The Challenge of Audience Reception: A Developmental Model for Educational Game Engagement

John L. Sherry

Abstract

According to educational gaming advocates, the engaging nature of games encourages sustained game play and enhanced attention to learning outcomes among players. Because children’s and adolescents’ play time varies by game genre, engagement with a game likely reflects the match between the genre and the player’s preferences and needs. Youth learn which games are likely to promote satisfying psychological needs and yield positive experiences, which then informs their engagement with the games. A model is presented for research and development of educational games based on uses and gratifications theory from communication science, as well as developmental science and cognitive science findings. © 2013 Wiley Periodicals, Inc.
Scholars are increasingly advocating the use of video and computer games for education (Aldrich, 2004; Gee, 2007; Mishra & Foster, 2007; Ritterfeld, Cody, & Vorderer, 2010). An extension of the widely used entertainment-education strategy (Salmon, 2000; Singhal & Rogers, 1999; Singhal, Cody, Rogers, & Sabido, 2004), it is believed that the entertaining properties of games can be leveraged to engage students while they learn less-than-engaging material. There is every reason to believe that this relatively new and highly popular mass medium could make a powerful platform for education (Gee, 2007; Prensky, 2000). In addition to commanding tremendous amounts of player attention and time, games can be tailored to individual ability levels, facilitate individual study through repetition or discovery, and simulate just about any phenomenon a teacher might want students to understand (Sherry & Pacheco, 2006). In fact, computer games can be used to demonstrate processes that are not otherwise possible in a classroom (e.g., simulating a billion years of geophysical development).

Research and advocacy have accompanied a plethora of attempts to create educational games; in one recent content study, Ratan and Ritterfeld (2010) identified more than 600 such games for analysis. Despite the tens of millions of dollars that have been poured into the pursuit of educational computer games by governments and foundations, it is difficult to identify one outstanding example of an educational game that is broadly used and shown to be effective, like television’s Sesame Street. Why is this the case? There are several possibilities. Perhaps the optimistic speculation is simply wrong and children cannot learn from games. More likely, the main problem is that the efforts to date have largely ignored the type of scientific evidence that Children’s Television Workshop (CTW) producers used to create so many successful television shows. Multiple literature reviews have identified a dearth of research on how learners interact with the formal features of games, such as game avatars, speed, outcome goal (e.g., chase, construct, race, explore; Blumberg & Ismailer, 2009; Hays, 2005; Mitchell & Savill-Smith, 2004; Sherry & Dibble, 2009). One important factor that has been neglected in the research is the effect of development on game play and the motivations for game play. In this article, we consider the large literature on media use and on child development to point toward research areas that still need attention.

Media Reception Processes

Advocates argue 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. This approach, broadly referred to as entertainment-education (EE), has been used around the world for years with a wide range of media in an effort to make didactic educational and development messages (e.g., better farming practices, limiting family size, condom use.)
more palatable for audiences (see Singhal & Rogers, 1999). Unfortunately, the EE approach has not shown straightforward evidence of success; sometimes audiences even show signs of resistance to these messages (Sherry, 1997). Often, as is the case with educational games, EE messages compete for attention with a number of other media messages, many of which are produced with large budgets solely for entertainment (Sherry, 2002). In general, children believe that educational games pale in comparison to the production quality of commercial games (Mitchell & Savill-Smith, 2004).

The EE approach takes an effects perspective, focusing on what the message will do to a passive media user without accounting for motivations, competition, and other factors in the reception process. It is not surprising that the effects approach has not yielded evidence of robust effects. The small effect sizes found in much media effects research (generally around 3–4% variance explained) suggest that there isn’t a simple linear relationship between message exposure and effects. If psychologists are unable to find evidence of strong effects in highly controlled experiments with very sensitive measures, why would we expect a strong effect amid the clutter of real life?

The uses and gratifications perspective, from communication science, argues that individuals use media for a variety of purposes in response to the challenges found in their life ecology (Ruggiero, 2000). Uses and gratifications (U&G) represents one of the oldest and largest traditions of media research. Unlike effects research, U&G posits an active individual who purposefully uses media to satisfy perceived needs and solve problems. Media use represents an individual’s choice to learn information, increase or decrease arousal, spend time with friends, and many other uses. According to Rosengren’s (1974) U&G model, the interaction of basic human needs, individual differences, and social factors leads to perceived problems or deficits (e.g., lack of knowledge, need for competition, diminished arousal), for which media use may be one solution. Over time, individuals learn which media content is effective in addressing the various problems encountered. Because people control their own exposure to media and the motivations for that exposure, the effects of media are a function of the purpose for that use. For example, an individual may read a newspaper to find out the latest sports scores; knowledge of the score is the media effect. There is a key implication here for educational games; mere exposure doesn’t cause strong effects, but purposeful use does. Playing a game with the purpose of learning will result in greater educational effects than playing the same game for fun. Our growing understanding of underlying neural mechanisms confirm this assertion. According to Lisman and Grace (2005), information is assigned to long-term memory storage if it meets the dual criteria of motivational importance and novelty. Therefore, dressing educational material in an entertaining game format is not sufficient to cause learning without concurrent motivation to store
information in long-term memory. Ultimately, the game player chooses what and when to learn.

