Digital Games in Education and Training:
A Bibliography

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August, 2003

Prepared by the Telecommunications and Information Policy Institute for the Educational Content Evaluation project.
Sponsored by the Digital Media Collaboratory at the University of Texas at Austin

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Introductory Remarks

This bibliography is designed to enhance research efforts conducted into the broadly-defined area of digital games and, more specifically, games' utility and promise in the contexts of education, pedagogy, and training. This bibliography is *not* intended to be a comprehensive survey of all research and writing that has emerged in the past three decades since the establishment of digital gaming as a common social activity – hundreds more references exist outside of those featured here. Rather, the entries found below were selected due to their specific reference to those sources that seem to carry the most relevance to future research into the use of digital games for educational and training purposes.

The sources listed below, therefore, can be seen to fall into several basic categories. The first of these focuses on work that examines **the usefulness and/or effects of electronic media in educational contexts**. Appropriate studies and essays from the broad and crowded field of television studies, for example, are included here with the understanding that certain findings or theoretical approaches may find useful application in research which is more specific to digital gaming.

The second category concerns that work (both popular and scholarly) which maintains a broad, "survey oriented" approach to the **formal qualities of digital games**. While these sources do not necessarily concern themselves specifically with digital games in education and training, they nonetheless provide the necessary backgrounds, histories, formalist analyses, and cultural criticisms which are necessary for any informed approach to the field.

Finally, the majority of the sources listed here either specifically concern **digital games and their application to educational contexts, represent experimental evaluations of the effects of digital games in terms of cognitive development or learning acquisition, or some combination of the two**. Though the bulk of research into digital gaming in general has historically concerned the effects of violent content on players, little of this work is represented here. Those sources here which do demonstrate some concern with violence in digital games are included due to some particularly useful aspect of their approach to the subject. More specifically, all of them maintain a focus on questions of violent content as a means of interrogating the manner in which digital games suggest or demonstrate elements of social modeling or transference among players. This bibliography is not divided into categorized sections, though the degree to which any source adheres to the categories described above should be easily identifiable.

Sources listed here were identified through a combination of library and Internet searches and were further augmented by entries from *The social effects of interactive games: An annotated bibliography.* (Mediascope 1996) Many of the abstracts included here were also provided by the Mediascope publication, and are identified as such where appropriate (along with any instances of their presence in research databases such as ERIC or PsycINFO). Overall, this bibliography should serve as a beneficial resource for any researcher conducting work that concerns digital games in training and education.

Digital Games in Education and Training:
A Bibliography

Aarseth, E. (2002). Computer game studies: Year one. *Game Studies, 1*(1).

Welcome to the first issue of the first academic, peer-reviewed journal dedicated to computer game studies. This is a noteworthy occasion, and perhaps the most remarkable aspect is that such a journal has not been started before. As we know, there have been computer games for almost as long as there have been computers: SpaceWar, arguably the first modern game, turns forty this year, and commercially the genre has existed for three decades. So why not something like this before?

Adelman, H. S., Lauber, B.A., Nelson, P., & Smith, D.C. (1989). Toward a procedure for minimizing and detecting false positive diagnosis of learning disability. *Journal of Learning Disabilities, 22*(4), 234-244.

Investigated the degree to which a highly motivating computer game learning task can improve differential diagnoses of learning disabilities. Findings from an initial investigation with 23 learning disabled students, aged 12 to 17 years, and 31 nondiagnosed students, aged 9 to 17 years, who were performing poorly at school indicate that a large proportion of Subjects diagnosed as learning disabled were able to learn effectively when pursuing such a task. Results illustrate the important role motivation plays in determining the validity of diagnostic assessment. In addition, they demonstrate that potential value of similar tasks for use in differentiating those who did not have impaired learning processes from among individuals diagnosed as learning disabled. (PsycINFO / Mediascope)

Alloway, N., & Gilbert, P. (1998). Video game culture: Playing with masculinity, violence, and pleasure. In S. Howard (ed.), *Wired up: Young people and the electronic media* (pp. 95-114). London: UCL Press, Ltd.

Amory, A., Naicker, K., Vincent, J., & Adams, C. (1999). The use of computer games as an educational tool: Identification of appropriate game types and game elements. *British Journal of Educational Technology, 30*(4), 311-322.

Amory, A. (2001). Building an educational adventure game: Theory, design, and lessons. *Journal of Interactive Learning Research, 12*(2), 249-265.

Anderson, C. A., & Ford, C.M. (1986). Affect of the game player: Short-term effects of highly and mildly-aggressive video games. *Personality and Social Psychology Bulletin, 12*(4), 290-402.

Axelrod, S., et al. (1987). Effects of video games as reinforcers for computerized addition performance. *Journal of Special Education Technology, 9*(1), 1-8.

Four second-grade students completed addition problems on a computer, using video games as reinforcers. Two variable ratio schedules of

reinforcement failed to increase student accuracy or the rate of correct responses. In a no-games reinforcement condition, students had more opportunities to respond and had a greater number of correct answers. (ERIC / Mediascope)

Baba, D. M. (1993). Determinants of video game performance. In J. L. Starkes, & F. Allard (ed.), *Cognitive Issues in Motor Expertise. Advances in Psychology* (Vol. 102, pp. 57-74). Amsterdam, Netherlands: North-Holland / Elsevier Science Publishers.

Studies were conducted to investigate several factors related to video game performance. These included: what people learn when playing video games; what comprises skill in this domain; why are some people better at video games than others; the relation between psychomotor abilities and video game performance; game knowledge and movement control in video game performance. (PsycINFO / Mediascope)

Baird, W. E., & Silvern, S.B. (1990). Electronic games: Children controlling the cognitive environment. *Early Child Development & Care, 61*, 43-49.

Recognizes that the electronic environment is a play environment and electronic games may elicit various forms of play. Electronic games allow children to control the environment and to engage in developmentally appropriate activity. Electronic game environments allow the same materials to be used in many ways selected by the player. Electronic games may provide multiple-perspective, autotelic learning environments and informally facilitate culturally-valued skills and knowledge. This depends on how games are designed, how available they are to children, and whether each game is matched to the child's interest and skill level. Through electronic games, children may control difficulty, game rules, and tools for problem solving, allowing them to construct cognitive tools unavailable to previous generations. (PsycINFO / Mediascope)

Baltra, A. (1990). Language learning through computer adventure games. *Simulation & Games, 21*(4), 445-452.

