Likes and Dislikes

During the play session, Volans consulted the game expert when having questions at the beginning, but eventually managed to win a domination victory on his own. Octans said the game "makes me feel so useless". Chameleon

destroyed all his colonies and eventually died. Pisces declared war on aliens during play. He said, “I just killed somebody! That was fun”.

When the play time was up, Taurus said, “I just got a colony ship and I gotta quit”. Pisces: “I destroyed this one ship, it was fun”. Volans: “that was Very fun. I got a domination victory, and I had twenty-six battleships”. Chameleon: “Conquer the galaxy, who even cares”. Volans: “I don’t, but I did it anyway”.

Taurus thought “everything was good except for the wars” and added, “You could control your ship and get parts from other ships”. Pisces liked “how you got to destroy other ships”. Both Chameleon and Pisces commented that the game “was OK but not as tight as *Atmosphere*”.

On the other hand, Octans thought “it was a waste of time”. Chameleon barely liked it too, disliking “almost everything, and once you have no money you can’t buy anything and then it says you die”.

Boys read the written documents somewhat, but didn’t rely on them. Except for Volans, when running into problems, FE members asked each other first.

Game Learning Value

Taurus and Volans both agreed the game was a good way to learn economics. Taurus said one can “learn to control and handle money”. Octans didn’t think it was a good way to learn.

Inspiration for Their Game Design

Playing *GalCiv* gave Taurus an idea for their game: “You have to travel to the planets by yourself instead of just telling the ships to go”. Chameleon also suggested “warping to different places like in *Star Wars*”.

Alien Expectations

Most FE boys said it will be cool to live in a galaxy with aliens. However, Chameleon did not think aliens will be peaceful with humans, because “they’ll be smarter than us, so they’ll have bigger weapons than us”, while Taurus, Octans and Pisces believed “in the future they’ll be peaceful with us”.

Imaging their appearance, Octans said they “will just be cute”. Taurus said, “They look like insects or alligators that are warm-blooded”. Volans said they would have “shiny green eyes, eight hands”.

Rocket Lions Report

Game Play Likes and Dislikes

Pluto, Scorpius, and Canis Venaciti developed strategies such as changing governments, reducing the population, taxing people, and planning budgets. Scorpius had a chance to fight aliens but he chose not to. Sextans and Horologium quitted playing before time was up.

Two RL dissented. Horologium said it was “dumb”, perceiving the game as “just a spaceship that you push around”. Sextans hated it, asking the group if this game is better than *Neopets*. Pluto, Scorpius, and Canis Veniciti said yes.

Pluto advised his peers to “use money correctly, can’t waste it all”. Scorpius liked to “tax people” in his civilizations and “tell them what to do, build stuff for you”. Pluto didn’t appreciate that he “couldn’t take them [space ships] a long distance” [due to the limit of the civilization’s technological development]. Canis Venaciti liked the cut scenes and disliked the pricing and payment options: “if you want to buy something” you have to “pay up front” [which is a misconception] and that the set price “wasn’t real price”. Only Scorpius read the game manual.

Game Learning Value

Pluto thought it was a good way to learn because it “taught me not to waste money” and “don’t keep pressing turn”. Scorpius said it would be a good way to learn “if you want to dominate galaxy. If you don’t, no.” Horologium and Sextans didn’t see any learning value in it.

Inspiration for Their Game Design

Rocket Lions had some ideas for their game from playing *GalCiv*. Pluto suggested, “You have to limit the amount of money, not all the money you want”. Scorpius continued the idea: “If you had enough people and a military, you could make them grow plants for you. But if you didn’t have enough people or money,

the civilization would crumble". Canis Venaciti agreed with the "special money system" idea. Sextans reminded the group to "have space ships in our games". Horologium wanted their game to "have an alien help guy kill the other aliens that are mean".

Alien Expectations

Pluto would live a galaxy with aliens and "probably want to fight them". He pictured different species, "some will be friendly to each other; some will be dangerous". Scorpius would too, "only if they were mostly good and mostly fools". He said, "Really stupid evil ones would be friendly; smart evil ones would be bad". The other three boys wouldn't, although Horologium believed "they come in peace". Sextans and Canis Venaciti said they would be bad and dangerous.

