Examining the evolution in the Game Design and Computer Science Discourse practices of Middle School Students in the Globaloria Learning Environment.

Abstract:
This paper presents the findings of an study that examined the evolution of children's thinking and discursive practices within computer science and computer game design in the context of Globaloria, an innovative learning platform and curriculum invented by the World Wide Workshop Foundation (www.WorldWideWorkshop.org). Globaloria aims to advance Science, Technology, Engineering, and Mathematics knowledge and skills among middle and high school children and teachers, by teaching them to design their own educational simulations, animations and computer games using the Adobe Flash Authoring environment.

In recent years, a flurry of research has emerged that has examined the potential that videogame design can bring as a learning environments suited to the demands that the 21st century society places on learners (Gee, 2003; Hayes and Games, 2008; Games and Squire, in Press; Harel Caperton, 2010). This area of research has been motivated in large part by the recent expansion that the game industry has experienced, and that has transformed it into a leading provider of entertainment worldwide, with multibillion sales a year. Educational researchers interested in harnessing the strong engagement that games elicit from players into scholastic pursuits, have shown initial evidence that games can only help children learn important concepts in areas such as computer science and mathematics (Kafai, 1995; Clark, et. al., 2009; Shaffer, 2006; Kelleher, Pausch, Kiesler, 2007). More generally, this research has shown evidence that games can be some of the best instantiations of learning environments that embody situated learning theory (Gee, 2003), and can help their players develop learning skills and habits of mind that are better suited for the demands of today's knowledge economy (Games, 2008, 2010; Shaffer, 2006; Squire, 2006; Steinkuehler, 2005).

This study relies on a qualitative methodology that combines case studies (Stake 1995) and discourse analyses (Gee, 2005), to produce a rich description of the learning ecologies of three Globaloria classrooms in Texas and West Virginia. Using an approach which triangulates evidence from the language, design activities, and game artifacts produced by children, the study supports claims about the evolution of their thinking and use of the discourses of computer game design and computer science (defined as the specialized ways of doing, thinking, producing, and communicating of computer scientists and game designers) as key tools that learner's learn to appropriate within a process of meaning articulation analogous to verbal conversation (Games, 2010). Findings suggest that as with previous research with game design for learning (Games, 2008; Kafai, 2006), Globaloria offers multiple opportunities for learners to enter the discourse of computer science, mathematics and engineering by scaffolding their learning process through a Web 2.0 technology supported approach that stresses game design projects as a way of beginning to learn with "the end in mind" (Wiggns and McTighe, 2005). It discusses the implications of this for the development of habits of mind central to the STEM disciplines, and discusses both the successes and challenges of implementing it in different educational settings. It finalizes with a discussion of heir implications for the development of a robust theory of educational game design.

References:

Clark, D. Nelson, B., Pratim, S., & D'Angelo, C. (2009) Rethinking Science Learning Through Digital Games and Simulations: Genres, Examples, and Evidence. Paper presented at the National Academy of Science Workshop on Computer Games, Simulations and Education. October, Washington, DC

Games, I.A. (2008) Three Dialogs: a framework for the analysis and assessment of twenty-first-century literacy practices, and its use in the context of game design within Gamestar Mechanic. E-Learning 5 (4).

Games, I.A., & Squire, K. (in Press) History of Computer Games in Education. To appear in S. Tobias and D. Fletcher (Eds.) Computer Games in Education. Charlotte, NC: Information Age Publishing

Gee, J. P. (2003). What video games have to teach us about learning and literacy (1st ed.). New York: Palgrave Macmillan.

Gee, J. (2005). *An introduction to discourse analysis*. Abingdon, UK: Routledge.

Harel Caperton, I. (2010) Toward a Theory of Game-Media Literacy: Playing and Building as Reading and Writing. International Journal of Gaming and Computer-Mediated Simulations, 2 (1).

Hayes, E., & Games, I. A. (2008). Making computer games and design thinking: A review of current software and strategies. *Games and Culture, 3* (1) 309-332.

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

Kafai, Y. B. (2006). Playing and making games for learning: Instructionist and constructionist perspectives for game studies. *Games and Culture, 1* (1), 36.

Kelleher, C., Pausch, R., and Kiesler, S. (2007) Storytelling Alice motivates middle school girls to learn computer programming, In *Proc. CHI 2007*, ACM Press, 1455-1464.

Shaffer, D.W. (2006). How Videogames Can Help Children Learn. New York: Palgrave McMillan.

Squire, K. (2006). From content to context: Videogames as designed experience. *Educational Researcher, 35*(8), 19.

Stake, R. E. (1995). *The art of case study research.* Thousand Oaks, CA: Sage Publications Inc.

Steinkhueler, C. (2005). Cognition and literacy in massively multiplayer online games . In D. Leu, J. Corio, C. Lankshear & C. Knobel (Eds.), *Handbook of research on new literacies*. Manwah, New Jersey: Erlbaum. Retrieved October 18, 2006, from http://website.education.wisc.edu/steinkuehler/papers/ SteinkuehlerNEWLIT2005.pdf

Wiggins, G., & McTighe J. (2005) Understanding by Design. Alexandria, VA: ASCD