Epistemic Assessment Collaborative

Final report of Marie Curie Action

Contemporary video games are profoundly engaging and motivating to young people, and a growing body of research on epistemic games, or games based on professional practices shows that games that simulate professional training can make deep and powerful learning available to students.

This project addressed a critical issue in the use of such game technologies for learning, namely: How can we assess innovative and creative thinking developed by computer games?

We addressed this question by developing a tool to distinguish between novice and expert thinking in the problems, concepts, and domain of the innovative profession of urban planning. In so doing, we also formed an international collaboration between researchers in the Netherlands and the United States in the assessment of game-based learning and innovative thinking.

The opportunity

To be competitive in the global economy, young people today need to learn to solve problems that require judgment and discretion, creative thinking, collaboration, and complex problem solving. With their ability to provide rich, complex, and compelling virtual worlds, computer games have great potential to teach learners to think innovatively and creatively.

Epistemic games

In epistemic games, players develop expertise by playing as novices training to be professionals such as engineers, urban planners, science journalists, and so on. More than a decade of research on epistemic games has shown that players can learn concepts and principles, and acquire practices and ways of thinking by learning to solve real problems the way professionals do. For example, in the epistemic game *Urban Science*, players become urban planners who will redesign their city.

Epistemic games are based on a specific theory of learning: the *epistemic frame hypothesis* (EFH) [1]. The EFH suggests that any community of practice has a culture [2] and that culture has a grammar, a structure composed of *skills* (i.e., things that people within the community do); *knowledge* (i.e., the understandings that people in the community share); *values* (i.e., beliefs that members of the community hold); *identity* (i.e., how members of the community see themselves); and *epistemology* (i.e., warrants that justify actions or claims as legitimate within the community). This collection of skills, knowledge, values, identity and epistemology forms the *epistemic frame* of the community. The EFH suggests that: (a) an epistemic frame binds together the skills, knowledge, values, identity, and epistemology that one takes on as a member of a community of practice; (b) such a frame is internalized through the training and induction processes by which an individual becomes a member of a community; and (c) once internalized, the epistemic frame of a community is used when an individual approaches a situation from the point of view (or in the role) of a member of a community. [3]

Specific aim

Unless we can assess meaningful development of innovative and creative thinking through professional training, there is no way to test the efficacy of epistemic games as learning tools for the digital age of global competition. Such games provide students with authentic real life learning experiences, with their complexity and limitations, and stimulate students to more higher-order thinking processes and active learning. However, it is imperative that assessment practices also change to being based on a theory of game-based learning.

To accomplish this, we developed an international collaborative, including researchers from the United States and the European Union, and developed a new online assessment instrument to identify the ways of thinking characteristic of the profession of urban planning.

Work accomplished

Dr. David Williamson Shaffer, a leading educational games researcher from the University of Wisconsin—Madison visited Utrecht University from August 2009 to August 2010. As a result of Dr. Shaffer's visit:

1. The *Epistemic Assessment Collaborative* was formed including researchers at the University of Wisconsin, Utrecht University, and the Open University of the Netherlands.
2. An online instrument for determining expertise in urban planning, the *Urban Planning Epistemic Inventory* (UPEI) was developed and pilot tested in the Netherlands. The results of the pilot were disseminated in a technical report.
3. The UPEI is being tested in the United States, and the results will be analyzed by members of the international collaborative.

The online instrument, described in more detail in the technical report, uses *clinical interview questions* asking players to explain their understanding of professional practice [4-6] , and *transfer scenarios* asking players to analyze problem situations in urban planning [4, 5, 7].

The instrument was analyzed by collecting data from experts and novices in the field of urban planning, and using epistemic network analysis, a new statistical and measurement technique developed by members of the EAC, to assess their relative performance. (Details are available in the technical report.)

The work of the project is documented on the Epistemic Assessment Collaborative website: http://epistemicgames.org/eac.

Additional knowledge transfer accomplishments

In addition to these project-specific outcomes, Dr. Shaffer's visit furthered the goals of knowledge transfer and exchange through his participation in regular meetings of the GATE (Game Research for Training and Entertainment) project and the IVLOS institute of Education at Utrecht University. Dr. Shaffer also conferred regularly with Paul A. Kirschner, Professor of Educational Technology at the Centre for Learning Sciences and Technologies at the Open Universiteit Nederland; Joost Raessens, Professor of New Media and Digital Culture at the Department of Media and Culture Studies at the Faculty of Humanities, UU as well as the director of the *New Media and Digital Culture* program; and Robert-Jan Simons, professor of ICT and Learning at the IVLOS institute of Education of UU and educational director of the Interuniversity Centre for Educational Research in the Netherlands.

Dr. Shaffer participated in numerous public presentations of his research in the European Community, including in Denmark, Germany, France, the United Kingdom, and the Netherlands, as well as in Turkey during the time he served as a researcher at Utrecht University.

Dr. Shaffer also served on four doctoral committees during his time as a researcher in Utrecht, and was a guest lecturer in a number of classes at Utrecht University and the Open University.

Significance

The Lisbon Strategy of the European Union recognized this reality, arguing that the "growing importance of information and communication technologies (ICT) in professional and private life call for a radical overhaul of the education system in Europe." [8]

This project has enhanced economic competitiveness in the EU by (a) developing assessments of innovative and creative thinking in game-based learning environments, (b) transferring knowledge about game-based learning and assessment to researchers in the EU, and (c) developing an international collaborative, including researchers from the EU, that continues to study the assessment of innovation and creativity in game-based learning.