Horologium thought aliens would look like humans. Sextans answered with acting, screaming, and making faces. Canis Venaciti drew a human-like body, explaining they might be "stupid and insane". Scorpius said aliens will look and act like his sister. "She must be an alien" said Scorpius.

9.5 EIGHTH GRADE GIRLS

Two girls excelled their peers by building star bases. Andromeda was the only 8th grade girl who developed strategies. A couple of girls liked playing *GalCiv*. Three girls said once they got over the learning curve, it was easy. Three girls disliked it for being too hard to understand. Most 8th grade girls didn't think it

was a good way to learn. Two girls suggested their game should not be so difficult and provide sufficient instructions.

When encountering problems, 8th grade girls frequently checked out the print instructions. They questioned the teacher-facilitators too, but they referred the girls back to the instructions. Most other girls wouldn't live in a galaxy with aliens.

Desdemona Report

Game Play Likes and Dislikes

Although both Carina and Andromeda had built star bases, Carina still seemed lost. Andromeda demonstrated the most understanding of the game by developing her play strategies. She had her defense shield protect her colony from enemy attack and sent all ships to the star base. After being declared war on, she expressed the eagerness to attack, only didn't know how. She talked out loud to the characters, and seemed very involved.

Aquila and Libra said it was confusing in the beginning: "It took me a little time but once I got it, it was easy". Carina thought the game was challenging, noisy, and difficult.

Girls referred frequently to the manuals and the teacher facilitator.

Game Learning Value

As far as its learning aspect, Andromeda “didn’t learn anything because it’s all make believe”.

Inspiration for Their Game Design

The game gave Andromeda ideas about “the way they looked”. Libra suggested their game should not be so confusing.

Alien Expectations

Andromeda would like to live in a galaxy with different alien cultures, “especially with aliens who looked human”. She imagined they look “just like people”. Libra responded that it all “depends where they live”. Aquila said it would depend on “whether or not they were intelligent; intelligent ones would have bodies adapted to their environments, but unintelligent ones would be microscopic like on Mars.” Libra added “If they lived underwater, they need things for them to live under water. They might breathe some different gas than oxygen”. Aquila suggested they “might have gills”.

Predicting human-alien interaction, Carina started with “people are usually suspicious” when they meet someone new. Aquila added, “Humans have a natural tendency to be curious – if they find the slightest clue they will try and explore”. Then Carina suggested, “Aliens might get offended”. Aquila said, “they might know more about us than we do ourselves”.

Kalisti Report

Game Play Likes and Dislikes

Cygnus progressed ahead of the other girls. She accidentally landed on a planet, without knowing how she did it. Perseus appeared frustrated.

Apus “liked it because it is challenging”. “First, I wonder what I am doing? After a while, I got used to it.” Apus and Perseus complained “you lost your ship too easily”. The other girls did not really like the game. Equuleus and Cygnus said the game “is really hard to understand.” Equuleus “didn’t even know how to do anything“. Perseus said it “takes too long”. Girls frequently looked at the instruction sheets to solve problems and asked the teacher-facilitator for help too.

Game Learning Value

Perseus said that it was a good way to learn strategy. Equuleus added, “If you could understand it.”

Inspiration for Their Game Design

After playing the game, Cygnus said, “We cannot make the game too difficult. We also need to give instructions.” Apus asked the girls “What kind of ship do we want?” She suggested, “We need a research lab and space.”

Alien Expectations

Perseus would like to live in a galaxy with aliens, “but it would be scary.” Cygnus said, “No way.” Apus thought it would be “Weird – what do I do?” Equuleus said that others in the galaxy would be “mad at you” and “start a war”.

As for predictions about aliens, Equuleus imagined “they can change shape based on their feelings.” Apus showed a picture she had drawn of a pet: they “feel sluggish”. Perseus added, “Or turns into slug”. Cygnius said when they “feel blue they turn blue”.

When asked for predictions on human and alien’s relationship, Cygnus said it depends on the type of the aliens. Perseus said, “Aliens exist in all different times. One race dies out. The other races start. Probably one somewhere, maybe even one right now.”

