Games and Culture
Volume 1 Number 1
January 2006 36-40

10.1177/1555412005281767
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Playing and Making Games for Learning

Instructionist and Constructionist Perspectives for Game Studies

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This article presents an overview of what we know about two perspectives, coined *instructionist* and *constructionist*, to games for learning. The instructionists, accustomed to thinking in terms of making instructional educational materials, turn naturally to the concept of designing instructional games. Far fewer people have sought to turn the tables: by making games for learning instead of playing games for learning. Rather than embedding "lessons" directly in games, constructionists have focused their efforts on providing students with greater opportunities to construct their own games—and to construct new relationships with knowledge in the process. Research has only begun to build a body of experience that will make us believe in the value of playing and making games for learning.

Keywords: *constructionism; learning; educational game; design*

If someone were to write the intellectual history of childhood—the ideas, the practices, and the activities that engage the minds of children—it is evident that the chapter on the late 20th and early 21st centuries in America needs to give a prominent place to the phenomenon of the video game. The number of hours spent in front of these screens could surely reach the hundreds of billions. And what is remarkable about this time spent is much more than just quantity. Psychologists, sociologists, and parents are struck by a quality of engagement that stands in stark contrast to the half-bored watching of many television programs and the bored performance exhibited with school homework. Like it or not, the phenomenon of video games is clearly a highly significant component of contemporary American children's culture and a highly significant indicator of something (though we may not fully understand what this is) about its role in the energizing of behavior.

Author's Note: The writing of this article was supported in part by a grant of the National Science Foundation (ROLE-0411814). The ideas expressed in this article do not reflect those of the supporting agency. An earlier version of this article was presented in October 2001 at the Cultural Policy and Video Games Conference at the University of Chicago.

Most software designers and commercial companies have sought to capitalize on this energizing of behavior by making games for learning. Building on the motivating nature of games, they hope to make the learning of academic matters more fun, if not easier. Far fewer people have sought to turn the tables: making games for learning instead of playing games for learning. As one should expect, different educators think of using games in different ways, reflecting their different philosophies of education. The most relevant of these differences is the split between predominantly instructionist philosophies and predominantly constructionist ones.[1]

Instructionist Perspectives

The instructionists, accustomed to thinking in terms of making instructional educational materials, turn naturally to the concept of designing instructional games. This central idea has venerable antecedents. Teachers did not have to wait for the computer to "make a game of" practicing the multiplication tables, the rules of grammar, or the quirks of spelling. And when the computer did come, the advocates of using it in education did not have to wait for the specific format of the video game to begin exploring the advantages of embedding school-like exercises in a computer game. An elegant and influential early example was How the West Was Won—a computer-based game in which players "throw" dice, then perform various arithmetic operations on the numbers to determine how far to advance a token on a board.

With thousands of instructional computer games on the market, including popular titles such as Math Blaster, we know little about which features make an educational game good for learning. A survey of the past 20 years of educational publications reveals a rather sparse bounty, in particular if one is interested in hard-core academic benefits rather than motivational or social aspects of playing games for learning. A common feature in nearly all those games is that they integrate the game idea with the content to be learned. To date, this research conducted on two-color screens in the late 1970s is still one of the more systematic investigations of different features such as sound, graphics, and combinations thereof in an educational game.[2]

What we learn from the few available studies is far from being comprehensive to provide us with a list of successful design features for good educational games. This rough summary is also plagued by customary concerns of research compilations: Too few studies in one domain, with a focus on one concept, or on one age group are available to provide a substantial foundation for recommendations. There is a near absence of commercial game evaluations, the exceptions being case studies on Where in the World Is Carmen SanDiego and more recently, Civilizations. Moreover, a deeper philosophical issue is hidden within the premise of instructional games: that we need games to "sweeten" the learning of difficult ideas. There is no doubt that learning is a demanding enterprise for students who strive hard to understand knowledge valued in our society. But do we need instructional games to make difficult ideas easy and fun to learn? One may wonder what messages about learning we are sending to students playing these games. There is a definite need for game studies to develop a more com-

prehensive research agenda that will provide instructional designers with better understanding of what works when, for what, and for whom.