Investigated the use of computer adventure games for the development of communicative fluency in students of English as a second language. Focused on student-centered activities that use a cooperative learning approach, in which the teacher is seen more as a facilitator than as an instructor. A major issue addressed is how an investigation of what makes computer games fun can provide information on what will motivate a student to learn. (Sage / Mediascope)

Banet, B. (1978). Computers and early learning. *Creative Computing, 4*(5), 90-95.

This paper discusses the effect that microelectronic technology will have on elementary education in the decades ahead, and some of the uses of computers as learning aids for young children, including interactive games, tutorial systems, creative activity and simulation. (ERIC / Mediascope)

Barge, G. (1997). How can we teach history through television? *Journal of Educational Media, 23*(2/3), 203-214.

Bickham, D. S., Wright, J.C., & Huston, A.C. (2000). Attention, comprehension, and the educational influences of television. In D. G. Singer, & J.L. Singer (ed.), *Handbook of Children and the Media* (Vol. 24, pp. 101-119). Thousand Oaks, California: Sage.

In this chapter, the authors address one of the most frequent and often controversial concerns about television viewing in preschool children. To what extent does the format of American television-characterized as it is by rapid pacing, frequent interruptions either for commercial messages or for changes of subject matter, and shifts in loudness or interpolations of music-affect children's attention spans and their ability to comprehend and later to retrieve program information. This is a matter of special concern when we consider whether programs designed especially for children can have an educational value. In the 1970s, as commercial networks and local stations largely abandoned children's programming, leaving that field to the Public Broadcasting System, two models of formatting emerged. These were exemplified by Sesame Street, which adopted a variation of the faster-paced, lively, short episode, and fast-talking patterns of commercial programming, and Mister Rogers' Neighborhood, which emphasized a slow-talking adult host and relatively longer episodes with a pacing more like that of a parent directly addressing a preschool child. These two programs had different goals (cognitive teaching versus social and personal development) and therefore could not be directly compared. Still, some critics feel that the faster-paced Sesame Street style was ineffective in yielding school-readiness learning and in-depth processing and potentially training children for anticipating a "jazzy" short-sequenced mode of presentation from their first-grade teachers.

Blank, D. E. (1982). 'Pac-Man' goes to school: Teaching problem solving in the electronic age. *Computing Teacher, 10*(1), 50-53.

Presents a problem solving model based on the *Pac Man* video game designed to help develop systematic, thoughtful, and productive decision making skills. The model and its applications to new situations are discussed. Also considered are steps in the problem solving process, suggested questions for teachers to ask students and anticipated student responses. (ERIC / Mediascope)

Bliss, J., Kennedy, R.S., Turnage, J.J., & Dunlap, W.P. (1991). Communality of videogame performances with tracking tasks. *Perceptual and Motor Skills, 73*(1), 23.

Bobko, D. J., Bobko, P., & Davis, M.A. (1986). Effect of visual display scale on duration estimates. *Human Factors, 28*(2), 153-158.

Seventy- two undergraduates played a video game on one of three television screens. Subjects estimated the duration of play and rated the stressfulness of the task. Game scores were also recorded. Findings show that duration estimation was effected by the scale, or size, of visual displays. In particular, verbal estimates of the duration of a fixed interval of time tended to increase as the size of a given visual display decreased. Neither ratings of stress nor game scores were correlated with duration estimates. Results are considered from two general theoretical frameworks, psychobiological chronometer and information storage-size

theories. Neither framework appears to account for the findings.

Bowman, R. F. (1982). A Pac-Man theory of motivation: Tactical implications for classroom instruction. *Educational Technology, 22*(9), 14-17.

The author argues in this study that video gamemanship represents conscious, deliberate mental and physical activity and promotes active learning by shifting players into the participant role. Each strategic movement generates a visible response. Moreover, the immediacy of reciprocal responses reduces the sense of distance between the player's efforts and successes. External stimuli are controlled to focus and define exploration and problem solving. Challenges are matched to players' developmental levels to create a psychological sense of flow. Relatedly, the player gains status, self-determination, and sustained enjoyment. It is contended that designing a humane, productive learning environment and a successful video game parlor draws essentially on the same considerations including beliefs about human nature, the nature of learning, and the interests and needs of students. (Association for Educational Communications and Technology / Mediascope)

Bracey, G. W. (1992). The bright future of integrated learning systems. *Educational Technology, 32*(9), 60-62.

Considers the future of Integrated Learning Systems (ILSs) and examines hypermedia as the most promising new interactive technology for education. Topics discussed include changes in technology; the use of computers in schools; the value of video games; the impact of ILSs on schools; and cognitive science and cognitive psychology. (ERIC / Mediascope)

Bransford, J. D., Sherwood, R., Vye, N.J., & Rieser, J. (1986). Teaching thinking and problem solving: Suggestions from research. *American Psychologist, 41*, 1078-1089.

Brody, H. (1993). Video games that teach? *Technology Review, 96*(8), 50-57.

Children's passion for Nintendo and its ilk worries parents, who fret about the effects of mindless entertainment. But a marriage between educational-software and video-game manufacturers has begun to yield products that look and feel like games but that actually teach the player something of lasting value.

Brougere, G. (1999). Some elements relating to children's play and adult simulation/gaming. *Simulation & Gaming, 30*(2), 134-146.

Children's play and adult gaming, each of which are present in the world of education and training, too often refer to different explanatory paradigms. Is this distinction a legitimate one? In what way? This introduction endeavors to provide some answers to these questions, based both on theoretical reflections and on examples given by the authors. The author attempts to demonstrate that these two fields of reflection have everything to gain through mutual enrichment.

Brougere, G. (1999). Guest editorial: play and simulation/gaming. *Simulation & Gaming, 30*(2), 132-133.