9.6 EIGHTH GRADE BOYS

Four boys had fun playing *GalCiv*. They liked exploring the galaxy, controlling civilizations, finding and claiming abandoned ships, and naming planets. Four boys disliked it. Most 8th grade boys didn’t think it was a good way to learn. Phoenix helped his group as he had played the game twice on his own at the camp, without any instruction. In contrast, there wasn’t as much interaction among the NJs. Boys hardly used the instructions. Two boys expressed interests in being part of a galaxy with alien cultures. Two boys thought human-alien interaction would be positive while four others said that they would be dangerous to humans.

Challenger2 Report

Game Play Likes and Dislikes

Phoenix had played *GalCiv* a couple of times before while at camp and he seemed very confident about his skills. During the play session, he was being called by his peers to help them with the game so that he hardly had time to play on his own. Serpens tempted to change the background music. Those who figured out how to play the game liked to compare what they have bought or created. Phoenix liked to “control the entire civilization”. Serpens liked to “move quickly and name colonies after you.”

Talking about reasons for disliking it, Apollo said, “I did not understand what I was supposed to do”. Orion said, “They follow me everywhere and kill me, I never was able to win nor do anything.”

Boys referred questions to Phoenix most of the time instead of reading from the manuals. Serpens said, “They gave us long things to read; I skipped through and started pushing buttons.”

Game Learning Value

CH2 mostly didn’t think of the game as a good way to learn.

Inspiration for Their Game Design

Orion suggested having a “giant meteor shower” in their game.

Alien Expectations

None of the boys were interested in being part of a galaxy with aliens. Phoenix would be “only if I am a totalitarian dictator”.

Making predictions about aliens, Orion said that they would “eat our flesh”. Apollo said “tall and skinny, big eyes, small mouth covered with skin, a face in the stomach and big fat stomach, and you can see their brains”.

Imagining how humans and aliens would interact, Serpens said, “Aliens will kill all humanity”. Phoenix thought that “one will completely dominate the other”. Apollo said, “It is going to be dangerous. Look at how people interact with each other. How are they going to interact with creatures?”

Neptune Jihad Report

Game Play Likes and Dislikes

During the play session, boys focused on their own tasks without interacting with each other much. Telescopium constantly asked for help, but was ignored by his peers. Although helped by the on site game expert, he still didn’t understand the game, and appeared frustrated. The boys did not read instructions until directed to do so. Once they realized the game expert was helpful they frequently directed questions to him.

Sagitta and Monoseros seemed to have a good time. Sagitta constantly said, “This game is awesome” while playing. He “wanted to fight somebody, but

they are all my friends". Monoseros said, "I think I was just attacked. Oh this is just awesome." He said it was cool to "explore the galaxy and find and claim abandoned ships". Sagitta added, "It was nice to explore new places except for being lost." Near the end of the game session, he quit *GalCiv* to play *Neopets*.

Lynx regretted blowing up his own planet in the game; Monoseros showed interest in this, asking what it took to produce the result. Talking about dislikes, Lynx thought that "it was dumb". Telescopium said "I felt so dumb" while lying on the floor. He said it was "too complicated". Monoseros replied, "Yet, I didn't read the manual either, but I still got it pretty much I guess". Telescopium responded: "[the game expert] helped me for a while, for probably an hour and I still couldn't get it".

Game Learning Value

Telescopium said, "It was impossible. I couldn't understand the game." Monoseros said, "Strategy means to plan things out for your own advantage, I guess it did some".

Alien Expectations

Lynx and Monoseros expressed interests in being part of a galaxy with lots of alien cultures. Telescopium disagreed: "I'd rather just be on earth; Aliens are evil". Later he added, "Here on earth, our cultural differences are tearing us apart; We should all just have one culture".

Monoseros believed in aliens and has seen them: “It was just like a flash of light that moved very quickly”. Lynx said when humans meet aliens “their reaction will be similar to ours, but we will like it”. Sagitta thought humans and aliens will “probably be friends”. Telescopium said, “Part would be friendly and part not”.

CHAPTER TEN: CONCLUSIONS

10.1 GENDER AND AGE DIFFERENCES AND COMMONALITIES

The elements that both genders enjoyed or planned to incorporate were variety and customizability of player avatars, personalization of game content (e.g. naming planets), open-ended game worlds, non-linear game flow, in-game tutorials, low learning curves, and character design (e.g. artificial intelligence, scripts, voice-acting).