Constructionist Perspectives

Without wanting to deny the value of instructional games, constructionists have focused their efforts in a very different direction. Rather than embedding "lessons" directly in games, their goal has been to provide students with greater opportunities to construct their own games—and to construct new relationships with knowledge in the process. In the world of educational games, such constructionist approaches have received far less attention than their instructionist counterparts, but it is conceivable that they hold equal if not more potential for engaging children's enthusiasm for games in the service of learning.

A series of studies in which 10-year-old children made their own educational video games will serve as an example. Here children met every day to design their own games, create all their own characters, storylines, game themes, and interactions over a period of 6 months to teach fractions to a group of younger students in their school. One prominent finding in these studies is persistent gender differences in virtually all design aspects ranging from violent feedback in case of a wrong answer, the cast of extended characters, the goals of the game, and fantasy context. Although there are no significant gender differences in the proficiency of making games, it is obvious that girls prefer to make very different fraction games from those designed by boys in their class. Most interestingly, when asked to design science rather than fraction games, these gender differences disappeared.

What we learn from these few available studies is that both boys and girls enjoy making games for learning. Game making also does not require expensive technologies to provide learners with the opportunities to develop their programming skills and to design rich and interesting game worlds and characters. It is only recently that other researchers have pursued this constructionist direction with renewed vigor.[3] They are developing new programming environments that facilitate the media-rich manipulations needed for game design, using game design activities to introduce girls to programming and examining girls' game designs. Many commercial video games provide level and character editors—features virtually unheard of in previous generations of entertainment software—to extend the playability of the game. These various design aspects could be further developed for educational purposes.

Final Thoughts

We have only begun to build a body of experience that will make us believe in the value of playing and making games for learning. Obviously, the image of children building their own games is as much a knee-jerk reflex for constructionists as making instructional games is for instructionists.

In the case of instructional games, a great deal of thought is spent by educational designers on content matters, graphical representations, and instructional venues. The greatest learning benefit remains reserved for those engaged in the design process, the game designers, and not those at the receiving end, the game players. After all, the game player is not partial to the discussions involved in developing valid instructional game ideas, designs, and strategies. What finds its way into the final designs is only a substrate of those discussions.

In the case of constructionist games, the learner is involved in all the design decisions and begins to develop technological fluency. Just as fluency in language means much more than knowing facts about the language, technological fluency involves not only knowing how to use new technological tools but also knowing how to make things of significance with those tools and most important, develop new ways of thinking based on use of those tools. Beyond that, game-making activities offer an entry point for young gamers into the digital culture not just as consumers but also as producers.

For the past 20 years, education has ignored the promises and challenges of games for learning. The special role of games in contemporary children's culture coupled with the deep sense of engagement common in game-related activities creates a new and promising context for games studies. We need to pursue all directions, whether it's about playing or making games for learning.

Notes

1. Seymour Papert (1993) coined the terms *constructionist* versus *instructionist* to highlight different pedagogical approaches in educational technologies. A more detailed discussion can be found in a book chapter of *The Children's Machine.*

2. The seminal work "What Makes Computer Games Fun?" by Thomas Malone appeared first in the December 1981 issue in *BYTE* magazine.

3. Different aspects of children designing educational fraction games were discussed by Kafai (1995), whereas the follow-up research and comparison can be found in Kafai (1998). More recent developments are directed by Ken Perlin and Mary Flanagan at New York University; Dorothy Bennett, Cornelia Brunner, and Margaret Honey at the Education Development Center's Children's Technology Workshop in New York; Punya Mishra and Carrie Heeter at Michigan State University; and Jill Denner and Lauren Werner at ETR Associates in San Francisco.

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