Brown, R. M., Brown, N.L., & Reid, K. (1992). Evidence for a player's position advantage in a videogame. *Perceptual and Motor Skills, 74*(2), 547-554.

Tested the hypothesis that the position a player occupies (i.e., right or left of center) affects performance in a ping-pong video game. Forty right-handed male university students performed better when deated on the right than on the left. The right-side advantage was maintained even when Subjects were presented with a mrror-image of the game, indicating that characteristics of the apparatus were not solely responsible for the right-side advantage. The compatibility of certian display and response components in the game may have accounted for the advantage of the player's position.

Buckingham, D. (2002). The electronic generation? Children and new media. In L. Lievrouw, & S. Livingstone (eds.), *Handbook of new media: Social shaping and consequences of ICTs* (Vol. 77-89). London: Sage.

Calvert, S. L., & Tan, S. (1994). Impact of virtual reality on young adults' physiological arousal and aggressive thoughts: Interaction vs. observation. *Journal of Applied Developmental Psychology, 15*(1), 125-139.

Calvert, S. L. (2001). Impact of Televised Songs on Children's and Young Adults' Memory of Educational Content. *Media Psychology, 3*(4), 325-342.

The purpose of the studies presented in this article was to examine the impact of televised songs on children's memory of educational material from School House Rock. School House Rock is an educational television series that teaches history, science, math, and English lessons via short, animated songs targeted to an 8- to 10-year-old audience. Single exposures favored verbal over sung presentations for recognition of important verbal content. After repeated exposure to a second vignette, children and adults remembered more educational material verbatim, but participants still did not recognize significant verbal program content. The results suggest that songs improve verbatim memory, but spoken presentations improve verbal comprehension of content. Policy implications concerning the educational and informational requirements of the Children's Television Act are considered.

Carlson, S. (2003). Can Grand Theft Auto inspire professors? *The Chronicle of Higher Education*, August 15, 2003, A31-A33

Church, D. (1999). Formal abstract design tools. *IGDA.com,* Retrieved March 23, 2003 from http://www.igda.org/articles/msakey_language.php.

Cohn, C. L., & Rentfro, R.W. (1995). Running the US economy: A computer simulation competition for high school students. *Journal of Education for Business, 71*(2), 64-68.

Coleman, D. W. (2002). On foot in SIM CITY: Using SIM COPTER as the basis for an ESL writing assignment. *Simulation & Gaming, 33*(2), 217-230.

This article describes a computer-assisted language learning (CALL) simulation-based activity for ESL writing using SIM COPTER. Participants have two roles: (a) a pilot who must locate an assigned destination and write directions how to walk there and (b) a visitor who must use another participant's directions to get to an unknown destination. Superficially an exercise in writing simple street directions, the activity requires a serious consideration of audience initially beyond most beginning ESL student writers. The activity makes the concept of audience more accessible by concretizing it. It is argued that ESL texts do not adequately deal with the concept of audience. CALL simulation-based writing activities provide an ideal way to do so in a realistic, communicative way.

The cookie monster: From Sesame Street to your hard drive. (2001). *South Carolina Law Review, 52*(4), 921-954.

Cooper, J., & Mackie, D. (1986). Video games and aggression in children. *Journal of Applied Social Psychology, 16*(8), 726-744.

Darley, A. (2000). *Visual digital culture: Surface play and spectacle in new media genres*. London: Routledge.

David, A., & Ball, M.P. (1986). The video game: A model for student-teacher collaboration. *Momentum, 17*(1), 24-26.

Describes a value-oriented computer game called *The Healer*, which focuses on healing one's enemies and the environment, while maintaining sufficient life force to achieve these objectives. Stresses that collaboration between students and teachers can result in computer programs that are value-driven, appealing to students, and useful learning tools. (Momentum / Mediascope)

de Felix, J., & Johnson, T. (1993). Learning from video games. *Computers in the Schools, 9*(2/3), 119-134.

Dempsey, J. V., Haynes, L.L., Lucassen, B.A., & Casey, M.S. (2002). Forty simple computer games and what they could mean to educators. *Simulation & Gaming, 33*(2), 157-168.

The purpose of this study was to evaluate computer games or components of the games that would lend themselves for use in an educational setting. Participants included 20 men and 20 women who volunteered to participate. All participants played four randomly assigned computer-based shareware or freeware games from among eight categories. Participants offered numerous suggestions for instructional applications of the noneducational games. Results suggested diverse patterns of preference and use between genders. Participants indicated many key features regarded as essential for an effective gaming environment as well as those that distracted them from play. Trial and error was observed to be the dominant strategy used across all game categories.In addition,participants suggested numerous educational applications for common categories of computer games.

Detterman, D. (1993). *Transfer on trial: Intelligence, cognition, and instruction*.

Norwood, NJ: Ablex.

Farber, P., Provenzo, E., & Holm, G. (eds.). (1994). *Schooling in the light of popular culture*. Albany, NY: SUNY Press.

Fisch, S. M., Truglio, R.T., & Singer, D.G. (2002). "G" is for growing: Thirty years of research on children and Sesame Street. *Contemporary Psychology, 47*(4), 475-478.

Fleming, D. (1996). *Powerplay : Toys as popular culture*. Manchester; NY: Manchester University Press.

Forman, G. E. (1987). Computer graphics as a medium for enhancing reflective thinking in young children. In D. N. Perkins, J. Lochhead, & J. Bishop (eds.), *Thinking: The Second International Conference* (pp. 233-243). Hillsdale, NJ: Lawrence Erlbaum Associates.

This study discusses the manner in which the physical aspects of interactive video, defined as any television image that can be controlled by the viewer, constrain and elicit what children chose to symbolize in their play. In addition, it identifies the impact of interactive video on pausing and reflective bahavior in children. (PsychINFO / Mediascope)

Friedman, T. (1995). *Making sense of software: Computer games and interactive textuality*. Retrieved February 17, 2003, from http://www.duke.edu/~tlove/simcity.htm

Fromme, J. (2003). Computer games as a part of children's culture. *Game Studies, 3*(1).

