CHAPTER

26

Video Games for Entertainment and Education

Ute Ritterfeld
University of Southern California

René Weber
Michigan State University

While the morality of games and their ethical implications in an educational context have been questioned from the very beginning of game technology evolution (e.g., McLean, 1978), video games[1] have become not only increasingly attractive for players of both genders (Burke, 2000), various ethnicities (Bickham et al., 2003), and ages (IDSA, 2003), but are also utilized more and more for educational purposes (see, for example, the annual serious games summit, http://www.seriousgamessummit.com/). Thus, studying the education potential for this new and controversial medium is of tremendous importance.

Although comprehensive effect theories on the specific impact of video game playing are still missing, more than a decade of research provides us with an impressive body of literature demonstrating mostly negative, but also significant positive effects (see, for introduction, Mitchell & Savill-Smith, 2004). The majority of research has focused on the potential negative effects of video game playing; however, this is due to an abundance of studies on violent games and does not reflect the potential of video games as a medium. While Weber, Ritterfeld, and Kostygina (chap. 24) discuss the findings on violent video game playing, hostility, and aggression, Lee and Peng (chap. 22) as well as Lieberman (chap. 25) give a comprehensive overview on effect studies with an emphasis on learning, and Durkin (chap. 21) further elaborates the benefits of video game playing for adolescents. This chapter focuses on the potential of video game playing to facilitate *developmental processes* through the unique combination of interactive entertainment and learning, while at the same time taking a rather theoretical perspective.

The term "developmental processes" refers to an understanding of media usage and effects in the context of human development. Human development is the result of continuous transactions between a person's biological constitution and his or her physical, social, and media environment over the life span. According to this perspective, media usage is not random but already reflects the developmental processes of a user who is selecting some media or content over others, and processing it according to his or her developmental capacities, previous experiences, and current developmental needs. At the same time, the media usage influences the developmental processes of the user.

Taking a developmental approach seriously results in proposing distinctly different challenges for media usage and effect studies usually undertaken in the field of communication: (1) Impact studies should reflect evolving mental representations of the game content. Individuals may interpret the same video game play in completely different ways. For instance, one person takes the video game world as a realistic simulation, whereas another reads it in a metaphoric or even ironic way (Potter & Tomasello, 2003). (2) The study of play (Ohler & Nieding, chap. 8) demonstrates clearly that play is not a random activity selected to overcome boredom but rather a highly rational choice that serves the need of developmental processes. From that functionalist point of view, the selection of video games, as well as the video game play, serves the player's developmental needs (Havighurst, 1971; see also Durkin, chap. 21). Accordingly, analyses of video game playing should take the developmental status of the player into account. (3) For a developmentalist, changes over time are crucial. Consequently, media impact studies should overtake a longitudinal perspective, considering that media effects may vary substantially in the realm of a person's development.

Vygotsky (1978) introduced the "zone of proximal development" to explain which input characteristics are most likely to influence human development. According to his view, an input is most influential if it matches the developmental stage of the person, that is, if it connects to the established mental structure and extends it. This principle can be easily adopted to explain media effects, especially those of interactive media: If the user chooses the challenges he or she can manage successfully, his or her mental organization is most likely influenced through the video game play. Vygotsky's concept is compatible with the notion of developmental tasks (Havighurst, 1971), which claims that individuals actively seek out challenges that are appropriate to master the improvement of cognitive, emotional, social, or behavioral skills. Accordingly, a player is expected to lose interest in a specific game if the game no longer provides support in resolving developmental tasks.

Similar to a child's play in the first few years but in contrast to other media activities, video game play offers the potential of utilizing interactive entertainment to improve developmental processes in an age far beyond preschool years. Moreover, video game play accounts for highly intrinsic activity leading to intense experiences of presence (Tamborini & Skalski, chapter 16), thus allowing for maximum focus on the activity and related information processing (Biocca, 2002).

As early as 1981, Malone introduced three factors of intrinsic motivation derived from video game play: challenge, fantasy, and curiosity. According to Malone, "challenge" occurs in a situation of uncertain outcome. Prototypically, challenge is imposed through time constraints, competition with other players or avatars (social norm of reference) or previous results (individual norm of reference), and hence creates winners and losers. Winning a game is supposed to enhance motivation to play the game again if the games posed an adequate challenge (Malone, 1981). However, recent findings indicate that losing a game can be intrinsically motivating as well, if the player receives positive feedback for his or her effort (Vansteenkiste & Deci, 2003). Nevertheless, the feedback does not take away negative feelings of disappointment. "Fantasy" is described as a state of cognitive and emotional involvement with the video game play facilitating game play skills. Most important, fantasy points to the virtual character of the experience that allows overcoming boundaries real-life experiences would impose. Finally, "curiosity" is divided into sensory and cognitive components, with sensory curiosity being dependent on the game surface and cognitive curiosity referring to the narrative of game play.

