Child Development and Genre Preference: Research for Educational Game Design

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Abstract

As the movement to capitalize on unique affordances of video games for learning continues to grow, relatively little research in that area has examined how formal features, such as genre and game mechanics, draw and hold children’s attention. This study examines which genres children prefer and the reasons why children prefer those genres by reporting on a video game uses and gratifications survey of children of various ages (n = 685). Results show distinct patterns of game use and preference tied to typical child developmental ecology at each age, indicating that genre preference varies by age and developmental context. Implications for game research and educational gaming are provided.

Introduction

More and more, scholars are advocating the use of video and computer games for education.¹⁻³ There is every reason to believe that this relatively new and highly popular mass medium will make a powerful platform for education.²⁻⁴ In addition to commanding tremendous amounts of player attention and time, games can be tailored to individual ability levels, can facilitate individual study through repetition or discovery, and can simulate just about any phenomenon a teacher might want students to understand.² In fact, computer games can be used to do many things in a classroom that are not otherwise possible (e.g., simulate a billion years of geophysical development).

Advocacy for educational games has been accompanied by a plethora of attempts at making educational games (Ratan and Ritterfeld⁶ identified over 600 such games for analysis). Advocates believe that the engaging nature of the games will lead players to spend more time and think more deeply about the learning outcomes while playing these games. However, there has been considerably less basic research delineating the types of formal features that attract children to games, engage their interest, and facilitate their learning,⁷ such as genre or game mechanics. For example, while some research exists on children’s genre preferences at different ages,⁸ little is known about why these genres are preferred or why genre preference shifts across childhood. In other words, what is it about the features or mechanics of a particular genre that draws children of certain ages to that genre? Understanding how formal features attract children to games is an important aspect of creating engaging educational games. What needs might educational games serve for children? Do children see games as an opportunity to learn? Or do games play a different role in their lives?

Media research has long focused on children’s use and understanding of media.⁹ In particular, uses and gratifications research shows that individuals are active in the media reception process, using media for a variety of purposes in response to their own needs.¹⁰ Uses and gratifications research posits an active individual who chooses a medium, a genre, or some specific content to satisfy needs. For games, these reasons include the challenge of beating the game, competition against friends and others, fantasy of doing something one cannot do in real life, diversion from problems, excitement/ arousal, and as a way of interacting socially.⁸ Because media serve a variety of needs, and individuals’ needs and abilities shift across the developmental lifespan, we would expect the amount and type of media use also to change across the lifespan. For example, cognitive processing skills needed to solve game challenges vary by age¹¹; game genres that are challenging for younger children may be boring for teens.

Just as there are a variety of needs, there are a variety of game genres to serve those needs. Various game genres may emphasize highly graphic and complex environments (shooters), simple clear objectives and patterns (puzzle games), extensive puzzle solving (strategy and fantasy role playing), exploration (simulations), or greater social interaction (online games). Over time, children learn via experience which game genres are useful for satisfying their emerging and changing psychological needs. At various ages, they approach each genre with a set of learned expectations.⁸

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Therefore, it is likely that some genres would be better than others at retaining learners’ attention at different times in the lifespan.

What genres of games are typically used for education? Several educational game advocates have identified simulation games and strategy games as having the greatest potential for learning.\textsuperscript{1,3,12,13} Simulation games are “Games in which players must balance the use of limited resources to build or expand some kind of community, institution, or empire, while dealing with internal forces within (such as crime and pollution in \textit{SimCity}), or external forces such as those of nature or chance... and often competition from other players as well.”\textsuperscript{14(p131)} Simulations allow players to interact with the educational material in a way that is not possible with classroom assignments or lectures—to experiment with the content. For example, games like \textit{SimCity} allow learners to make urban planning decisions and then get feedback on their decisions. Other games have simulated a wide variety of learning content, including such things as physics,\textsuperscript{15} geology,\textsuperscript{16} and leadership.\textsuperscript{2} Strategy games, such as \textit{Civilization}, have been used to teach both history and strategic thinking by allowing learners to model historical events.\textsuperscript{17,18} Wolf\textsuperscript{14(p132)} defines strategy games as “Games emphasizing the use of strategy as opposed to fast action or the use of quick reflexes, which are usually not necessary for success in these games.” Similar to simulations, strategy games put learners at the front seat of historical events, allowing them to make decisions and receive the consequences of those decisions.

