

# Considering Gender in Digital Games: Implications for Serious Game Designs in the Learning Sciences

Yasmin B. Kafai, University of California, Los Angeles, 2331 Moore Hall, kafai@gseis.ucla.edu

**Abstract:** This paper reviews the research literature on gender and gaming in light of the growing interest in digital games for learning. It outlines three different approaches that have been developed to address gender issues in digital games: ‘games for girls’ that build on gender differences by promoting different notions of femininity, ‘games for change’ that support gender play by challenging stereotypes, and ‘games as designs’ that position girls as creators of their own learning environments. The paper then discusses implications for design methods, choices of game genres and features, research in learning environments, and approaches to data analyses for learning science researchers interested in designing and using games for learning.

## Introduction

Over the last ten years, we have witnessed some remarkable changes in the field of digital games. The most obvious one concerns the move of digital games into mainstream entertainment. Now people of all ages and backgrounds, and not just young boys and men, can be seen playing games. New gaming formats and platforms have expanded participation into mobile, massive online and alternative reality gaming anytime, anywhere, and with anyone. Equally important is the recognition of digital games for their educational benefits amplified by the creation of the serious games movement. But arguably one of the most significant changes has been the increased presence of girls and women as gamers. Recent industry reports (Entertainment Software Association, 2007) list over 40% of women as gamers with casual gamers consisting of over 70% women players.

Thus the worry about gender issues in games, which has been documented so prominently in the research literature (Cassell & Jenkins, 1998; Yelland & Rubin, 2002), might seem misplaced and could explain why it has been put to rest in some discussions. No other than Jim Gee (2003), who has helped popularize video games as examples of promising learning environments, articulated that he had “nothing whatsoever to say about this issue” (p. 10) given the large number of existing publications. Gee admitted that videogames, like other popular cultural forms, overstress sexualized women in their content and usually portray them as minor characters but foresaw that this will change. As I will argue, this is an overly simplistic view because gender in digital games has always been about more than just having larger numbers of female players and fewer virtual bosoms in games.

Two different arguments have been prominent in discussions on why gender should matter in digital games. The technology pipeline argument has been discussed most extensively because boys’ early access to video games presumably provided them with a home advantage (see Hayes, in press). Consequently, increasing girls and women’s participation in gaming has been seen as one way to address the lack of women’s involvement with technology. Yet, the trends seem to indicate otherwise: over the last ten years the participation of women and minorities in IT fields has decreased. Games as such have little changed, and women have made few inroads into the game design industry (Cohoon & Asprey, 2006). A second argument as to why gender should matter in digital games concerned the content of digital games, most notably the violence and stereotyping (Hartmann & Klimmt, 2006; Provenzo, 1991) which were seen as another deterrent for girls. While researchers have debated to what extent these messages are received as transmitted (Kinder, 1991), stereotyping continues to exist even with strong female protagonists such as Lara Croft now prominent in many games (Jansz & Martis, 2006).

These arguments have made gender in games an issue that we cannot ignore because they illustrate that lack of participation and bias in representations have implications far beyond mere numbers. Within industry and academia different proposals have been developed for addressing these issues: (1) ‘games for girls’ that build on gender differences by promoting different notions of femininity and (2) ‘games for change’ that support gender play by challenging stereotypes, and (3) ‘games as designs’ that position girls as creators of learning environments. In the following sections, I will outline the premises of these different proposals, provide examples of existing game designs, and then articulate implications for the choices of design methods, game genres, features, research in learning environments, and data analyses for learning science researchers interested in designing and using games for learning.

## Gender in the Design of Digital Games

In the early 1990’s, video games were mostly seen as toys for boys. During those years, there was little interest in the game industry to create and market games for girls because all the research had shown that girls just weren’t interested in computers, and, by extension, in digital games. Yet, others wondered whether this

untapped market segment could be mined by designing games for girls. These discussions crystallized in the girl game movement — an unlikely alliance between academics and industry (for an extensive discussion, see Cassell & Jenkins, 1998). Within the girl game movement, games were created for girls only based on the premise of gender differences emphasizing traditional notions of femininity. This approach to gender in game design will be called ‘games for girls.’ In contrast, approaches under the premise of gender as a social construct have favored games that challenge stereotypes and will be called ‘games for change.’ Finally, ‘games as designs’ position girls as creators of learning environments. The following sections will provide more detail to the different approaches using selected games as examples that illustrate similarities and differences in game character design, mechanics, and context.

