

GUEST EDITORIAL PREFACE

Special Issue on Education and Poverty: Theory, Research, Policy and Praxis

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INTRODUCTION

The American Educational Research Association (AERA) is a national organization dedicated to promoting the use of research to improve education. The theme of AERA's 2013 Annual Meeting was, "*Education and Poverty: Theory, Research, Policy and Praxis.*" The goal of the conference was, "to consider the relationships of education and poverty from multiple perspectives and through diverse methodologies" (Tierney & Renn, 2012).

As part of AERA, The Applied Research in Immersive Environments for Learning (ARiEL) Special Interest Group is a growing group of scholars committed to exploring the use of immersive technologies for learning. Our focus at the 2013 AERA Annual Meeting was to investigate educational research topics relevant to the relationship of equity and diversity with immersive technologies. Papers were presented that aligned with the SIG's stated goals of research that supports, provides, or delivers learning and/or instruction through the use of immersive experiences/interactions that engage

participants using computers/digital mediation and/or technology.

The *International Journal of Virtual and Personal Learning Environments* (IJVPLE) partnered with ARiEL and AERA to provide a publication outlet for presenters to submit papers based on their presentations. This partnership is seen by the Journal and the ARiEL SIG as an important next step in disseminating important research on immersive technologies to policy makers, instructional technologists, and teachers. The papers in this issue of IJVPLE align with AERA's 2013 conference theme ("education and poverty") as well as ARiEL's focus on educational research topics relevant to the relationship of equity and diversity with immersive technologies.

PAPER SUMMARIES

The papers accepted for this special issue of IJVPLE were as follows. First, a paper by Mamta Shah and Aroutis Foster that presented the development of the "Inquiry, Communication,

Construction and Expression (ICCE) Framework for understanding learning experiences in games. This compelling framework is based on the Technological, Pedagogical, Content Knowledge framework and provides a bridge between game analysis and game integration by helping teachers to identify learning experiences and design of opportunities that may be missing in a game. Readers of this special issue should consider reading and studying this article first prior to their consumption of the other articles in the issue. A deep understanding of the ICCE framework will provide the reader with a lens through which they may examine some of the other learning related games discussed. Not only could this result in a deeper understanding and application of the works, but the discovery of learning experiences and design opportunities that may be missing from these other works could have a potentially large impact on our understanding of equity and diversity with immersive games.

Next, two of the papers in our special issue focus on the use of immersive technologies in learning science. High poverty schools are often associated with the lack of an infrastructure to support a Science, Technology, Education, and Mathematics curriculum (Subotnik, Tai, Rickoff, & Almarode, 2008; Legewie & DiPrete, 2012). Research indicates that the future of STEM depends on our nation's ability to engage all student populations, including diverse populations (URMs), at all stages of the STEM pipeline (Frehill, 2011). By minority status, only 9% of all first-time STEM freshmen were African Americans, only 7% were Hispanics, and only 1% were Native Americans in contrast to 83% Caucasians and Asian Americans. Additionally, under-represented minorities in STEM fields experience the highest attrition rates of 44% compared to Asian students at 26% and Caucasian students at 25%. Historically, schools in urban and rural settings have tended to have fewer STEM resources and curricula than schools in suburban settings (Oakes, et al. 1990; Roscigno, Tomaskovic-Devey, & Crowley, 2006; Gollub, Bertenthal, Labov, & Curtis, 2002).

Unfortunately, this lack of infrastructure and curriculum only exacerbates the lack of trained STEM workers to fill higher paying jobs. In this light, Webb Knight, Wu, and Schielack look at the relative impact of the immersive Wolong Nature Reserve on student learning and attitudes toward science in a large university ecology classroom. Results showed that there are still many technical and pedagogical challenges that need to be overcome before VEI can become an engaging and impactful approach to teaching scientific inquiry. Researchers also learned that VEI was particularly effective in teaching students one of the most important aspects of scientific inquiry - how to formulate a hypothesis.

Zheng and Spires studied 5th graders' flow experience in a game-based science learning environment. The researchers demonstrated that the immersive technology game was effective in supporting students' flow experience and increased science content learning. The study demonstrated that the game was effective in supporting students' flow experience and science content learning. The study made important contributions to our understanding of which game design features significantly contribute to students' flow experience.

Both studies' results have important implications for the implementation of immersive technologies in learning science and the impact of poverty. Universities and low SES schools should consider partnering together to provide the pedagogical and technological infrastructure needed for a STEM program to be successful. Application of Zheng et al.'s game design features that promote student flow experience could be integrated across the STEM curriculum at these schools in order to promote a more engaging atmosphere that recruits more students into the program and eventually into higher paying STEM careers. Webb, Knight, Wu, and Schielack's Virtual Ecological Inquiry Environment could be provided free of charge by the sponsoring university to low SES schools along with the necessary hardware and professional development for teachers to integrate it into their instruction. Partnerships like these could

go a long way toward increasing the numbers of low-SES and minority students who pursue STEM careers.