Although video games are most commonly used by older children, adolescents, and young adults, the often-made assumption that the media format is less suitable for older or younger audiences is questionable. Rather, the current user profiles reflect an industry that produces video game primarily for teenagers. The potential for other demographic groups to engage in video game play more has yet to be acknowledged. For very young children (e.g., Din & Calao, 2001), special need children (e.g., Rizzo et al., 2001), disabled individuals (e.g., Hasdai, Jessel, & Weiss, 1998) or geriatric clienteles (e.g., Shapiro, 1995) in particular, developmentally appropriate technology and content may be the most important tool to facilitate developmental processes. Because intrinsic motivation is heavily influenced by hope for success and fear of failure (Lepper & Henderlong, in press), appropriate challenges will most likely result in appreciation of the technology. Rightfully, the increase of computer literacy evolved as one of the main efforts in adult education (see Askov, Maclay, & Meenan, 1987).

Thus, video games offer an opportunity for intrinsically motivated, high-involvement experiences freed from real-life constraints that allow performances in the zone of proximal development facilitating individualized format developmental processes while reaching out to all members of society. If the developmental outcomes are considered valuable, video game play would be the ultimate paradigm for entertainment–education.

In the following section we provide support for this thesis, first addressing more closely the unique *characteristics of video game play* to facilitate developmental processes, then briefly outlining *enjoyment* and *learning* as the two kinds of game-related experiences blended together in the *entertainment–education* paradigm.

CHARACTERISTICS OF VIDEO GAME PLAY

From a historical perspective, books, television, and video games represent the evolution of make-belief: Books provide the reader with a *narrative* yet communicate through written language alone; television introduces simulation of the world through spoken language and images; and video games allow for *interactivity* and—potentially—*intelligent* reactions of the system (see Table 26.1). Compared to television, the primary disadvantage of video games, being less sophisticated and believable in *simulation*, is about to vanish (see Anderson, Funk, & Griffiths, 2004). The newest video game graphics already blur the boundaries between video documentation and animation.

Although video game play differs significantly from television watching, a theory on its differential impact is still lacking. Instead, researchers tend to apply models from television research to playing video games, despite being well aware that this generalization is flawed (e.g., J. Smith, chapter 5). The interactive—and even more, the intelligent—nature of a video game results in the incomparability of game play. In fact, every game play experience is unique.

The interactivity of the medium allows a player to choose settings or the unfolding of a narrative, to participate in the narrative, pursue goals, accept challenges, and experience

TABLE 26.1
The Evolution of Make-Belief

Characteristics of Medium	*Books*	*Television*	*Video games*
Narrativity	Yes	Yes	Yes
Simulation	No	Yes	Yes
Interactivity	No	No	Yes
Intelligence	No	No	Yes

self-efficacy. Moreover, the user can interact with avatars and other players. The term "intelligence of the medium" refers to the fact that the video takes the player's play history into account. In a rudimentary way, it could mean that the program "remembers" the player's name. A highly sophisticated program adapts game play to player achievements, failures, or even preferences. Thus, the embedded challenges can be tailored on an individual basis. Moreover, the system may give feedback to the player, tutor him or her, or make recommendations to improve game play.

One popular understanding of video games is that there will be an increased impact on its users compared to television *because* of the interactive possibilities (Markle Foundation, 2003). However, the potential for interacting with or through the medium is neither equivalent with the perceived interactivity nor with the interaction that takes place. Factual interactivity may enhance the user's involvement (Rockwell & Bryant, 1999) and hence his or her deeper processing of content (e.g., Ritterfeld, Weber, Fernandes, & Vorderer, 2004). Calvert and Tan (1994) provided evidence that this thesis holds true for aggressive thoughts. A recent study by Lee, Jin, Park, and Kang (2004) demonstrated that elaboration of a video game narrative led to greater presence, but research on the specific impact of interactivity of video games is still lacking. One reason for the shortage of scientific investigations may be methodological constraints. A study aiming to control the impact of interactivity on players' experiences and play outcomes would require an experimental setting in which interactive video game play is compared to non—interactive video game play. The latter would merely consist of watching video game play. However, as mentioned above, each game play experience is unique, differing in content, experience, and subsequently, impact. A noninteractive version of the video game play must therefore be identical to the interactive video game play, excepting the possibility to interact. The only—although compromised—possibility to realize such a comparison is to produce recorded versions of individual sessions of video game play and compare matched pairs of individuals who either play or watch them. But, even watching a game played by another person does not reflect the game play the viewer would have conducted him or herself. Moreover, matched pair samples designs depend heavily on the comparability of the paired individuals. Variables relevant for video game play such as gender, age, video game literacy, previous video game play experiences, topic-related interest, knowledge, and so on would have to be controlled carefully, altogether still allowing only limited approximation to comparability.