### **Games for Girls: Building on Gender Differences**

A large body of research has established significant gender differences in various aspects such as performance and experience related to video game play (for an overview, see: Greenfield & Cocking, 1996). Other research focused on differences in game playing interests and used these as an explanation for why girls were not playing video games (Hartmann & Klimmt, 2006; Klawe, Inkpen, Phillips, Uptis, & Rubin, 2002). Industry designers and academics thus argued that games needed to emphasize different content, mechanics, and characters in order to appeal to girls. The Barbie series exemplifies the characteristics of a typical girl game aimed at 6 to 11 year olds. Barbie Fashion Designer released by Mattel in 1996 was the most popular package produced in this series. It let players design clothes for the Barbie doll and model them on a catwalk before printing them out on special clothes-like paper and gluing or ‘sewing’ them together to dress an actual Barbie doll. The software provides dozens of clothes patterns that fit the actual Barbie doll body and a large array of different colors and print patterns. Other software packages in this series let the player via Barbie explore the ocean environment (e.g., Barbie Ocean) or create dresses for collaborative doll play (e.g., Barbie Print ‘n’ Play). These game activities emphasized traditional notions of femininity such as being beautiful and fashionable. Greenfield and Subrahmayan (1998) explained the success of Barbie Fashion Designer with its focus on girls’ traditional play patterns with dolls. When Mattel released Barbie Fashion Designer, the title outsold all other console games in the traditional boys market. This commercial success indicated for the first time that girls could be interested in computers given the right software.

Other efforts, most notably the Friendship series developed by Purple Moon under the direction of Brenda Laurel, promoted different interests of girls, those of social interaction and helping. The Friendship series focused on girls ages 8 to 12 years old. For instance, Rockett’s New World released by Purple Moon in 1997 presented a player with the situation of moving to a new school and navigating her way through the social maze for making friends. In the game, Rockett would face different social situations with classmates and could rehearse answers and experience their outcomes. Rockett and her six friends were dressed in casual fashion. A diary provided additional information about Rockett’s feelings and interests (see Laurel, 1998). Other packages in this series would allow Rockett and her friends to explore secret pathways in a forest and design friendship bracelets. The game activities focused on gaining access and social status among peers. This group of girl games has often been called ‘purple software’ because of its purple packaging while the Barbie software, and others alike, were called ‘pink software’ because of their pink packaging. The successes and failures behind these two developments have been extensively discussed elsewhere (Jenkins, 2003; Jenkins & Cassell, in press; Laurel, 2003). But what’s important here is that this focus on gender differences in game play and interests produced clear prescriptions on how to design games for girls: offer female player protagonists, afford realistic feature choices, use cooperation not competition, and provide positive but not violent feedback.

### **Games for Change: Supporting Gender Play**

The pink and purple games that appealed to large numbers of girls (based on their commercial successes) and used girls rather than boys as a starting point for their designs, created considerable concern among feminist researchers (Cassell & Jenkins, 1998; deCastell & Bryson, 1998): the promotion of traditional values about what it meant to be a girl, the limited choices of identification with femininity, and the creation of separate, girls-only spaces leading to a possible ghettoization of girls (Seiter, 1993). But one of the most problematic aspects was for many the “essentialization” of girls and boys — the assumption that all same sex children share the same likes and dislikes. This view ignores the substantial differences that exist within a group of girls or boys. A recent meta-analysis found that most of the observed differences between men and women in psychological studies are rather small with the exception of motor performances and views on aggression (Hyde, 2005). Many researchers now focus on contextual factors and their impact on situating gender. For instance, a follow-up study of Kafai (1998) revealed that most of the observed gender differences disappeared in children’s video game designs once the context for the instructional games was changed from teaching mathematics to teaching science. More recently, research has expanded to focus on physical locations in which games are played (Beavis & Charles, 2005; Bryce & Rutter, 2002; Carr, 2005; Schott & Horrell, 2000). In these

studies researchers examine the ways girls' access to and participation in game play is supported when various family members compete for access to consoles or how locations structure game play.