Funk, J. B., Flores, G., Buchman, D.D., & Germann, J.N. (1999). Rating electronic games: Violence is in the eye of the beholder. *Youth & Society, 30*(3), 283-312.

Funk, J. B. (2001). *Children and violent video games: Are there "high risk" players?* Paper presented at the "Playing by the Rules" conference, University of Chicago.

Gagnon, D. (1986). Videogames and spatial skills: An exploratory study. *Educational Communication and Technology, 33*, 263-275.

This study of undergraduate and graduate students examined the potential relationship between spatial aptitude and video game use. The purpose of the study was to determine the relationship between scoring ability on video games and spatial aptitude as defined by standardized tests; explore potential gender differences; and examine effects of video games practice on spatial aptitude scores. (ERIC / Mediascope)

Garcia-Carbonell, A., Rising, B., Montero, B., & Watts, F. (2001). Simulation/gaming and the acquisition of communicative competence in

another language. *Simulation & Gaming, 32*(4), 481-491.

For more than three decades, researchers and practitioners in the field of English as a foreign language have faced the issue of communicative competence as a goal in language acquisition and how to reach this goal. In this article, the authors address the issue from the point of view of a theoretical and practical meshing of simulation and gaming methodology with theories of foreign language acquisition, including task-based learning, interaction, and comprehensible input, showing how simulation and gaming can be used in those phases of language acquisition in which formal instruction has proved less ineffectual. The objective of this article is to describe the close relationship between the acquisition of foreign language competence and its components and experiential learning through simulation and gaming, with specific reference to two experiments in this area.

Gardner, J. E. (1991). Can the Mario Bros. help? Nintendo games as an adjunct in psychotherapy with children. *Psychotherapy, 28*(4), 667-670.

Discusses the clinical purposes computer-type games can serve in psychotherapy with children. Computer games can aid in the assessment and development of the child's problem-solving abilities. Games also can help the child increase the ability to perceive and recall subtle cues, forsee consequences of actions and act on past consequences, and improve perceptual-motor coordination. In addition, they provide a manner of releasing or controlling aggression, a means of dealing with success and failure, and an opportunity to mutually coordinate activities in a spirit of cooperation. case examples are provided of two boys, aged 5 and 7 years, and one girl, aged 10 years. (PsycINFO / Mediascope)

Garris, R., Ahlers, R., & Driskell, J.E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming, 33*(4), 441-467.

Although most agree that games can be engaging and that games can be instructive, there is little consensus regarding the essential characteristics of instructional games. Implicit in the research literature is the notion that if we pair instructional content with certain game features, we can harness the power of games to engage users and achieve desired instructional goals. In this article, the authors present an input-process-output model of instructional games and learning that elaborates (a) the key features of games that are of interest from an instructional perspective; (b) the game cycle of user judgments, behavior, and feedback that is a hallmark of engagement in game play; and (c) the types of learning outcomes that can be achieved. The authors discuss the implications of this approach for the design and implementation of effective instructional games.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.

Gill, T. (ed.). (1996). *Electronic children : How children are responding to the information revolution*. London: National Children's Bureau.

Graybill, D., Kirsch, J.R., & Esselman, E.D. (1985). Effects of playing violent versus nonviolent video games on the aggressive ideation of aggressive

and nonaggressive children. *Child Study Journal, 15*(3), 299-305.

Green, B., Reid, J., & Bigum, C. (1998). Teaching the Nintendo generation? Children, computer culture and popular technologies. In S. Howard (ed.), *Wired up: Young people and the electronic media* (pp. 19-41). London: UCL Press, Ltd.

Green, S. C., & Bavelier, D. (2003). Action video game modifies visual selective attention. *Nature, 423*(May 29, 2003), 534-537.

As video-game playing has become a ubiquitous activity in today's society, it is worth considering its potential consequences on perceptual and motor skills. It is well known that exposing an organism to an altered visual environment often results in modification to the visual system of the organism. The field of perceptual learning provides many examples of training-induced increases in performance. But perceptual learning, when it occurs, tends to be specific to the trained task; that is, generalization to new tasks is rarely found... here we show, by contrast, that action-video-game playing is capable of altering a range of visual skills. Four experiments establish changes in different aspects of visual attention in habitual video-game players compared with non-video-game players. In a fifth experiment, non-players trained on an action video-game show marked improvement from their pre-training abilities, thereby establishing the role of playing in this effect.

Greenfield, P. M. (1984). *Mind and Media : The effects of television, video games, and computers*. Cambridge, Massachusetts: Harvard University Press.

Greenfield, P. M. (1994). Video games as cultural artifacts. *Journal of Applied Developmental Psychology, 15*(1).

Argues that video games (VGs) are cultural artifacts that both depend on and develop the iconic mode of representation, particularly the dynamic representation of space. It is suggested that, as cultural artifacts, VGs require and develop a particular set of cognitive skills and are a cultural instrument of cognitive socialization. However, VGs have greater appeal to some groups (e.g., boys) than to others. Reasons for the gender differences are discussed. Future study of VGs and their cognitive effects will have to take account of the multimedia and multimodal sets of representational tools surrounding the increasingly fertile marriage of TV and the computer. (Mediascope)

Greenfield, P. M., Camaioni, L., Ercolani, P., & Weiss, L. (1994). Cognitive socialization by computer games in two cultures: Inductive discovery or mastery of an iconic code? *Journal of Applied Developmental Psychology, 15*(1), 59.

A cross-cultural and experimental examination of computer games as cultural tools of cognitive socialization. This study also investigates the cognitive processes involved in mastering computer games. Research took place in the United States and Italy, which differ in their exposure and attitudes to computer technology. Exposure to computer technology

(either over the long term, as a member of a culture, or in the short term of our experimental computer game treatments) was associated with greater skill in decoding scientific-technical information graphically represented on a computer screen with a preference for iconic diagrams rather than the written word in communicating this information. (Mediascope)

Greenfield, P. M., Brannon, C., & Lohr, D. (1994). Two-dimensional representation of movement through three-dimensional space: The role of video game expertise. *Journal of Applied Developmental Psychology, 15*(1), 87.