For instance, a recent study about epilepsy in children (Pellouchoud, Smith, McEvoy, & Gevins, 1999) compared a group of children playing a game with another group of children watching the game, although without matching individuals according to control variables. The authors used electroencephalographic recording (EEG) to observe mental activity in playing virsus watching a video game demonstrating equally high activation. To our knowledge, no study to date has applied a matched pair design to control for the effect of interactivity.

Another interesting difference between television and video playing has been identified in the context of the uses and gratification approach (see Sherry, Lucas, Greenberg, & Lachlan, chapter 15): Whereas television has always been used for entertainment *and* educational purposes, video games are primarily played for entertainment. Purposeful education, it seems, is not significant in playing such video games. The use of "game" as a label that connotes pleasurable, enjoyable activities reflects this distinctive characteristic. Moreover, the games industry initially adopted the notion of video games as merely entertaining media, introducing so-called educational or learning video games as a supplemental category. The differentiation between entertaining and educational video games is still widely accepted (Lee & Peng, chap. 22). This not only implies that most video games have no educational potential, but also takes for granted that educational video games are significantly less fun than "real" video games.

LEARNING

Yet, the distinction between entertaining and educational video games simplifies the understanding of educational value. If education is defined through explicit learning goals embedded in the video game play, the distinction may be justified. However, educational value derives from a much broader variety of learning opportunities (see Nathan & Robinson, 2001). In fact, every change in the mental organization of a person is considered development, respectively learning (Bjorklund, 2000). Strictly speaking, every input processed influences the user and thus, results in learning. The question is *what* we learn and for *how long* the effect persists. With this understanding of learning, we may even consider learning to play a specific video game an educational outcome. The fact that such an outcome is usually not considered educational only reflects moral standards that distinguish between desired and undesired effects.

From a pedagogical perspective, enhancement in cognitive and metacognitive skills is the most desired outcome. Cognitive skills include, for instance, spatial abilities (see the avant-garde work by Greenfield and colleagues presented in the special issue of the *Journal of Applied Developmental Psychology*, 1994; but also more recently De Lisi & Wolfrod, 2002), linguistic competence (e.g., Din & Calao, 2001; Veale, 1999), knowledge acquisition, decision making (e.g., Ko, 2002), or problem solving (e.g., Ritterfeld et al., 2004). Metacognition refers to the fact that humans are conscious about their thinking: One can select, evaluate, and modify strategies for knowledge acquisition, problem solving, or other learning processes (Schneider & Lockl, 2002). For example, Oyen and Bebko (1996) successfully applied video games for the development of memory-enhancing strategies. Metacognitive skills play a major role in education because they help individuals learn how to learn. Research suggests that teaching metacognitive skills results in increased learning, especially in unfamiliar situations in which habitual responses are not successful (Scruggs, Mastropieri, Monson, & Jorgenson, 1985). Computer simulated worlds are designed to confront the user with a broad variety of unfamiliar situations in which he or she is supposed to act. It seems plausible that video game players benefit from metacognitive strategies in situations in which a challenge cannot be mastered. Metacognitive strategies unfold even at the very moment a child begins to play a video game. As Ko (2002) observed, video game play patterns vary between random guessers and good problem solvers, indicating the use of metacognitive strategies in the latter.

Pillay (2003) investigated the possible transfer of computer game literacy to performance on computer-based instructional tasks. Results indicate that transfer depends on the similarity between the designs of the computer game design and the instructional software. Moreover, linear-cause-and-effect computer games were found to encourage means–end analysis strategies, whereas adventure games experiences influenced inferential and proactive thinking in the usage of the instructional software.