Elements girls enjoyed or planned to incorporate included storylines, character communication tools (e.g. gestures), multiple difficulty levels, sufficient instructions, online chatting, collaboration with other players, and traditional feminine themes such as pretty avatars and cute pets. The idea of pets or sidekicks ultimately showed up as part of the game designs of three of the four girl teams. Older girls preferred trivia types of games more than the younger girls did.

Elements boys enjoyed or planned to incorporate include weapons, fighting, challenging levels of difficulty, controlling ships via keyboard, complex interfaces with buttons, switches, or other mechanisms, game balance issues (e.g. limiting the amount of money players can own), navigating space through teleportation and warping, and multi-player split screens. Most boys enjoyed collaborating with other players, although some of the older boys preferred individual play. The younger boys enjoyed online chatting more than the older

ones. The younger boys were more open to incorporating pets into their games than the older boys.

10.2 GAME EXPERIENCES

It is likely that girls either had less game experience than boys or else they found commercial games less appealing than boys did, as evidenced by more frequent reference to other commercial games during boy conversations. Throughout the six focus group discussions, girls referred to four non-Camp game titles, and boys named 13 games. Eighth grade girls didn't name any non-Camp digital games at all. The only game besides ones they played at the camp that was mentioned by both genders was *The Sims*.

Similar to Kafai's (1998) research, while discussing their ideas for their own games, boys appeared more influenced by commercial games, although traces of components from games played at camp could also be detected. One 8th grade boy group was so fascinated with the commercial console game *Halo* that they ended up bringing in the game and demonstrating the multiplayer play on an Xbox in the final presentation. Girls seemed more influenced by games played at camp and other pop culture media content such as movies and cartoons when planning their own games.

The 5th grade boy who beat *GalCiv* did not do so by accident. Near the end of the camp, he approached one of the game experts and had a light discussion about another strategy game, WarCraft. Computer games of the

same genre are often based on a previous model (Ray, 2003). He may very well have been exposed to strategy games prior to the camp and applied the same concepts in playing *GalCiv*. With perhaps a swirl of luck, the 11-year-old beat the game in one hour, impressive considering that twenty-five years and older researchers had to spend numerous hours to win even once.

Familiarity with a game genre seems to advantage players new to a particular game. Girls who grow up playing fewer games and more limited genres of games than boys do will likely have an increasingly difficult time catching up with the game experience boys have amassed when learning to play a new game.

10.3 GAMEPLAY LEARNING STYLES

Risk Taking

The experience gap (Margolis & Fisher, 2002) and learning style in computers disadvantage females at figuring out (male-designed) games quickly (Ray, 2003; Turkle, 1988), evidenced by gender differences in use of the instructions prepared by researchers, game manuals, and on-site game experts while playing *GalCiv*. More boys attempted to comprehend it independently than girls; some boys developed strategies and discovered play mechanics that went beyond the basic controls and functions presented in the instructions (which themselves were rarely used). Among 5th graders, girls relied heavily on the game experts, whereas boy groups didn't ask for as much help. It is interesting to

note that one boy who did ask for help at the beginning of the play session eventually won the game. The 8th grade girls relied heavily on the instructions, consulting with the on-site game experts the least. The 8th grade boys, however, seemed proud of themselves *not* reading the instructions while still managing to play *Liftoff* and *GalCiv* well, two of the hardest games at the camp.

Girls' reliance on instructions when playing the games at camp was reflected when they talked about what to implement in the games they were creating. Girls more often complained about the lack of adequate directions, while boys didn't see the need (8th grade girls, *Atmosphere*). Girls also requested more detailed instructions even when they didn't use them (5th grade girls, *GalCiv*). In all, providing sufficient instructions for their own games was brought up several times in the girl groups, while only fifth grade boys thought of it – once simply calling for "better instructions" in their own game.

Previous research has demonstrated that girls are less prone to take risks during game play; they want to avoid mistakes and know how things work before starting play (Gottfried, 1986; Ray, 2003; Turkle, 1988). A key element in this tendency is lack of prior extensive experience with video games. In line with these findings, 5th grade girls relied on the experts, while 8th grade girls relied on the instructions, with disadvantages in previous game experience limiting their ability or desire to explore on their own.