Two studies tested whether video games could contribute to the development of spatial representational skills required for humans to interface effectively with computer technology. The authors studies 82 undergraduates to assess the relationship between expertise in a 3-dimensional action arcade video game and the skills of dynamic 3-dimensional spatial representation (SR), as assessed in a mental paper-folding test. Study 1 established a correlation between video game expertise and skill in SR. Study 2 established a causal relationship between video game skill and spatial skill through an experimental paradigm. Short-term video game practice had no effect on mental paper folding. However, structural equation modeling provided strong evidence that video game expertise, developed over the long-term, had a beneficial effect on the spatial skill of mental paper folding.

Greenfield, P. M., DeWinstanley, P., Kilpatrick, H., & Kaye, D. (1994). Action video games and informal education: Effects on strategies for dividing visual attention. *Journal of Applied Developmental Psychology, 15*(1).

Two experiments investigated the effects of video game expertise on divided visual attention in college students. Divided attention was measured by using response time in targets of varying probabilities of two locations on a computer screen. In one condition, the target appeared ten percent of the time in one location (low probability position), 80 percent of the time in the other location (high probability location, and ten percent of the time in both locations. In the other condition, the target appeared 45 percent of the time in each position (equiprobable or neutral positions) and ten percent of the time in both positions. Subjects for Experiment I represented two extremes of video game skill: experts and novices. Subjects for Experiment II were an unselected group with a continuous distribution of video game performance (labeled more skillful, less skillful). Experiment I established that video game experts were similar to novices in manifesting an attentional benefit at the high probability position. However, unlike novices, experts did not show an attentional cost at the low probability position. Experts also had significantly faster response times than novices at both the ten percent and 80 percent positions, but not at the 45 percent position. Experiment II established that video game experience was a causal factor in improving strategies of divided attention. Five hours of play on a video game called *Robotron* produced a significant decrease in response time at the ten percent location, the locus of the expert-novice difference in Experiment I. (Mediascope)

Greenfield, P. M., & Cocking, R.R. (eds.). (1996). *Interacting with video* (Vol. 11). Norwood, N.J.: Ablex.

Griffiths, M. D., & Davies, M.N.O. (2002). RESEARCH NOTE: Excessive online computer gaming: implications for education. *Journal of Computer Assisted Learning, 18*(3), 379-380.

Halttunen, K., & Sormunen, E. (2000). Learning information retrieval through an educational game: Is gaming sufficient for learning? *Education for Information, 18*(4), 289-311.

Healy, J. M. (1990). Chaos on Sesame Street: Does this carnival of images help students read? *American Educator, 14,* 22-27.

Healy, J. M. (1991). 10 reasons "Sesame Street" is bad news for reading. *The Education Digest, 56,* 63-66.

Healy, J. M. (1998). *Failure to connect: How computers affect our childrens' minds - for better or worse*. New York: Simon and Schuster.

Herz, J. C. (1997). *Joystick nation: How videogames ate our quarters, won our hearts, and rewired our minds*. Boston: Little, Brown, and Co.

Horn, R. E. (1995). The story of the guide to simulations/games for education and training. *Simulation & Gaming, 26*(4), 471-480.

Icon Group, Ltd. (2002). *The 2000-2005 world outlook for video games*. San Diego, California: Icon Group, Ltd.

IDSA. (2002). Essential facts about the computer and video game industry. Washington, DC: IDSA (Interactive Digital Software Association).

Jacobs, R. L., et al. (1987). Simulation and games in training and development: Status and concerns about their use. *Simulation & Games, 18*(3), 385-394.

Comments on the status of the use of simulations and games in training and development settings and discusses concerns limiting their use. It is argued that the performance orientation of interactive simulation games allows immediate feedback and remediation. Concerns found in the literature and through interviews with 7 managers of training departments include cost effectiveness, a preference for quantitative vs. qualitative outcomes, the problems of evaluation, the perceived inappropriateness of mixing fun with training, the perceived need to have computer skills to do simulations, and the perception that employees expect and feel more comfortable with a lecutre format for crucial functions.

Jenkins, H., & Cassell, J. (eds.). (1998). *From Barbie to Mortal Kombat: Gender and computer games*. Cambridge, MA: MIT Press.

Jenkins, H. (2003). Game theory. *Technology Review*. Retrieved February 26,

2003, from http://www.technologyreview.com/articles/print_version/wo_jenkins032902.asp

Jenkins, H., Walter Holland, Kurt Squire. (forthcoming). Theory By Design. In B. W. Perron, Mark J.P. (eds.), *Video Game Theory*: Routledge.

Kafai, Y. B. (1995). *Minds in play: Computer game design as a context for children's learning*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Kawashima, T., Satake, H., Ueki, S., & Tajima, C., et al. (1991). Development of skill of children in the performance of the family computer game "Super Mario Bros." *Journal of Human Ergology, 20*(2), 199-215.

Investigated skill development of children in the performance of a family computer game, *Super Mario Bros*. Subjects were from three age groups: 40 kindergartners, aged 6 years; 34 third graders, aged 9 years; and 30 sixth graders, aged 12 years. Nine kindergartners and three third graders were inexperienced with the computer game. The other Subjects were experienced. The skill to perform the game with either hand was evaluated by the mean scores gained by the Subjects. In the right hand dominant situation, the mean score improved significantly with advancement of age. The same was true in the left hand doiminant situation, but more distinctly. The mean scores were significantly higher in the right hand situation than in the left hand situation. Experienced Subjects were superior to inexperienced Subjects. The correlation between the reaction time and game score was also investigated with the same Subjects. Almost no correlation was found. (Mediascope)

Keller, J. M. (October, 1987). Strategies for stimulating the motivation to learn. *Performance and Instruction,* pp. 1-7.

Kent, S. L. (2001). *The ultimate history of video games : From Pong to Pokemon and beyond--the story behind the craze that touched our lives and changed the world*. Roseville, CA: Prima.

Kinder, M. (1991). *Playing with power in movies, television, and video games : From Muppet Babies to Teenage Mutant Ninja Turtles*. Berkeley, CA: University of California Press.

King, L. (ed.). (2002). *Game on : the history and culture of videogames*. London: Laurence King.