Giving children the opportunity to learn how to program their own games is another way that video games contribute educational value. It enhances not only their technological skills, but also problem solving, creativity, and more (Kafai, 1995, 1998). The development of technological skills seems especially important for overcoming gender differences, as girls are usually less interested in videos than boys are (Gallup Poll, 1997). However, if girls are provided with the opportunity to use computers successfully, most gender differences vanish (Ching, Kafai, & Marshall, 2000).

One possible undesired impact of video game playing on sensomotoric control was primarily addressed through the criticism on ego-shooters (see Weber, Ritterfeld, & Kostygina, chap. 24) and racing games. Ego-shooters are assumed to cultivate the usage of firearms, and a player's driving habits in racing games are supposed to transfer into real-life driving styles. Although they are currently being investigated, empirical evidence for any of these assumptions is meager (Klimmt, 2003).

Comparably negative are assumptions regarding attitude formation through violent video games (Weber, Ritterfeld, & Kostygina, chap. 24). Sherer (1998) used simulation games to enhance moral development, with only partial success. The discussion of other possible contributions of video games to the development of positive attitudes such as altruism or social acceptance is still neglected. Theoretically, the potential is immense if one considers the global experiences of online gamers communicating with each other. Such communication experiences are supposed to cultivate attitudes as the most sensitive reflector for social norms. More generally, the study of video game-mediated content should be connected with impact studies to investigate the potential of video games (compared to other media) to lead to attitude formation.

Additionally, if video games are considered cultivators, the development of socioemotional skills should be influenced, too (see also Subrahmanyam, Greenfield, Kraut, & Gross, 2001). First, it is assumed that computer game-mediated communication enhances communication skills. But identity formation, autonomy, tolerance for frustration, or coping behavior may also improve extensively through video game play (for details, see Durkin, chap. 21).

Finally, we would like to emphasize the adaptability of video game technology to specifically improve handicaps or disabilities. Rizzo et al. (2001) developed and evaluated computer game-based educational technology for children with attention deficits. Scientific Learning developed games specifically for language and reading-impaired children, which resulted in significant improvement (Tallal, Miller, Jenkins, & Merzenich, 1997; Veale, 1999). Hasdai, Jessel, and Weiss (1998) used a driving simulator to help children with either progressive muscular dystrophy or cerebral palsy improve their ability to operate a wheelchair safely. To secure transfer effects, the authors designed the game environment according to the school environment in which the children were living. Results demonstrate that simulation games are efficient, though not fully compensating for, real-life practice. Olney (1997) successfully implemented computer games in training programs to scaffold communication in children with autism, Down syndrome, mental retardation, cerebral palsy, or pervasive developmental disorder. Finally, games can contribute to facing the increasing social challenge of multilingual environments, through requesting technologies for children to independently learn a second (or third) language that is not used at home (see Baltra, 1990).

In sum, video games can be specifically tailored to enhance cognitive, metacognitive, socio-emotional, or behavioral skills, even addressing various user needs. With the development of more sophisticated intelligent systems, the potential for education in formal and informal contexts will rise dramatically. Still, there is concern that the time spent playing a video game may be harmful. In fact, several studies report that the amount of video game playing correlates negatively with school performance (for an overview, see Gentile, Lynch, Linder, & Walsh, 2004). However, most of the video game play considered in the various studies contained violence. Lieberman, Chaffee, and Roberts (1988) demonstrated an interaction effect between the amount of time spent on playing video games and the content of the games played: Children frequently playing violent video games performed more poorly in school than children who rarely used those games. On the other hand, school performance increased in children who frequently played educational games. Durkin and Barber (2002) reported data suggesting a curvilinear relationship between the amount of playing and positive outcomes.

Most interestingly, parents are somehow negligent in controlling their children's video playing. In a study by Gentile et al. (2004), 43% of adolescents who play video games said their parents did not control their video game usage at all. Also, children who reported that their parents set limits for video game playing performed better in school than children who experienced no control. However, available studies on the association between the time invested in video game play and the differential impact of various games report only short-term effects. To date, we are still lacking longitudinal studies on the educational impact of video game play.

Finally, educational value can be defined through the pathway selected for learning. Explicit, instructional learning is considered the major goal of education. However, developmental psychologists illuminate the fact that the younger children are, the more their learning is incidental and implicit[2] (Bjorklund, 2000, p. 18). Accordingly, implicit learning seems to be the main pathway for children and adolescents to learn video game play (Sala & Boyer, 1994). As mentioned above, video game playing may offer the possibility of an experience that is very similar to early learning in childhood, in which developmental tasks are performed without being aware of the developmental goal. Moreover, playing video games may result in a mental activity integrating intense cognitive, metacognitive—and, depending on the game—sometimes even social experiences while providing enjoyment at the same time.