The habit of reading instructions thoroughly can sometimes facilitate better game play. When playing *The Great Solar System Rescue*, most girl teams,

though taking a longer time to accomplish the first mission, made no mistakes at all, whereas most boy teams took less time but made one mistake.

This is not to say that male players want to or enjoy making mistakes, however. Both genders found the training sessions and “hint system” helpful in *Space Academy GX-1* and *Liftoff*. And both male and female groups talked about incorporating training features into their games. So although the boys seemed to rely on hints, game experts, and manuals to a lesser extent than the girls, the boys do appreciate having some form of assistance available to them.

Suggestions for game developers

Not only females, but all players who have insufficient or limited prior game experience need more helpful introductions and guides prior to and while beginning games as novice gamers. It doesn’t mean they are only willing to play easy games. Developers can help them overcome learning curves by including user-friendly in-game tutorials, hint system, and intuitive interfaces. Additionally, to reinforce inexperienced players to continue playing when they encounter problems, detailed game manuals, FAQ resources, and an online forum function for help in answering questions on the official game websites, as well as game play customer service, should be implemented to assist novice players.

10.4 GENRES

Similar to previous research results, the games girls named during the focus groups were mostly adaptations of cartoons or movies, whereas boys

mostly named sports and action games; girls mentioned games on the computer or Game Boy, while boys talked about games on consoles. Girls liked the trivia type of games better than the boys did, as Planetary Data Center was more popular among girls than boys in *Space Academy GX-1*. Eighth grade girls talked about traditional puzzle games such as word games, card games, and board games. This preference for puzzle and trivia games may intensify as girls grow older, as more 8th graders liked them than 5th graders.

Themes

Participants' pattern of interests in game themes in this study conforms to traditional gender roles. In spite of several common features being liked by both genders in *Neopets*, girls described taking care of pets as fun, while the younger boys called it educational and the older boys didn't talk about this aspect at all. On the other hand, many boys mentioned enjoying the fighting aspect of the game, whereas few girls talked about this.

Boys expressed desire for controlling spaceships through the keyboard or interfaces such as switches and the command keypad, and incorporated these into their design ideas. Boys, younger and older, pervasively requested weapons, explosions, and more action, as evidenced by Gravity Pilot Trainer where one shoots rockets being the only section in *Space Academy GX-1* welcomed among boys. To a much lesser extent, some girls from both grades did show a preference for action, destruction, and war games, mentioning incorporating ways to control space ships, or desiring to attack enemies.

Educational Games

Boys' attitude toward educational games is illustrated by an event that occurred when playing *Great Solar System Rescue*. Although CH2 appeared very pleased after successfully accomplishing the missions and demonstrated seriousness and focus while solving problems during the process, during the focus group discussions many boys still dismissed it as a boring educational game, and not good for learning. The younger boys had the stereotyped impression that educational games aren't fun, but their attitudes changed more easily once they experienced the game for themselves.

The criticism of the games as being "too educational", "too simple", "too kiddie" was heard from both grades of boys, especially the older ones, but rarely from the girls. Eighth grade girls only considered one game too easy, of which they were two years over-aged for, but they never used "educational" in a negative way like the boys did. Boys clearly have a preconceived notion about educational games, and as they grow older it is likely that this will becoming more deep-rooted.

10.5 GOALS AND FEEDBACK

Winning

Boys' liking of "conquering the challenge", as a 5th grade boy said, may be best illustrated when the 5th grade boy beat the complex strategy game *GalCiv* –

When the group started talking about their experience, he said: “That was very fun. I got a domination victory”.

The research literature suggests girls do not play games to win. They need reasons as motivation, and they enjoy the process and the benefits of playing games (Klawe et al., 2002). These reasons are commonly framed in the form of games’ back-stories by the developers, which are asserted by many researchers as being important to girls. Regarding process, as found by previous studies, as well as this current project, boys eagerly worked on beating the games, while girls generally took their time exploring the game world and reading the background stories. The benefits were usually social interactions, such as collaboration and communication, which didn’t seem to be as important for the older boys in the study. As observed, some of the 8th grade boys voiced preferences for playing individually rather than collaborating with other players, and didn’t express appreciation for the communication function of *Atmosphere*, while on the other hand, girls and younger boys were more fascinated by the two experiences.