Lee, J., Trigueros, M., Taguena, J., & Barrio, R.A. (1993). Spectrum: an educational computer game. *Physics Education, 28*(4), 215-218.

Lin, S., & Lepper, M.R. (1987). Correlates of children's usage of videogames and computers. *Journal of Applied Social Psychology, 17*(1), 72-93.

Two hundred and ten students in fourth, fifth, and sixth grades responded to a questionnaire concerning their experiences with electronic video games and computers. Teacher (n = 189) ratings of academic achievement,

personality characteristics, and behavior patterns were also obtained for each student. Data were used to examine hypotheses concerning potential effects of electronic video games on school-age children and to provide evidence concerning the correlates of computer usage by school-age children. Video game usage showed significant, positive correlations with teacher ratings of impulsivity, significant negative correlations with ratings of academic achievement, and little relationship to rated sociability. Video game use also proved positively related to other social activities and to microcomputer use.

Ljubic, M. (2000). Is traditional educational media dead? *Educational Media International, 37*(2), 128-130.

Lorch, E., & Castle, V. (1997). Preschool children's attention to television: Visual attention and probe response times. *Journal of Experimental Child Psychology, 66*(1), 111-128.

Love, M., & Banks, S. (2001). Using interactive digital television to support basic skills learners. *Journal of Educational Media, 26*(1), 35-48.

Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive Science, 4*, 333-369.

Mates, B. F., & Strommen, L. (1995). Why Ernie can't read: Sesame Street and literacy. *The Reading Teacher, 49*(4), 300-308.

Mates, B. F., & Strommen, L. (1996). Who Reads on Sesame Street? *The Education Digest, 61*(8), 63-67.

McClurg, P. A., & Chaille, C. (1987). Computer games: Environments for developing spatial cognition? *Journal of Educational Computing Research, 3*(1), 95-111.

Investigated whether 57 students in fifth, seventh, and ninth grades playing select computer games utilizing spatial skills would improve their scores on a spatial ability measure. A significant treatment effect in favor of the experimental conditions was found in the analysis of covariance. No significant interaction or main effects were found for grade level or sex, indicating that males and females in all three grade levels seemed to benefit from this experience. Results suggest that certain computer games may enhance the development of spatial ability, as measured by a mental rotation test. Identified spatial components of the two games tested included visual perception and discrimination, differentiations of opposite obliques, visualizations of transformations in series, the use of referent systems, and the development and updating of cognitive maps. (PsycINFO / Mediascope)

McSwegin, P. J., Pemberton, C., & O'Banion, N. (1988). The effects of controlled videogame playing on the eye-hand coordination and reaction time of children. In J. E. Clark, & J.H. Humphrey (ed.), *Advances in Motor Development Research* (Vol. Vol. 2, pp. 97-102). New York: AMS Press.

Investigated the effects of video game play on the eye-hand coordination of boys and girls aged 7 and 8 years, as measured by the Lafayette Rotary Pursuit. The study concluded that video game playing experience contributed to improved eye-hand coordination and reaction time. (PsycINFO / Mediascope)

McVey, C. G., Jr. (1997). *The Child's Experience of Video Game Play*. Unpublished Doctoral Dissertation, University of Texas at Austin, Austin, Texas.

In the three decades since their introduction, video games have become a major force in the lives of American children. The predominant theme of violence in most video games has, not surprisingly, received much attention from parents and researchers. Violence has dominated the video game literature, though other topics such as gender portrayals and potential benefits have received some attention. While most adults have little or no personal experience with video game play, existing research has largely ignored the child's voice and perspective on video games. Against this research backdrop, this qualitative study was aimed at exploring the phenomenological experience of typical child video game players. The two central research questions involved an exploration of child players' experiences and a comparison of children's views with the existing literature. Ten boys, ranging in age from eight to sixteen years, participated in this study. Data collection occurred in participants' homes and included observations of game play, stimulated-recall activities, and child and parent interviews designed to elicit their perspectives regarding the affective, behavioral, and cognitive experiences of video game play. Additionally, self-report questionnaires were used to gather supporting data and four participants attended a group interview. The entire data collection process, including component parts, followed an increasing progression, in terms of the amount of structure employed. Study findings were reported in two ways. First, the case study method was used to present findings for five participants. Results suggested that the experiences of individual participants were, in part, grounded in what each child brought to the experience. Second, comparisons of findings across participants and with the existing literature revealed the role of individual characteristics such as developmental level, temperament, and attitudes, though many issues such as economic concerns and parental concerns were found to be common across participants. In addition to participant-based differences, a number of other factors were shown to influence the experience of video game play, including the social and environmental context of game play and game characteristics. For example, sibling play was contrasted with solitary play and sports games were contrasted with fighting games. Overall, the child's experience of game play was shown to be a complex and evolving phenomenon, worthy of respect and attention from concerned adults.

Mediascope. (1996). *The social effects of electronic interactive games: An annotated bibliography*. Studio City, CA: Mediascope.

Murray, J. H. (1997). *Hamlet on the holodeck : the future of narrative in cyberspace*. New York: Free Press.

Myers, D. (1992). Time, symbol transformations, and computer games. *Play &*

Culture, 5(4), 441-457.

This article describes a symbol-transformation model of play with examples drawn from popular home computer games. The model is used to explain the subjective distortions of time commonly experienced by computer game players. The model has many parallels with, but also some unique advantages and extensions beyond, alternative explanations for time distortion during play. One example is the concept of "flow". Conclusions concern defining the subjective experience of time during play with reference to the symbol transformations of opposition and contextualization. (PsycINFO / Mediascope)

Nawrocki, L. H., & Winner, J.L. (1983). Video games: Instructional potential and classification. *Journal of Computer Based Instruction, 10*(3-4), 80-82.