ENJOYMENT

At this point, we will briefly outline the concept of enjoyment in the context of media studies. Here, enjoyment is considered the core experience of entertainment (Vorderer, Klimmt, & Ritterfeld, 2004), defining the sum of positive reactions toward media experiences being cognitive, affective, or conative. This view is consistent with empirical evidence in psychology indicating that the motivational basis of human activity relies on two rather independent systems: a so-called approach system and an avoidance system (Elliot & Thrash, 2002). Activation of the approach system results in enjoyment, whereas activation of the avoidance system leads to pain (Berridge, 2003). Enjoyment in game play may result from (a) sensory delight; (b) suspense, thrill, and relief; or (c) achievement, control, and self-efficacy (Vorderer et al., 2004).

Over 3 decades of game production, technological improvements in game design resulted in a dramatic increase of sensory delight, mostly visual and sonic, though possibly even kinesthetic and olfactory, in interactive theaters (e.g., Universal Studios' show "Shrek II"). However, the development of narrative aspects lags behind. Most games offer similar and quite simple stories (Clanton, 2000). But, it is the narrative that ultimately provides entertainment value beyond the pleasure of senses (see Lee et al., 2004). Suspense, thrill, and relief are enjoyable reactions that result from narratives (Brock, Strange, & Green, 2002). Moreover, avatars (either automatic or controlled by the player) allow for parasocial relationships, a phenomena that is widely acknowledged for its contribution to entertainment (Vorderer et al., 2004).

There is no doubt that enjoyment plays a key role in achievement (Sansone & Harackiewicz, 2000). However, authors disagree about whether enjoyment and intrinsic motivation are distinct qualities (e.g., Sansone & Smith, 2000) or one and the same (e.g., Linnenbrink & Pintrich, 2000). The intrinsic motivation to play a game results from promoting enjoyable experiences (approach state) and from preventing boredom or failure (avoidance state). For instance, a study by Lee, Sheldon, and Turban (2003) demonstrates how enjoyment and performance in achievement settings depend on the individual's capability to focus mentally on the task given. Persons high in achievement motivation in general enjoy challenges much more than individuals low in achievement motivation (Durik & Harackiewicz, 2003). Low achievers are more task-dependent and tend to enjoy tasks aligned with their interests more. In general, enjoyment through achievement can be a result of either mastery or performance (Linnenbrink & Pintrich, 2000). Mastery orientation is based on the need for a deeper understanding of a task, whereas performance orientation results from the wish to be superior and to win. Most interestingly, research on sport games demonstrates that enjoyment seems not to differ significantly between cooperative and competitive tasks (Tauer & Harackiewicz, 2004).

In sum, entertainment in video game play reflects enjoyable experiences while playing the game. Thus, the concept of enjoyment is closely related—if not identical—to intrinsic motivation, which again is crucial for developmental processes, as we address further in the following section.

ENTERTAINMENT–EDUCATION

The abovementioned distinction between educational and entertainment games (for more details, see Lee & Peng, chap. 22) is based on the assumption of a single dimension with education and entertainment defining the poles. However, entertainment and education should be conceptualized as two different dimensions. A distinction between educational and entertainment games neglects the possibility that the two may coexist. The construction of a 2-dimensional space with entertainment and education as axes allows the deduction of a variety of hypotheses regarding the relationship between the two.

Whether and to which amount the entertainment–education paradigm is applicable to interactive technology remains still unclear. In theory, one can argue for a general relationship between entertainment and learning that is (a) either linear positive (entertainment as facilitator), (b) linear negative (distraction hypothesis), or (c) inverse u-shaped (moderate enjoyment hypothesis) (see Fig. 26.1).

Overcoming the abovementioned simplifying dichotomy of media entertainment and education was the—at first implicit, increasingly more explicit—goal of a paradigm called entertainment–education. The general idea to utilize enjoyment for learning is undoubtedly not new, but the purposeful use of media—especially video games—to facilitate these means is still incipient. Mostly applied in the area of health communication, entertainment–education programming in radio and television have recently proven to be tremendously effective for knowledge acquisition, attitude, and even behavior change (see Singhal & Rogers, 2002; Slater, 2002).