While games for girls movement was based on the premise that all girls are alike, games for change was predicated on the notion that gender is a socially constructed identity (deCastell & Bryson, 1998). Theorists like Butler (1990) have introduced the notion of 'gender play,' meaning that both girls and boys, and men and women, experiment with gendered expressions within different contexts. Much of the research has focused on where and how society places constraints on gender performances and thus impacts a gendered identity formation. The basic premise of these games is to challenge existing gender stereotypes and provide room for exploration. This take on gender obviously leads to games with different game mechanics, contexts, and characters. One example is SiSSYFiGHT 2000 developed by Zimmerman and others (2003) to illustrate how one can challenge norms about social interactions. SiSSYFiGHT 2000 focuses on girl groups who are all out to ruin each other's popularity and self-esteem. The object of the game is to attack and dis enemies both physically and verbally until they are mortified beyond belief. The game involves six online players and each round establishes who comes out as a winner or loser; the final results are published on an online board reset on a weekly basis. The game activities focus on abusive practices used by girls to establish popularity in their groups and thus explicitly challenge stereotypes that all girls are nice and supportive.

### **Games as Designs: Exploring Gender Construction**

A different approach provides room for exploration of gender by creating tools for learners to design games (Kafai, 2006). In her early work, Kafai (1996) found significant differences in girls and boys' game designs but no differences in their abilities to make the games. In the project, students aged 9 to 11 years were asked to design fraction games to teach other students at their school about fractions. Most of the boys' designs featured violent feedback, were situated in a fantasy settings and assumed a male player, while most of the girls designed games with no violent feedback, selected realistic settings and made provisions for players of different gender. An alternative interpretation of these findings would propose that the boys positioned themselves in their games as savvy game players by choosing established conventions that reaffirm their gender while the girls did the same with their choices (Pelletier, in press). A later study (Kafai, 1998), in which students were asked to design and implement astronomy games found no differences in game designs suggesting that context plays an important role in how students position themselves in relation to particular subject matters and game designs. In the same spirit, Flanagan (2006) incorporated game mechanics such as cooperation, sharing and fair representation in the multi-player game RAPUNSEL which is programmed by the players themselves. RAPUNSEL, aimed at 11-14 year olds, presents a multi-player game world populated by two sets of creatures called, Peeps and Gobblers, who like to dance. Peeps design and program dance moves while Gobblers learn them from copying the Peeps. Players control Peeps characters by programming increasingly complex dance moves that can be stolen by Gobblers. Players have the choice of two modes: battle or exploratory. In exploratory mode, players can decorate their houses in their home base and make music. In the battle mode, players confront Gobblers and put voodoo-like spells on them to protect their moves. Players collect credits for their home designs, new music loops, dance moves, and character designs. RAPUNSEL includes both cooperation and competition thus allowing players to choose whichever mode they prefer.

Each of these approaches incorporates expression of and play with gender in different ways. The 'games for girls' approaches stress different notions of femininity: Mattel's Barbie series focuses on beauty and fashion while Purple Moon's Friendship series focuses on popularity and friendship. The 'games for change' approaches challenge these traditional notions: Zimmerman's SiSSYFiGHT 2000 explicitly asks players to engage in psychological and physical attacks whereas Flanagan's RAPUNSEL allows players to choose their mode of interaction of being either collaborative or competitive. In 'games as designs' girls can position themselves either way as players. Each approach has built in challenging or confirming notions of what is considered to be appropriate for a girl. It is clear that multiple factors — design, mechanics, and contexts — impact gender differences and performances.

### **Implications for Serious Game Designs in the Learning Sciences**

The purpose of this review was to present the quite diversified treatment that gender has received in the research and design of digital games. There is not one easy answer how to address gender in the design of digital games for learning but clearly multiple aspects to consider. The learning sciences community has not extensively discussed the gender issue. For instance, the recently edited Handbook of the Learning Sciences (Sawyer, 2006) did not include a chapter on this topic. This may come as a surprise given that so many learning science studies deal with technology designs or interventions in schools where there has been an extensive documentation of gender issues. Previous research has revealed significant gender differences in access, use, attitudes and achievement in regard to computers in schools (Kirpatrick & Cuban, 1998; Volman & van Eck, 2001). Studies have documented, over and over again, that girls' access and participation with computers is not the same as those of boys. For instance, Schofield (1995) painted a dramatic picture of the cultural and social

forces that shape girls' inclusion or exclusion in computer classrooms and school clubs. Some recent research has also moved away from examining gender differences. Here researchers (Jenson, deCastell & Bryson, 2003) propose opportunities for girls to develop and experience new identities as technology experts within their school by allowing them to voice their concerns about inequitable access.