What motivates children to play computer games? A number of studies have looked at the reasons children give for game use. Olson (2010) reviewed the literature on game play motivations and categorized them into three groups: 1) social motivations, 2) emotional motivations, and 3) intellectual/expressive motivations. Social motivations encompass a variety of purposes, including competing with others, hanging out with friends, making friends, and opportunities for leadership or for teaching others. Emotional motivations include playing games to manage mood (e.g., arousal/excitement) and the opportunity to experience the intrinsically rewarding, highly focused state called flow (see Csikszentmihalyi, 1988; Sherry, 2004). Finally, Olson found a variety of intellectual motivations, including playing for the challenge, experiencing creativity, experimenting with different identities, and curiosity/discovery. She also surveyed 12- to 14-year-olds and found that five of the 17 motivations were endorsed by at least 40% of subjects: fun (70%), excitement (40%), reduction of boredom (48%), challenge of figuring something out (45%), and competition with others to win (40%). Sherry, Lucas, Greenberg, and Lachlan (2006) identified a similar set of motivations and tested them with a sample of children ranging from 10 to 18 years of age. These reasons included 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 a way of interacting socially (Sherry, Lucas, et al., 2006). The importance of these motivations varied across ages, with the 10-year-olds primarily playing for challenge and arousal, 13-year-olds enjoying competition with friends; and 16-year-olds playing primarily for competition and diversion. Further, the motivations varied within each age group by sex, with boys reporting higher levels of most motivations. However, regression analysis showed that social interaction was the main reason girls played games, while boys tended to play for arousal.

It is unsurprising that motivations for game play vary across age groups. Consistent with U&G, the degree to which individuals experience emotional, social, and intellectual motivations should change as emotional, social, and intellectual needs change developmentally. Thus, U&G is consistent with the life span developmental maxim that children both produce and are produced by their environment (Bronfenbrenner, 2005; Lerner, 1978, 1982; Scarr & McCartney, 1983). For example, in the study by Sherry, Lucas, and colleagues (2006), there was a clear shift from playing alone to playing with a friend for competition as developmental demands and opportunities for socialization change. Consistent with more general developmental patterns (Hartup & Stevens, 1999), older children (early and mid teens) were more likely to cite the social motivation of playing for competition with friends than were younger children (middle
childhood), and social motivations accounted for more variance in game play time for older children.

As subtle and dramatic shifts in development create new perceived problems for children, motivations for game play should change, along with particular preferred game genres. For example, Greenberg, Sherry, Lachlan, Lucas, and Holmstrom (2010) found that individuals who were higher on social motivations to play such as competition and social interaction were more likely to prefer game genres that permitted social interaction, such as racing or sports games. This is consistent with general case, in which early teens engage in less social interaction than older teens. Similarly, games that require a higher level of cognitive development, such as strategy games, were more likely to appeal to older children than younger children, consistent with Hale’s (1990) finding that cognitive processing skills needed to solve game challenges vary by age.

If we want children to be engaged with educational games, we need to consider what it is that brings them to the game play environment and what they expect from the experience. U&G provides a valuable window into patterns of game genre preference across developmental stages. As such, game engagement is facilitated when the right type of game is chosen for the changing developmental needs of the target audience. Considerations include developmental abilities/demands, game play motivations, and game genre attributes. Figure 2.1 provides a system for thinking through game learning.

**Developmental Factors.** The first considerations are the developmental demands and the developmental abilities of the learners. As human systems theorists (Bronfenbrenner, 2005; Lerner, 1978), cognitive scientists (e.g., Tomasello, Carpenter, Call, Behne, & Moll, 2005), social learning theorists (e.g., Bandura, 1986), and situative learning theorists (Derry & Steinkuehler, 2003) argue, learning occurs in a social context. The social context can provide structure, encouragement, behavioral models, and support to varying degrees as the individual progresses through the lifespan. According to U&G, the social context is an important source for motivations to use media.

We can imagine a broad array of developmental changes that could affect engagement with educational games. Social motivations would change as children shift from near-exclusive family influence to peer

---

**Figure 2.1. Model for Game Engagement**

![Diagram](image-url)
influence in the teen years. These changes would be realized in greater desire for computer games that allow coplay, as well as a desire to keep up with the latest popular games as a form of social bonding. For young children, the main social context is the family. Hence, parents can exert more influence on young children to use educational games by providing more educational than recreational games, coplaying, or even requiring a certain amount of learning time per day. As peer influence increases, motivations to play games that others are playing come to the forefront. The importance placed on learning within a peer group can also effect whether educational games are acceptable. Opportunities for peer activities such as clubs or sports can take away from time available to play educational games. Additionally, peer play carries implications of competition, including encouragement to perform at the highest levels as well as potential loss of interest in gaming due to poor performance relative to peers (Sherry, Lucas, et al., 2006; Vorderer, Hartmann, & Klimmt, 2003; Schmierbach, Xu, Oeldorf-Hirsch, & Dardis, 2012).