Discusses the potential for the use of video games in computer-based instruction, the value of such games as motor skill assessment devices, and the influence of game design factors on the motivational value of such games. On the basis of participant observations at several video arcades, the authors discuss the quality of visual displays and the incentives provided by individual scoring systems. Problems are noted with respect to the reliance on the games on color coding and the low fidelity of controls. A video game classification system is proposed that would help link games to training or educational requirements. the instructional value of different types of games are rated in terms of their use of perceptual, psychomotor, memory, and rule- and concept-learning skills. (PsycINFO / Mediascope)

Noble, A., Best, D., Sidwell, C., & Strang, J. (2000). Is an arcade-style computer game an effective medium for providing drug education to schoolchildren? *Education for Health: Change in Learning & Practice, 13*(3), 404-406.

Pack, T. (2000). CD-ROM for Budding Musicians: Kids will love Sesame Street Music Maker. *Link-up, 17,* 32.

Papert, S. (1980). *Mindstorms*. New York: Basic Books.

Papert, S. (1993). *The children's machine: Rethinking school in the age of the computer*. New York: Basic Books.

Pearce, C. (2002). Story as play space: Narrative in games. In L. King (ed.), *Game On: The history and culture of videogames* (pp. 112-119). New York: Universe.

Piaget, J. (1964). *The child's conception of the world*. London: Routledge.

Poole, S. (2000). *Trigger Happy : the inner life of videogames*. London: Fourth Estate.

Prensky, M. (2001). *Digital Game-Based Learning*. New York: McGraw-Hill.

Provenzo, E. F., Jr. (1991). *Video kids: Making sense of Nintendo*. Cambridge, MA: Harvard University Press.

Provenzo, E. F., Jr. (1992). What Do Video Games Teach? Their social and educational impact must be reckoned with. *The Education Digest, 58*(4), 56.

Provenzo, E. F., Jr. (2000). INTRODUCTION: Special Issue: Computing and Educational Studies. *Educational Studies, 31*(1), 2.

Racine, S. J., & Dilworth, D. (2000). Using interactive television to teach professional communicators: Overcoming perceptions and negotiating first impressions. *Journal of Business and Technical Communication, 14*(3), 348-371.

Radencich, M. C. (1984). From Dick and Jane to Tron? *Reading World, 24*(2), 1-3.

Describes the amount and difficulty of the print appearing on video game screens on the basis of the application of a readability formula to several games. Educational implications of children's exposure to video games include the possibility of using video games to increase reading speed and to improve skimming and scanning skills of good but slow readers. Problems with habitual use of video games include exposure to writing models that do not use complete sentences and that lack punctuation. (PsycINFO / Mediascope)

Raymond, J. (2000). Kids just wanna have fun. *American Demographics, 22,* 48-56.

Ricci, C. M., & Beal, C.R. (2002). Effect of interactive media on children's story memory. *Journal of Educational Psychology, 94*(1), 138-144.

The authors examined the influence of interactive media on children's story memory. First-grade children (children aged 6 to 7 years) experienced a computer-based story in one of four presentation modes. One group heard only the narration, analogous to radio. A second group saw an audiovisual presentation, analogous to television. A third group viewed the story and interacted with animated areas of the screen, and the fourth group was yoked to the interaction group such that they observed but did not control the interaction. The audio-only group consistently recalled and comprehended poorly, but there were no differences among the other media groups. In the interaction groups, there was also no relation between the amount of interaction with the story and subsequent memory. Overall, the results for interactive media were similar to the findings for the television-like presentation.

Robertson, T. (1996). Embodied actions in time and place: The cooperative design of a multimedia, educational computer game. *Computer Supported Cooperative Work, 5*(4), 341-368.

Sakey, M.*There are no words (yet): The desperately incomplete language of gaming*. Retrieved February 17, 2003, from http://www.igda.org/articles/msakey_language.php

Scantlin, R. M. (1999). *Interactive media: An analysis of children's computer and video game use.* Unpublished Doctoral Dissertation, University of Texas at Austin, Austin, TX.

Children vary in the amount of time they spend playing computer and video games and in their preference for particular types of game content. The purpose of this study was to describe time-use patterns of 572 children 1–12 years of age. Game categories (educational, sports, sensorimotor, strategy, and other) and context of play (secondary activities, location of play, and who was with the child when playing) were analyzed by child age, sex, and ethnicity. Total minutes of interactive game play increased as a function of age, with boys' playing time higher and rising faster than girls' playing time. Younger children played more minutes of educational games than did older children, and girls more than boys. African American children reported little educational play at any age. Generally, sensorimotor and sports play increased as a function of age, with boys reporting significantly more minutes than girls at all ages. African American children spent a greater proportion of their time playing games whose titles were "unknown" than did White children. All groups of children spent about 60 percent of their game time focused only on interactive games, and about 30 percent of their game time communicating with others while playing. About 80 percent of the time spent playing games occurred in children's own homes. The youngest children, 1–5 years, spent a higher proportion of their time with adults present (20 percent), while the 9–12 year olds spent less time with adults (8 percent) and relatively more time alone (44 percent). Children of all ages, sexes, and ethnic groups spent 32–38 percent of their game time playing with other youths.

Schutte, N. S., Malouff, J.M., Post-Gorden, J.C., & Rodasta, A.L. (1988). Effects of playing videogames on children's aggressive and other behaviors. *Journal of Applied Social Psychology, 18*(5), 454-460.

Schwartz, S. (1988). A comparison of componential and traditional approaches to training reading skills. *Applied Cognitive Psychology, 2*(3), 189-201.

Twenty-four primary school children with average intelligence and no oral language comprehension deficits, but who were 18 or more months behind their peers in reading comprehension, participated in an evaluation of two approaches to reading remediation. Half the Subjects received teacher-based tutoring using the DISTAR program. The remaining Subjects received practice on four computer games. The games were designed to improve performance on a set of information-processing components shown to have an impact on reading comprehension. Training in both conditions focused mainly on word decoding and phonics. Although almost all Subjects improved their reading comprehension test scores after training, the poorest readers made significantly greater gains in the componential training condition than in the DISTAR condition. (PsycINFO / Mediascope)

Schwartzman, R. (1997). Gaming serves as a model for improving learning.

Education, 118(1), 9-18.

Seonju, K. (2002). An empirical analysis of children's thinking and learning in a computer game context. *Educational Psychology, 22*(2), 219-233.