While games have always been around schools, they have been used mostly for motivational rather than academic purposes. Many teachers use board and computer games in classrooms as a reward for students completing their assignments. We found though that gender concerns often fall to the wayside when teachers examine serious games (Kafai, Franke, & Battey, 2002). Few teacher reviewers considered whether the design of game contexts, activities and characters could be biased towards one group. The reviews also revealed that most teachers focus on motivational and not content-related criteria when discussing learning with digital games. Ito (2006) and others have argued that we cannot neglect the social and cultural factors when considering learning with serious games which situate when, how and who is learning what. In the following sections, I will articulate the implications for considering gender when designing and researching digital games in the learning sciences by focusing on the design methods, game genres, and game features, and data analyses.

## **Design Methods**

Since the field of the learning sciences considers the design of educational technologies and tools a central part of its mission, it is particularly important to consider the design method itself. Why this is important is apparent in early research conducted by Huff, Fleming, and Cooper (1987) who asked designers to develop gender-specific educational software, they found game designs for boys and learning tools for girls. When asked to design generic software, designers replicated the same patterns. While this is not a comprehensive body of research, the few studies seem to suggest that bias can come into play in the design of serious games. Several researchers have made proposals for different design methodologies to address this issue. For instance, Cassell (1998, 2002) proposed what she called underdetermined design for software and games encouraging boys and girls (and by implication, men and women) to express aspects of self-identity that transcend stereotyped gender categories. In this approach, activities involving girls and boys are not neutral or isolated acts but involve the person becoming and acting in the world as part of the construction of a complex identity. Flanagan and Nissenbaum (in press) called for a design approach that reveals the values designers bring to their games' designs as revealed in Huff, Fleming, and Cooper's (1987) research findings. They argue that designers and producers need to pay attention to safeguarding critical values in all phases of the game design process: delineation of a project, specification of game mechanics, implementation and revisions. These two proposals provide concrete suggestions of how learning science designers can prevent potential gender biases when designing learning tools and environments.

## **Game Genres**

Beyond the design method, learning scientists also need to be considerate what kind of game genre they choose for their learning design. It is clear that we need to move beyond the drill-and-practice versions often used in schools as motivational tools to reward students for completed assignments. It is only in the last few years, since the publication of Gee's (2003) examination of cultural and social aspects of learning in gaming environments, that the academic appeal of games has gathered more momentum. Note that these games are obviously not the type of first person shooter or violent games often discussed in the media for promoting problematic cultural values or being of less interest to girls. The multiplayer online games considered here fall more into the category of simulation games that already have a long standing history of successful classroom use and learning, with or without computers. Learning scientists should be aware that there is considerable discussion within industry and academia of what constitutes a game. For instance, within the game industry casual games that are immensely popular with female gamers are not considered real games because they do not require the time investment needed for participation in many commercial MMORPGs. On the other hand, in the field of game research some find that Shaffer's (2006) proposal of epistemic games is really more a simulation than a game. Game researchers often invoke Johan Huizinga's (1938/1955) magic circle that describes game play as a free and meaningful activity, carried out for its own sake, spatially and temporally segregated from the requirements of practical life, and bound by a self-contained system of rules. While epistemic games are described as imagined worlds with rules in which the player assumes professional roles, their close tie to authentic professional practice puts them much more squarely into the field of simulations rather than games. In addition, the proposal of epistemic games itself does not consider different epistemologies. Feminist researchers in the sciences have argued for a long time to recognize alternative and equally important frameworks and approaches within science. From this albeit brief discussion, it becomes apparent that the choice of a particular game genre is no trivial matter but loaded with various assumptions about what is considered a game for whom.