Reward and punishment

Among all the games, the Launch Simulator in *Liftoff* was the only game that required starting over if one failed, although the punishment wasn’t as severe as “death”. The younger girls appeared lukewarm about it while the older girls and most boys liked it for being difficult, even wanting to make it more challenging. It was the only educational game approved by all 8th grade boys as

good for learning. As Ray (2003) indicated, to accommodate a broader range of players, the game should offer an alternative resolution other than failing the entire training sequence. Most other games at camp, especially educational games, offered rewards instead of punishments.

Difficulties

Girls asked for different difficulty levels to accommodate different players, while boys in the study tended to admire the difficult games. Eighth grade boys constantly, and 5th grade boys occasionally, wanted to make their own games, and games played at the camp, more challenging. For example, after playing *Liftoff*, the younger boys and the girls of the 8th grade wanted to make it easier, complaining it was too hard to understand, while some of the 8th grade boys wished to complicate it. There were a couple girls who liked games for being challenging, while their peers complained of the difficulty levels in *Liftoff* and *GalCiv*.

To design flexible games that everyone can enjoy, it would be a good idea to provide choices in difficulty levels such as “Easy”, “Medium”, or “Hard”, as seen in various commercial games on the market.

10.6 GAME WORLD

Open-ended-ness and nonlinear-ness

All groups liked the open-ended game worlds in *Neopets* and *Atmosphere*. They usually described them with expressions such as “there are so many things to do” or “you can explore around”. For their own games, they also wanted to provide players with different choices of missions. Translated into design concepts, this is a desire for non-linear game flow. When faced with linear play, as in *The Great Solar System Rescue*, both genders of the 8th graders complained there wasn’t much to do.

For their own games, both genders had the idea of mini-games within a larger game world, inspired by *Neopets*, *Liftoff*, and *Space Academy GX-1*, and this was eventually incorporated in two of the four boy groups’ game designs.

Unlike Kafai’s (1998) findings, the girls in this project did not show a preference for game worlds with familiar environments.

Creation and destruction

Although both genders liked assembling spaceships in *Liftoff*, it is quite obvious that girls avoided approaches that caused destruction when playing *GalCiv* and *Neopets*, two games that allow players to develop their own play styles. In *GalCiv* most boys quickly looked for enemies to fight - even the one who beat the game took the military approach, which essentially involves blowing up opponents’ ships and invading their colonies, whereas girls built star bases and defense shields first. Likewise, in *Neopets*, while girls focused mostly on taking care of their pets, boys ventured into the Battledomes.

10.7 CUSTOMIZABILITY AND PERSONALIZATION

Many children requested avatars that resembled themselves. Customizability of the avatars and personalization of the game content (e.g. naming planets) were important features welcomed by all groups. Otherwise, girls wanted traditionally feminine avatars (a girl, someone pretty, cute animals) while boys wanted traditionally masculine ones (robots, a ninja with big weapons, a game character from *Halo*). When playing *Atmosphere* there were only three female avatars to choose from. As a result, almost all the girls chose the same female avatars, resulting in them not being able to distinguish each other.

10.8 GRAPHICS

Although boys were more critical about games that had graphics that were not 3D and too unrealistic, the positive reactions towards *Neopets* proved that being three-dimensional and realistic is not a requirement for success among boys and girls. The *WarCraft*, a commercial strategy game series popular among male audiences, is not 3D and very “cartoony” in visual design.

10.9 GAMES FOR LEARNING

Neopets, though not an educational or space game, was the single game embraced by a majority in all groups as good for learning, with only two 5th grade girls saying they only had fun. All groups considered the *Great Solar System Rescue* as good for learning but none of the 8th grade boys did. *Galactic*

Civilizations was the most universally not good for learning, but all eight groups had at least one or more members who did think it good for learning.

Table 10.1: Games considered good for learning without disapproval in all groups

	Girls		Boys	
	5th grade	**8th grade**	**5th grade**	**8th grade**
Neopets		X	X	X
Great Solar System Rescue	X	X	X	
Space Academy	X			
Atmosphere	X		n/a	n/a
Liftoff				X
Galactic Civilizations				

Fifth grade girls

Neopets, *The Great Solar System Rescue*, *Space Academy*, and *Atmosphere* were considered good for learning. *Liftoff* and *GalCiv* were hard, but a couple of girls also liked them because of the challenge.