Shubik, M. (2002). The uses of teaching games in game theory classes and some experimental games. *Simulation & Gaming, 33*(2), 139-156.

The use of lightly controlled games, primarily in classes in game theory, is discussed. The value of such games is considered from the viewpoint of both teaching and experimentation.

Silvern, S. B. (1986). Classroom use of video games. *Educational Research Quarterly, 10*(1), 10-16.

Suggests that arcade video games can provide children with an interesting mix of what Piaget (1962) termed practice games, symbolic games, and games with rules. Such games can give children practice with hand-eye coordination, facilitate social interaction, and develop skills including pattern and rule generation, hypothesis testing, and generalization. Educational video games, in contrast, generally are limited to the practice type and many fail to sustain interest; although, games of construction such a LOGO manage to brisge play and learning. (PsycINFO / Mediascope)

Silvern, S. B., & Williamson, P.A. (1987). The effects of game play on young children's aggression, fantasy, and prosocial behavior. *Journal of Applied Social Psychology, 8*(4), 435-462.

Special report: The learning revolution. (1994, February 28, 1994). *Business Week,* 80.

What's interactive, looks and feels like a video game, yet teaches kids reading and math? It's called "edutainment", and it's the latest buzzword in education. Edutainment is still in its infancy--and there are plenty of skeptics--but jazzy multimedia computers are already reinventing the way children learn, at home and in school. And demand for high-tech teaching tools is fueling a hot new industry. It's a revolution that may finally fulfill computers' educational promise and transform the rules of the classroom.

Sprengel, A. D. (1994). Learning can be fun with gaming. *The Journal of Nursing Education, 33*(4), 151.

Squire, K. (2001). *Reframing the cultural space of computer and video games*. Retrieved February 26, 2003, from http://cms.mit.edu/games/education/research-vision

Squire, K. (2002). Cultural Framing of Computer / Video Games. *GameStudies (World Wide Web Journal), 2*(1), 16.

Squire, K. (forthcoming). Video Games in Education. *International Journal of Simulations and Gaming*. Retrieved February 26, 2003 from

http://cms.mit.edu/games/education/research.html

Computer and video games are a maturing medium and industry and have caught the attention of scholars across a variety of disciplines. By and large, computer and video games have been ignored by educators. When educators have discussed games, they have focused on the social consequences of game play, ignoring important educational potentials of gaming. This paper examines the history of games in educational research, and argues that the cognitive potential of games have been largely ignored by educators. Contemporary developments in gaming, particularly interactive stories, digital authoring tools, and collaborative worlds, suggest powerful new opportunities for educational media.

Subrahmanyam, K., & Greenfield, P.M. (1994). Effect of video game practice on spatial skills in girls and boys. *Journal of Applied Developmental Psychology, 15*(1).

Subrahmanyam, K., Greenfield, P.M., Kraut, R., & Gross, E. (2001). The impact of computer use on children's and adolescents' development. *Journal of Applied Developmental Psychology, 22*(1).

Subrahmanyam, K., Greenfield, P.M., Kraut, R., & Gross, E. (2002). The impact of computer use on children's and adolescents' development. In S. L. Calvert, A.B. Jordan, & R.R. Cocking (eds.), *Children in the digital age: Influences of electronic media on development* (pp. 260). Westport, CT: Praeger.

Thavikulwat, P. (1995). Computer-assisted gaming for entrepreneurship education. *Simulation & Gaming, 26*(3), 328-336.

Turkle, S., & Papert, S. (1990). Epistemological pluralism: Styles and voices within the computer culture. In I. Harel (ed.), *Constructionist learning*. Cambridge, MA: MIT Media Laboratory.

Turkle, S. (1997). Seeing through computers: Education in a culture of Simulation. *The American Prospect,* 76.

Computer literacy used to mean knowing how computers worked; now it means just knowing how to work with them. What we need are new critical reading skills for the emerging electronic culture.

VanDeventer, S. S., & White, J.A. (2002). Expert behavior in children's video game play. *Simulation & Gaming, 33*(1), 28-48.

This study investigated the display of “expert" behavior by outstanding video game–playing children. Seven highly proficient, video game–playing, 10-and 11-year-old children were observed in the act of teaching adult “foils” how to play one of two popular home video games. The children were also debriefed after the teaching sessions. Observation and debriefing transcripts were then analyzed for evidence of expert behaviors such as self-monitoring, pattern recognition, principled decision making, qualitative thinking, and superior memory. The findings indicate that

outstanding video game–playing children frequently display the characteristics of experts as they are displayed in other domains. Differences in levels of expertise also appear to be present along a continuum from novice to expert. Further study of video game processes may inform educators about the development of expert proficiencies in children.

Wertsch, J. (1987). Collective memory: Issues from a sociohistorical perspective. *Quarterly Newsletter of Comparative Human Condition, 9*(1), 19-22.

Wheatley, W. J. (1999). Enhancing the effectiveness and excitement of management education: A collection of experiential exercises derived from children's games. *Simulation & Gaming, 30*(2), 181-198.

Is there truly any difference between the games we enjoyed as children and some of the more dynamic and energizing experiential exercises used today for management education, training, and development? The author of this article presents a collection of such experiential exercises, with roots that can be traced to a variety of games that are still being played by our children. Although not totally novel and unique, many children's games containing music, magic, and other fun activities are becoming more and more widely used to enhance the dynamism and excitement of management education, training, and development. They can also easily be customized to be used as icebreakers and/or energizers or used as complete interactive exercises to enhance the management education process. The old proverb that "a lesson taught with an entertaining facet is a lesson retained" is still alive and well.

White, J. A., & VanDeventer, S.S. (1991). A successful model for software evaluation. *Computers in the Schools, 8*(1-2-3), 323-326.

Wishart, J. (1990). Cognitive factors related to user involvement with computers and their effects upon learning from an educational computer game. *Computers & Education, 15*(1-3), 145-151.

Wolf, M. J. P. (ed.). (2002). *The Medium of the Video Game*. Austin, TX: University of Texas Press.

Wong, K. K. (1996). Video game effect on computer based learning design. *British journal of educational technology : journal of the Council for Educational Technology, 27*(3), 230-233.