## **Game Features**

Within actual game design, there seem to be more controversial prescriptions for how to address gender within the design of particular features. When researchers examine digital games for learning they have

considered gender differences in spatial reasoning skills (Loftus & Loftus, 1983), the impact of motivational factors (Malone, 1981; Rubin, Murray, O'Neil & Ashley, 1997). For instance, Malone's (1981) seminal work "What makes things fun to learn" investigated various motivational features of a dart game that would increase the learning and engagement of mathematical content. He found only one instance with significant differences between boys and girls in what they liked about games: "The boys seemed to like the fantasy of popping balloons and the girls seemed to dislike this fantasy. The addition of musical rewards, on the other hand, appeared to increase for girls, but to decrease for boys, the intrinsic interest of the activity" (p. 226, Malone & Lepper, 1987). The dart game investigated by Malone presented simple graphics on black screens with no customization options for the players. In contrast, Rubin, Murray, O'Neil and Ashley (1997) examined students' interactions with Broderbund's Logical Journey of the Zoombinis, which focuses on discrete mathematics and logical reasoning. They found both groups were equally engaged in the game but girls tended to spend more time customizing the design of the Zoombini features (color and shape of eyes, mouth, hair, nose, and shoes) while the boys spent more time on solving logical puzzles. These results suggest that boys and girls find many (but not all) of the same game features appealing but that differential engagement could be consequential for learning outcomes when girls don't get to the core content of the game.

## **Game Modding**

Gender has been a much more prominent concern in programs that promote and study the making of digital games for learning, a very different paradigm that puts the players in charge of designing the game(s) themselves (Kafai, 2006). It was seen as a particularly promising way to get girls interested in computers and competent in technology by asking them to design applications rather than to focus on the learning of decontextualized algorithms (AAUW, 2000). Today most commercial games are released with modding features or game engines that allow players to customize their avatars, levels, and interactions (Seif El Nasir & Smith, 2006). Many games or player-generated environments such as Second Life by Linden Lab and Whyville by Numedea seem to suggest that players, girls and boys alike, are drawn to these participatory features. A new genre of alternative reality games (MacGonigal, 2007) even uses player participation as a design directive for creating the next steps in the game rather than defining upfront the end goal of the game. All these developments in game design and play features should be of great interest to learning science researchers. There is now a whole range of different game design tools under development ranging from modding to programming tools. But even tools that allow for the design of games can be designed to incorporate features that promote more equitable access as Kelleher (in press) has shown with "Alice". Here the inclusion of the popular SIMs characters engaged girls in storytelling and connected them to aspects of game design. Akin to this is the "RAPUNSEL" program by Flanagan (2006) discussed earlier in this paper. Similar successes have been seen with media-rich environments such as "Scratch" that allow for a range of game designs by boys and girls (Pepler & Kafai, 2007). While there is some debate about the differences in using either modding or programming tools for making serious games, in the end both efforts involve interfaces and some form of scripting language designed to allow players to manipulate different aspects of the game.

## **Data Analyses**

Finally, the analysis of data collected from observations, surveys, tests and interviews also needs to include the consideration of gender. Few studies in the learning sciences actually examine gender in learners' interactions or artifact production. Thus it should at least be a requirement to examine gender differences as one way to gauge potential disparities. For instance, Nelson (2007) documented that girls ask for less instructional guidance in River City but otherwise little attention, if any, has been given to gender issues. More importantly, researchers need to pay close attention to various contextual factors that can impact learning outcomes. It might actually be more helpful to identify different groups of learners and how they interact with learning games than to resort to the traditional grouping that pitches boys versus girls. For example, Steinkuehler (2006) is conducting extended investigations of how players collaborate with others to solve problems, search for information, and engage in discussions. Attention to process, activities, and interactions rather than just outcome measures might be helpful in revealing differential uses.

## **Conclusion**

It is clear from this review that there isn't one right proposal but many different aspects to consider. For those who subscribe to the games for girls approach, the goal would be to offer games with more choices, and different game mechanics. For those who favor games as designs, the answer would be to offer game modding and making features that provide opportunities for players to define the meaning and personalize assets in the games. Other proposals have focused on criteria for educational activities and content. One way to address a wide range of activities and themes based on different interests is to create wide walls, not just low thresholds for learners to enter the game (Resnick & Silverman, 2005). Our ultimate goal should be to make games for learning more accessible and rich gaming experiences for all. Many of the changes in teaching and learning that

came out of the gender equity movement improved the situation for all students, and not just for girls and women. In any case, digital games are not stand-alone applications but should always be seen in the context of a larger learning community. Having learners become game designers and creators is a small yet achievable step as the examples have shown — but one with considerable implications for those interested in closing the divide or participation gap in the digital culture (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2006). Perhaps this will lead us to lay the foundation to achieve more equitable participation in the technology culture at large.

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