Do school-aged children enjoy playing simulation and strategy games? Do children of various ages enjoy playing children’s entertainment games that are often used for education (e.g., \textit{Math Munchers} and \textit{Dora the Explorer})? This study looks at children’s relationships to these key genres as a function of developmental changes.

Method

Survey data were collected from three high schools ($n=317$; $M$ age =16.56), two middle schools ($n=227$; $M$ age =13.84), and two elementary schools ($n=141$; $M$ age =10.15) in the Midwestern region of the United States, with equal percentages of male and female respondents. Only fully completed surveys were included, resulting in a total of 685 usable cases. The survey contained scales that measured (a) the number of hours played in various dayparts during the typical week, (b) personal rankings of 14 game genres, (c) motivations for video game play, and (d) temperament (5th grade sample only).

Amount of game play

To facilitate autobiographical memory, respondents filled out a grid that broke the typical week first into days and then into four dayparts (before noon, between noon and 6 p.m., between 6 p.m. and midnight, and after midnight). All dayparts were summed to create a score representing the total number of hours played during the typical week.

Game genres

Respondents were asked to rate, on a scale of 1 to 7, how much they like playing each of the three game genres ($1=$ strongly dislike; $7=$ strongly like; 0 for games that they were not familiar with). Simple descriptions of each genre were provided along with names of popular games from that genre. Strategy games were described as “Games that use strategic planning skills,” and \textit{Command and Conquer, Civilization}, and \textit{Age of Empires} were provided as examples. Simulations were described as “Games where you create a simulation,” and examples provided were \textit{Roller Coaster Tycoon} and \textit{SimCity}. Children’s entertainment games (or “kids” games) were defined as “Games primarily designed for children’s use,” and examples given were \textit{Pokemon} and \textit{A Bug’s Life}.

Game play motivations

Motivations for video game play were based on the 20-item uses and gratifications scale measuring six game play motivations generated from focus group interviews.\textsuperscript{8} This scale has been validated in a number of studies, and all dimensions displayed high levels of internal reliability.\textsuperscript{8,19} These six motivations included challenge, competition, fantasy, social interaction, diversion, and arousal.

Temperament

Parents of 5th grade respondents filled out the 54-item Dimensions of Temperament Scale-Revised.\textsuperscript{20} The version of the DOTS-R used for the 5th grade sample was designed for administration to parents of young children. The DOTS-R is a standard temperament scale in the literature and has been exhaustively tested for psychometric properties in adult and child populations.\textsuperscript{20} Temperament traits included were approach/withdrawal, task persistence, rigidity/flexibility, rhythmicity, mood, and activity.

Results

Weekly playing time

The average number of hours played per week across the total sample was 13.22 ($SD=18.41$), with boys reporting playing more than twice as many hours per week ($M=19.18$, $SD=16.40$) as girls reported playing ($M=7.92$, $SD=11.31$). The total number of hours per week is roughly equivalent to the estimated number of hours per week found in a recent national survey of youth.\textsuperscript{18} In the 5th grade sample, boys ($M_b=18.46$; $SD=21.44$) played almost three times more hours per week than girls ($M_g=6.61$; $SD=17.30$), and the overall sample mean was 12.58 hours ($SD=20.32$). Among 8th graders, boys ($M_b=22.94$; $SD=20.30$) played twice as much per week as girls ($M_g=11.54$; $SD=16.74$), with the total sample averaging 16.67 ($SD=19.25$) hours per week. The sex differences in the 10th grade sample were the greatest, with boys ($M_b=16.96$; $SD=14.54$) playing three times more hours per week than girls ($M_g=5.77$; $SD=9.48$), and the total sample reporting 11.06 ($SD=13.35$) hours per week.