Eighth grade girls

The games considered good for learning by all of the 8th grade girls were *The Great Solar System Rescue* and *Neopets*. *Space Academy* was the only game considered too easy. Some 8th grade girls complained that *Atmosphere*, *Liftoff*, and *GalCiv* were hard to understand, although many enjoyed *Liftoff* too.

Fifth grade boys

Similar to 8th grade girls, *Neopets* and *The Great Solar System Rescue* were the only games considered by all 5th grade boys as good for learning. *Space Academy* was the only game these boys complained about as being too

easy. *Liftoff* and *GalCiv* were too complicated for some while some others liked them for that exact reason.

Eighth grade boys

Unlike all the other groups, *The Great Solar System Rescue* was strongly rejected because it was not fun enough to be good for learning. Eighth graders were two years over-aged for *Space Academy GX-1* and one year for *Liftoff*. Only *Atmosphere* and *GalCiv* escaped being labeled as childish by 8th grade boys. *GalCiv* was the only game considered too complicated to understand by some 8th grade boys.

10.10 INTEREST IN SPACE SCIENCES

Regarding space sciences as career aspirations, the gender gap is more distinct among the 5th graders than the 8th graders. More than half of the 5th grade boys, compared with one girl, showed interest in space sciences either for schooling or as future careers. The fear of outer space was a reason offered by some of the 5th grade girls. The 8th graders of both genders were about equally and quite strongly interested in space sciences. However, half of the 5th grade girls' did dream of careers heavily involving the natural sciences in other fields.

The most prominent gender difference in role preference is interest in leadership. Many boys in all groups wanted to be the leader of a science team, both as a game role to play and as a future career. Girls did not show such a tendency.

10.11 LIMITATIONS OF THE CURRENT STUDY

All the focus group participants were volunteers recruited from local schools and do not exactly represent the larger population of equivalent ages and genders in the United States. Also, the focus group situations varied because of moderators' individual differences. Each moderator's level of involvement in the groups could not be standardized, so perhaps some questions might have been skipped in certain groups depending on the situation. The group dynamics could also affect participants' interaction and responses within the groups. Research has found that adolescent males give different data in individual interviews than when in peer groups (Wight, 1994). Would boys and girls act and answer differently alone or in mixed-gender groups?

Because this thesis heavily depends on the researcher observers' field notes, the quality of the notes proved to be important. The individual differences of researcher-observers influenced what they recognized, interpreted, and recorded. In addition, the two researcher-observers of the same group did not always interpret the participants' statements in the same way. Therefore, when the author merged the two notes into group reports, there could be some misinterpretation in the interpretation of the notes.

This study collected rich data on a small sample of ten 5th grade girls, ten 5th grade boys, ten 8th grade girls, and eleven 8th grade boys. The sample was self selected – parents chose to volunteer their kids to participate in camp. The participants were a mix of low, middle, and upper income families, with 5th graders more likely to be from low income parts of the city. Some of the

participants came to camp because of strong personal interest in space exploration and games. Others were sent to camp primarily because parents thought it would be good for their children. All participants (or their parents) did volunteer to participate in a 2 week space pioneer learning adventure camp. Replicating parts of the study with samples representing other specific populations would enable more informed judgment as to how generalizable these findings are.

10.12 DIRECTIONS FOR FUTURE STUDIES

This thesis was not able to answer whether more game experience predicts greater computer literacy. Are those who learn to play games faster more comfortable with computers? Do they have more game experience? If as previous studies indicate that games are learning wheels into computers and technology, do computer gamers have better computer skills than non-gamers?

Although the purpose of the camp was to design games that would foster interest in space and space sciences, the actual process by which learning occurs via video games was beyond the scope of this study. Specifically, future studies could examine how, what, and to what extent children learn from both learning-targeted and commercial video games. The bulk of research in this area has predominantly focused on video game playing effects on motor, spatial perception, and cognitive skills. However, few have focused on what, if anything, children actually learn from playing games, both explicitly (i.e. things they realized that they learned) and implicitly (things they learn, but are not able to

articulate). Any such studies would necessitate game playing situations similar to how games are played in the “real world” i.e. generally more than once and over a period of time, rather simply one point in time.

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