Laffey, Stichter, and Galyen approach the diversity and equity theme by examining the impact of immersive learning on students with disabilities in a distance education environment. One in five Americans is classified as having a disability; that is, “a physical or mental impairment that substantially limits one or more major life activities of such individual” (Americans with Disabilities Act, 1990). In 2010, the poverty rate for persons age 16-64 with a disability was 28.8% (DeNavas-Walt, Proctor, & Smith, 2010). Compared with non-disabled individuals, people with disabilities are more impoverished, unemployed, less educated, and have a poorer physical and behavioral health status (Baldwin and Johnson 2006; Burkhauser and Houtenville 2006; DeJong, Palsbo, Beatty, Jones, & Neri, 2002; DeLeire, 2000; Erickson and Lee, 2008; Kruse and Schur, 2003; McColl and Shortt 2006; Newman, Wagner, Cameto, & Knokey, 2009; Schur, Kruse, Blasi, & Blanck, 2009; Stapleton and Burkhauser, 2003; U.S. Department of Labor, Bureau of Labor Statistics, 2009; Yelin and Trupin, 2003).

Because education is a factor in helping people overcome poverty, it is important to consider how Laffey, Stichter, and Galyen’s approach may help open up new educational opportunities for disabled persons. In this study, the researchers developed iSocial, a 3D Virtual Learning Environment designed to help students with high functioning autism spectrum disorders to develop social competency and other related social needs. Researchers learned important lessons for implementing immersive 3D environments in K-12 environments, including how to overcome bandwidth and firewall issues. Systems like iSocial require high and consistent bandwidth, synchronization across a network, and the ability to operate under pressure to get lessons completed in an allotted time period. Unfortunately, these requirements may exceed common technology infrastructures in schools. Also, researchers learned the importance of leveraging a high quality, evidence-based

curriculum in combination with an immersive environment whose affordances were inherently social, engaging and game-based.

Further development of iSocial could have a big impact on the social skills of high functioning autistic children. The ability of this system to be scaled to a state-wide or national implementation is possible due to the lessons learned in this study. In turn, increased social skills among high functioning autistic children could result in a higher employment rate and lower poverty rate.

TYPES OF INTERACTION

In her study, Anderson attempted to determine the nature of interaction between people in Massive Multiplayer Online Role Playing Games (MMORPGs). She provided a linguistic analysis comparing MMORPG and Computer-mediated communication (CMC) interactions. Evidence points to MMORPGs being more interactive and also supportive of collaborative and cooperative interaction, key factors in distance education. These results suggest that communication in MMORPGs is more social and has an informal tone, and that the presence of virtual space allows for deeper and more diverse interactions. As already noted in this article, immersive environments like MMORPGs can be used to study social phenomena that influence issues of equity and diversity (Loomis, 1992; Lombard & Ditton, 1997; Persky & Blascovich, 2008). People interact and react to the presence and actions of avatars in these environments. For example, Beck (2012) examined how the gender and ethnicity of student avatars in immersive environments can influence teacher expectations and perceptions. Applying Anderson’s findings, an increased use of MMORPG’s in education may result in increased student-student and student-instructor interaction, as well as more collaborative and cooperative interaction. This increased interaction could act as a counterbalance to how people react to the visual presence of avatars in these environments.

The next article looks at how to communicate nanoscientific knowledge through the use of an immersive, 3D environment. Schönborn, Höst, Palmerius and Flint developed this environment to help scaffold student understanding of the scale and symbolism of nanotechnology. Results reveal that the immersive environment allows users to successfully traverse and navigate, as well as actively use the grab gesture to interact with virtual nanotubes and explore the nano-scenarios. Results also show that exploration in this immersive environment consists of different interactive styles. Due to the STEM based nature of nanotechnology, application of these results could help to develop low cost STEM curriculum that is more easily applicable in low-SES schools. It could also help engage students who have not traditionally embraced STEM curricula to get involved in a game-like immersive environment, thus potentially addressing the gaps in minority and low-SES populations that pursue STEM careers.

CONCLUSION

The Applied Research in Immersive Environments for Learning (ARiEL) Special Interest Group and The International Journal of Virtual and Personal Learning Environments (IJVPLE) are at the forefront of confronting issues such as poverty that involve diversity and equity with immersive technology. The articles in this special issue approach these issues in various ways, but on the whole provide practitioners with a suite of tools and best practices for implementing fair and impartial interaction in STEM-based and disabilities related curricula. Future research should consider continual, focused addressing of these important issues, and I am confident that ARiEL and IJVPLE will be a part of it.

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