Genre preferences

Children’s entertainment games were the least preferred genres among all grade samples (see Table 1). Boys liked strategy games significantly more than girls in all grade samples, with simulations being the top game for girls in both the 5th and 8th grade samples. Boys liked strategy games
from 8th grade on, while girls did not rank strategy games highly until 10th grade.

Uses and gratifications—8th and 10th grade

For the 8th grade and 10th grade samples, the six video game uses and gratifications were simultaneously regressed on respondents’ liking of simulation, strategy, and kids game genres using least-squares regression. In both the 8th and 10th grade samples, the regression equation for kids game genre was not significant, so those results are not reported here.

In the 8th grade sample, preference for simulation games was explained by two significant predictors: one positive, playing for challenge ($\beta = 0.31$, $p < 0.01$), and one negative, playing for competition ($\beta = -0.32$, $p < 0.01$), but the model only explained about five percent of the variance ($adj \ R^2 = 0.05, F(6, 220) = 2.76, p < 0.01$). The equation for preference for strategy games accounted for more variance ($adj \ R^2 = 0.20, F(6, 220) = 10.19, p < 0.01$), and also had two predictors: playing for competition ($\beta = 0.30$, $p < 0.01$) and playing as social interaction ($\beta = 0.19$, $p < 0.01$).

Similar equations and amount of variance explained were found in the 10th grade sample. Preference for simulation games was not significant ($adj \ R^2 = 0.02, F(6, 314) = 2.02, p = 0.06$). Again, more variance was explained in the equation for preference for strategy games ($adj \ R^2 = 0.23, F(6, 314) = 17.12, p < 0.01$). The two predictor motivations were playing for social interaction ($\beta = 0.22, p < 0.01$) and for arousal ($\beta = 0.23, p < 0.01$).

Temperament plus uses and gratifications—5th grade

Least-squares regression analyses were conducted to gauge the relative contributions of temperament and uses and gratifications to preference for kids, simulation, and strategy genre games among 5th graders in the sample. Both temperament and uses and gratifications contributed significant variance to player preference across all three genres. Children who liked kids games were more likely to be low on task persistent temperament ($\beta = -0.26$, $p < 0.01$) and enjoyed playing children’s entertainment games for challenge ($\beta = 0.28$, $p < 0.05$). Overall, the regression equation was significant ($adj \ R^2 = 0.09, F(15, 124) = 1.96, p < 0.05$). Liking simulation games was predicted by high task-persistent temperament ($\beta = 0.20$, $p < 0.05$) and playing for fantasy ($\beta = 0.52$, $p < 0.01$), and the regression equation was significant ($adj \ R^2 = 0.26, F(15, 124) = 4.22, p < 0.01$). Preference for strategy games was also significant in the 5th grade sample ($adj \ R^2 = 0.30, F(15, 123) = 4.88, p < 0.01$). Significant predictors included the temperament traits approach ($\beta = 0.22, p < 0.01$), negative mood ($\beta = -0.18$, $p < 0.05$), and the motivation of playing for competition ($\beta = 0.23$, $p < 0.05$).

Discussion

Overall, these results provide new insights into the dynamics of game preference from middle childhood to adolescence. First, it is important to note that the estimate of the amount of game play per week by different age groups in these data is consistent with national sample surveys. As has been found before, 8th graders report playing more hours per week than younger or older children, suggesting a late childhood peak before adolescence.