There are basically three pathways for entertaiment–education (see Fig. 26.2): First, an entertainment experience is used as a motivational facilitator to process educational information (motivation paradigm). The function of entertainment in this experience can be described as a "door opener" to allocate attention to educational content, to develop interest in the content, and finally process the educational information delivered (Ritterfeld et al., 2004; Vorderer & Ritterfeld, 2003). It is hereby implied that the content alone would not be a strong enough attractor to ensure processing, and it requires enrichment through entertainment. Accordingly, entertainment media can be enriched with educational games. For instance, the addition of

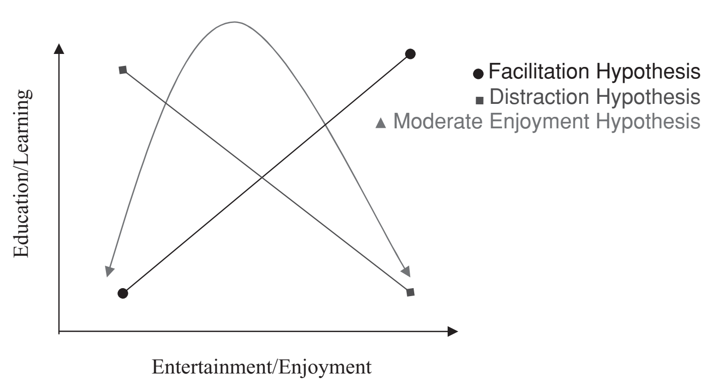

FIG. 26.1. Theoretical assumptions on the entertainment–education link.

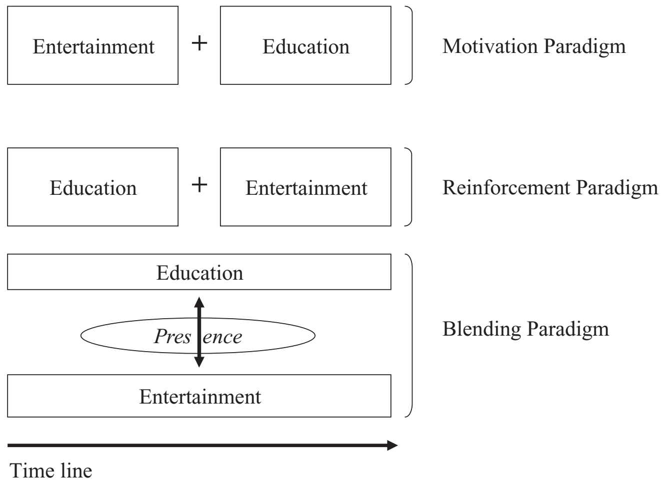

FIG. 26.2. Paradigms of entertainment–education.

information to entertainment can be found in some video games providing hyperlinks to research on specific issues (e.g., Sesame Street Web-based games). Thus, entertainment serves as a mediator between content and the educational impact. This approach has been proven successful for attentiveness toward linguistic information (Ritterfeld, Klimmt, Vorderer, & Steinhilper, 2005), science education (e.g., Ritterfeld et al., 2004) and health education (e.g., Ritterfeld & Jin, in press).

The second paradigm (reinforcement paradigm) argues from the contrary perspective with utilizing entertainment for reinforcement purposes. The promise of such an approach is to enhance motivation to process educational content. Reinforcement can come as a surprise after succeeding or be expected (Malone, 1981). A reinforcement strategy is applied in most educational games through scores, virtual money, fun animations, or the reward of progress in the video game play. The effect of repeated usage of educational content (e.g., Vorderer, Böcking, Klimmt, & Ritterfeld, in press) on phonological awareness or phoneme distinction (Veale, 1999), for example, demonstrates the effectiveness of entertainment as a reinforcement strategy at first glance. But, the studies do not reveal how motivated subjects were while participating in the training. Reinforcement may result in an unintended and undesired motivational decrease. If individuals are intrinsically motivated, they do not have to be preached to. Nor do they need incentives in order to perform a task. In these individuals, reinforcement may even reduce intrinsic motivation on the long run (Lepper & Henderlong, 2000).