Emotional motivations would likely be effected by mood changes initiated by hormonal changes during puberty. At the extremes, the interaction between frequent and intense negative mood states during puberty and the highly satisfying experience of flow (Sherry, 2004) during game play could result in escapist patterns of play resembling addiction. Intellectual motivations, accompanied by developmental advancements in cognitive abilities, would drive a shift in genre preference from simple children’s games to games that present more complex intellectual challenges such as simulations and strategy games. Additionally, individual differences in cognitive skills such as three-dimensional mental rotation, targeting, or object location memory can be instrumental in leading children to some games and away from others.

**Game Play Motivations.** As the social context shifts relative to developmental trajectories, motivations for educational game play also change. Shifts in genre preference due to the interaction between cognitive skills and intellectual motivations, such that gamers should prefer more demanding games as they develop cognitively, are predicted by U&G. Several studies have shown a strong correlation between genre preference and level of ability in a number of cognitive skills. In an experimental study with college students, Sherry, Rosaen, Bowman, and Huh (2006) showed that success at game play was a function of cognitive skills such as three-dimensional mental rotation, verbal fluency, targeting, and object location memory, and that success at the game was strongly correlated with liking and intention to play again. Boot, Kramer, Simons, Fabiani, and Gratton (2008) found that expert gamers outperformed non-gamers on a variety of cognitive skills, including object tracking, change detection, task switching, and mental rotation. After allowing the non-gamers 21.5 hours of practice playing a first-person shooter, the differences remained, suggesting that either gamers were naturally superior at these skills or that 21
hours was not adequate to offset the gains experienced from long-term playing. However, focus groups with both gamers and non-gamers suggest that the former is a strong possibility (Sherry, Lucas, et al., 2006). Non-gamers frequently cited poor performance in comparison to friends as a reason they stopped playing games. Additionally, non-gamers also stated that they found three-dimensional interfaces confusing and disorienting, suggesting that deficits in three-dimensional mental rotation were deterrents to game play.

Other motivations may include the desire to play games to maintain relationships (e.g., via coplaying with peer groups) and one’s place in the relationship (e.g., via knowledge of popular games). Additionally, the notion of challenge as an intellectual motivation may differ across individuals. For example, Sherry, Lucas, and colleagues (2006) found that individuals with task-persistent temperament (e.g., the length of time children continue an activity despite obstacles) were more likely to play complex simulation games, while individuals who were low on task persistent temperament were more likely to play the less challenging kids games.

**Game/Genre Attributes.** Just as there are diverse needs, there are diverse game genres to serve those needs (Sherry & Pacheco, 2006). Thus, genres provide a broad palate of play options that can accommodate different developmental needs, individual differences, and game play motivations. Various game genres may emphasize highly graphic and complex environments (e.g., shooters), simple clear objectives and patterns (e.g., puzzle games), extensive puzzle solving (e.g., strategy, fantasy role playing), exploration (simulations), or greater social interaction (online games; Spence & Feng, 2010). Over time, children learn which game genres are useful for satisfying their emerging and changing psychological needs. Thus, they approach each genre with a set of expectations such that interest in game genre varies by age (Greenberg et al., 2010). Therefore, it is likely that some genres would better engage learners’ attention at different times in the lifespan, relative to their perceived needs.

**Discussion**

A fundamental finding of the extensive U&G literature has been that individuals are selective in their media choices and that these choice are a function of desired solutions to perceived problems (Ruggiero, 2000). Developmental science provides the context and understanding of how both abilities and demands change across the lifespan. Finally, cognitive science tells us that assigning information to long-term memory and organizing information in long-term memory are functions of the individuals’ experiences and motivations to remember particular information. Taken as a whole, the lesson painted is of a motivated, active learner finding, perceiving, and storing information.
Why did *Sesame Street* work so well? The CTW understood that preschool children were self-motivated to learn about the world and the symbol systems that older family members use. They also understood from U&G research that children primarily used television for learning. The developmental goal and the medium were an excellent match. CTW also understood that parental approval was a strong motivator for preschoolers, so they encouraged parents to co-view, both formally and by providing content that had some appeal to adults. Finally, they took the time to figure out how preschoolers made sense of the formal features of television; that is, what drew and held their attention. In the end, they created a show in which developmental goals were achieved by using accessible media in a manner consistent with the child's life ecology. This needs to be the lesson learned by earnest educational game designers and researchers.

**References**


---

**John L. Sherry** is an associate in the Department of Communication at Michigan State University, Michigan, USA. He may be reached via e-mail at jsherry@msu.edu.