Age

As expected, genre preference differs by age. The only consistent finding across age groups is that respondents rated children’s entertainment games among the lowest in each age and sex cohort. Simulation games are quite popular among 5th and 8th graders, particularly girls, probably due to the various incarnations of The Sims. Preference for simulation games was predicted in the 8th and 10th grade samples by playing for challenge. Preference for simulation games was also negatively associated with playing games for social purposes: competition against others in the 8th grade sample and for social interaction in the 10th grade sample. These findings suggest that simulation games tend to be liked more by children seeking an internal, focused experience.

The popularity of strategy games among children also increases as children grow older. Boys’ rankings move from near the bottom to near the top as boys move from 5th to 8th grade. Girls are slower to like strategy games, but by 10th grade, strategy games are the second most popular genre for girls. It is likely that the increased popularity is due to developmental changes in cognitive abilities; intellectual challenges offered by strategy games may be too difficult for many younger children, but are a more appropriate challenge for older children.

Play styles

Overall, simulations are preferred more by girls while strategy games are preferred more by boys. These gender differences in genre preference are consistent with predictions from earlier research on children’s gendered play styles and the affordances of particular video games genres. That is, playground research has shown that girls prefer more open play without clear rules and goals. The simulation genre facilitates this type of open play. On the
other hand, strategy games feature direct competition, which playground research has shown is more a characteristic of boys' play style.

Social interaction

Children of all three ages who enjoy playing games with and against friends were more likely to like strategy games. This is probably due to the nature of the game, which often requires competition among a number of players. Strategy games, such as Command and Conquer and Civilization, are primarily designed for competitive play, pitting player against player (or computer) in the conquest of land and resources. This competitive type of play, as opposed to the solitary planning often found in simulation games, encourages more interaction with other players as competitors or partners. As children get older, their social orientation expands from the individual and the family to include larger groups of outside peers. As such, games that facilitate engagement with peers grow in developmental salience.

Temperament

The data reveal interesting interactions among individual differences, stage development, and genre preference. For example, children in the 5th grade sample who are low on task persistence, but still like to play games for challenge, are attracted to the children’s entertainment game genres. It may be that the temperament trait of low task persistence is interacting with the lesser challenge offered by the children’s entertainment game genre. In other words, the simplicity of the games may appeal to children who enjoy the challenge of game play, but do not necessarily have the task persistence to engage more difficult genres. There may be a goodness-of-fit between the challenge offered by these games and the limited skill set of the low-persistent children. Such a fit would be consistent with the media flow model of video game play, which predicts that game play is particularly enjoyable and engaging when there is a balance between the challenge of the game and the skill of the player. Inversely, highly persistent children may not find enough challenge in these games to place demand on the attentional skills they possess.

While low task-persistent 5th graders liked children’s entertainment games, high task-persistent 5th graders were more likely to prefer engaging in fantasy experiences using simulation games. Simulation games like Roller Coaster Tycoon reward persistence in designing and testing various versions of theme parks and coasters. Additionally, simulations allow 5th graders to take part in the fantasy of creating something for their own (imaginary) consumption. A different interaction among temperament traits predicted liking strategy games in the 5th grade sample. Children who liked strategy games were more likely to be rated high on approach, which is openness to new experiences and people, and like games that provide competition with other players. These two predictors are consistent with the notion that strategy games are enjoyed as a form of social interaction. From the data on 8th and 10th graders, it appears that as children who are high on approach get older and gain greater independence, strategy games will likely become a social outlet for these outgoing children.

Conclusion

Taken as a whole, the findings from this study shed some new light on how developmental changes interact with genre affordances to effect genre preferences. Educational game researchers can take advantage of these patterns of preferences as they think about how to deliver learning games that are both engaging and consistent with childrens' experiences with games. It is important that researchers are aware of these expectations and their relationship to child interest. Of course, there are many more formal features and other genres to consider in game design. Educational games require careful consideration of the learning objectives and the learning method adopted, as well as formal features such as game mechanics, graphics, and genre. Developing a better, research-based understanding of how children make sense of video games will provide designers with additional tools for creating more effective educational gaming experiences for all children.

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References


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