Both the motivation and the reinforcement paradigm are based on an additive concept of entertainment and education, in which educational information is added to an entertaining program or vice versa. Educational goals are mostly explicit and primarily intended learning is aspired. A combined game format is used to teach cognitive skills, such as in the popular *Mathematic* or *Reading Blasters* that are now available for all performance levels. The game format consists of appealing settings, characters, feedback, and reinforcement. The user knows exactly what he or she is expected to learn. The surplus of gaming compared to instruction derives from the hope that the fun elements provide additional pleasure. However, the most pleasure in educational settings is obtained from achieving a goal (Shah & Kruglanski, 2000). Entertaining byproducts may increase pleasure of the senses but cannot replace lacking success. Strictly speaking, even a highly entertaining format cannot compensate for a user who fails to achieve the learning goal. On the other side, if a user indeed succeeds, he or she might not need the entertainment surplus at all. The assumption that entertainment contexts facilitate learning in general is plausible at first glance, but loses suggestive power if applied to all players.

From a developmental perspective, changes in mental organization most likely occur through (a) repeated processing, which not only establishes networks but also reinforces new pathways; (b) problem solving; and (c) generalization to other domains. There is no evidence that reinforcement can actually facilitate developmental processes other than the first. For instance, why should a child improve his or her mathematic problem solving if a correct result is reinforced with attractive animation? It is much more likely that already acquired skills can be practiced in such an entertaining context.

Practicing skills does not allow solving new tasks that require cogitating. But, it enhances the fluency and speed of the performance and reduces mistakes. Expertise research states that practice is crucial for academic performance (Ericsson, 1998). Deliberate practice means vast and extensive intrinsically motivated training. As Schneider and Stefanek (2004) summarized, deliberate practice and an IQ that is slightly above average guarantee the best results for children's GPAs. Similarly crucial for performance is an early start with practice that allows stabilizing acquired competences that are necessary to build on for further developments. Longitudinal data reveal that a combination of intense practice, highly developed interest, and intrinsic motivation predicts above average performance (Schneider & Stefanek, 2004). Video games provide a terrific opportunity to realize the described triad (practice, interest, intrinsic motivation).

However, intrinsic motivation and interest are expected to be much higher in video games selected for entertainment purposes than those chosen for educational reasons. Consequently, practice will be lower in educational games. Blumberg (2000) drew this conclusion by investigating the role of learning goals prior to playing a computer game (*Sonic the Hedgehog 2*). His findings reveal an age and skill dependent pattern: Older children improved their performance when they were trying to be especially attentive while playing the video game whereas the effect reversed for younger children. The latter improved their video game play if they were pursuing personal goals for mastering the game.

Yet, as Slater (2002) pointed out, entertainment–education unfolds its greatest potential strategy if the information provided becomes an essential part of the entertainment experience. The prototype for a blend between entertainment experience and education (blending paradigm) is game play in early childhood before the child becomes conscious about educational goals and settings (see Ohler & Nieding, chap. 8). Around kindergarten age, children learn to distinguish between educational and play purposes while at the same time shaping their attitudes toward educational activities (Oerter, 1999). If they enjoy educational settings and develop interest in instructional learning, the distinction between primarily entertainment and primarily learning activities is unnecessary. Although being of different qualities, humans may enjoy both activities and learn in both settings. Children whose attitudes toward learning tend to become negatively formed will eventually develop a distinction between enjoyable entertainment activities and unattractive learning activities. These children should profit most from entertainment–education strategy. Entertainment–education intends to adopt the unified approach of early game play for older children who are less motivated to learn, but also for adolescents and even adults.

As mentioned above, blending an entertaining narrative with educational content became a popular entertainment–education strategy in health-related TV and radio programming. Most interestingly, this strategy has been proven to be tremendously successful for audiences that otherwise could not be reached with persuasive messages (Singhal, Cody, Rogers, & Sabido, 2004). Although Lee et al. (2004) most recently provided empirical evidence for the effectiveness of a narrative in video game play for the experience of presence, the educational relevance still needs to be investigated.

Recently, so-called *pedagogical dramata* (e.g., Marsella, Johnson, & LaBore, 2003), which utilize interactive game play to teach successful communication strategies, were introduced. For example, Clarke and Schoech (1994) developed a simulation game for adolescents to learn impulse control, and Oakley (1994) pioneered a video game play for at-risk teens displaying consequences of drug abuse. Marsella and his team introduced an interactive technology in which parents of children suffering from cancer learn to communicate with their sick child and cope with crisis in the family and work place (Marsella et al., 2003). Miller and Read (in press) developed a similar technology to teach homosexual men safe-sex negotiations. Evaluation results demonstrate the acceptance of the technology in the target groups, respectively, and its impact on communication skills and behavior (Miller & Read, in press). Similar to educational games, pedagogical dramata pursue an explicit learning goal. In contrast to educational games, they offer simulated situations that otherwise cannot be experienced for training purposes. The user dives into the simulation in order to improve communication or behavioral skills in a protected, safe environment. Because the development of pedagogical dramata is still in its very beginning, the technology has not yet been applied to less mature audiences, but it is easy to imagine how the principle can be applied to all age groups and specifically tailored for different target groups.

In sum, most video games currently available follow the motivation and/or the reinforcement paradigm to combine entertainment with education. The role of game play in the motivation paradigm can be described as seduction with the goal of entertainment to allocate attention and direct it to educational content (see Table 26.2). It is implied that the entertaining experience of game play provides enough intrinsic motivation for continuation and ultimately learning. Educational goals can hereby be implicit or explicit, facilitating intentional and/or incidental learning that may include complex problem solving. The reinforcement paradigm differs from the motivation paradigm; in using entertainment as reward, it provides a means to improve extrinsic motivation. A reward system implies that the educational goal has to be explicit, and learning is intentional. As mentioned above, game play as reinforcement may facilitate practice but does not enable a person to solve problems.

Both pathways combine entertainment and education in sequence. In contrast, the blending paradigm claims a parallel experience of entertainment and education, facilitating intrinsic motivation to resolve developmental tasks. The educational goal is implicit, and learning is primarily incidental. Incidental learning is not predictable; education relies on the fact that a gamer chooses games and plays them to support his or her developmental tasks. Thus, this kind of game play mimics the most effective play observed in young children.

Children play various games with differential impact on their developmental processes. One predominant game format to resolve developmental tasks is role-play (Oerter, 1999), which simulates real life, engages fantasies, and involves new formats for communication and exploration of behavior. Most importantly, children are highly immersed and intrinsically

TABLE 26.2
Characteristics of Motivation, Reinforcement, and Blending Paradigm

	Role of Game Play	*Focus of Motivation*	*Educational Goal*	*Goal Communication*	*Model of Learning*
Motivation Paradigm	Seduction	Intrinsic	Allocation of Attention	Explicit	Either or
Reinforcement Paradigm	Reward	Extrinsic	Practice	Explicit	Intentional
Blending Paradigm	Simulation	Intrinsic	Developmental tasks	Implicit	Incidental

motivated while role-playing. Consequently, one expects a positive linear correlation between entertainment and education for role-play. Generalizing this to video game play, we assume that the mimic of role-play is most sufficient in providing highly immersive experiences with entertainment and education combined. We consider the experience of nonmediation (presence) an indicator for a successful blend, which is illustrated in Fig. 26.2.

Finally, research on the improvement of intrinsic motivation points to social context, which has long been underestimated. Not only are values or attitudes that build interest, set learning goals, and enhance achievement motivation heavily influenced (Ryan & Deci, 2000; Jacobs & Eccles, 2000) by social contexts, but social contexts also serve as a direct motivator. Multiplayer games, especially multiplayer online games where individuals meet in a virtual environment, provide a social context freed from real-life constraints.

Taken together, we propose that the impact of entertainment on the educational experience differs according to which paradigm of entertainment–education is applied. Simulation games should allow for a variety of incidental learning effects, whereas prototypical educational video games mostly enhance intentional learning by using entertainment as motivator or reinforcement strategy. Given that the game provides content via a socially valued format, desired educational outcomes are practice and higher attention toward the content.

Because the entertainment and the educational experience are not identical, one may argue that they compete for attention, with the risk of too much entertainment reducing the educational value. Due to the abovementioned possible negative consequences of reinforcement and the here-described potential for distraction through high entertainment, it may be expected that the relationship between entertainment and education (as described in Fig. 26.1) is not linear. Consequently, we propose a curvilinear correlation between intentional learning and enjoyment.

In conclusion, from a pedagogical perspective, games that use entertainment for motivation and reinforcement are undoubtedly valuable. If, as elaborated above, high entertainment may reduce the educational impact in these games, game development faces the challenge of identifying the optimal balance between entertainment and educational content. But, even perfectly balanced “entertainment+education” games provide only limited surplus to resolve developmental tasks. Thus, from a developmental perspective, the ultimate pathway of game-based entertainment–education is offered through online multiplayer simulation.

NOTES

[1]To stay consistent with the title of this volume, we use the term “video game” as a generic category including all electronic and interactive games.

[2] Incidental and intentional learning are antagonists with intentional learning being goal-directed and incidental learning being unplanned (Kerka, 2000). The term “implicit learning” refers to the learning process as being not conscious, opposed to explicit learning (Perrig, 1996).

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