Submit Grant Proposal | VR@Illinois

Submitted by:
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1. Name
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3. Your Status
Faculty

4. Your Department
Curriculum & Instruction

5. Provide a brief summary of the VR/AR project that would be funded by this grant proposal

There is a growing interest in how immersive whole-class learning simulations and games can support K-12 students to engage in authentic Science, Technology, Engineering & Math (STEM) learning and develop critical 21st century skills. However, the increased complexity of these environments place new challenges on teachers' ability to facilitate the learning process. In these environments, many of the interactions and learner states are hidden behind computer screens making it difficult for teachers to know when and where they are most needed. To this end, it is increasingly important to research interventions that can capture these streams of data and leverage them in ways that provide teachers actionable information. While there have been attempts at developing real-time dashboards on laptops or tablets (including several instances in my own prior work), these often require a heads-down experience for the teacher, distracting them from what is going on off the screens. Hands-free AR applications through devices such as the Microsoft Hololens provide a unique opportunity to provide timely information to teachers about the state of their class while allowing them to continuing observing the class and engaging with students. By capturing the real-time data from students' interactions when engaged in our whole class simulation and applying a blend of real-time data mining and learning analytics, we hope to answer the following two research questions: 1) What kinds of real-time alerts can effectively support teachers to intervene with students at key moments in their learning? 2) How do teachers' actions differ when alerts are spatially indexed (i.e. float above groups in the room) compared to alerts that appear at the periphery of their vision instead (i.e., as a newsfeed)? To answer these questions, my team will implement our Hololens design in a local middle school that is already running one of our learning simulations – City Settlers, a city building simulation in which groups of students are cooperating/competing with other groups in the class to build virtual cities. City Settlers runs as an interdependent system, meaning that the actions of one city can impact the state of other

nearby cities (i.e. groups that are physically close to them in the classroom). Leveraging the data that is generated by students taking part in City Settlers, we will prototype two different approaches to providing the teacher a heads-up AR experience. In the first approach, we the teacher will be able information about the state of each group's cities floating above them in the room, such as, the city's pollution levels, if the city is very active in trading with others, how their city's development is affecting other cities, or if the city is trending negatively or positively along certain metrics (e.g., the city's happiness or population growth). In the second condition, the teacher will receive these events as a newsfeed in their periphery as they happen (with options for isolating a single city or seeing it as an aggregated feed). While we have outlined several of the data feeds we anticipate will be useful in the classroom, we will develop the AR application in close co-design with the teachers to ensure they meet teachers' authentic needs. We will evaluate the success the different conditions through detailed interviews and feedback sessions with the teachers and through a combination of log and video analysis. We aim to understand which alerts the teacher attended to, how the AR application affected teachers' visual focus in the room, and how (and if) the teachers respond to the different alerts.

6. How much funding are you requesting?
$5000

7. Provide a brief preliminary budget of how the funds would be used
The fund will be used to support two graduate researchers in the development and testing of the AR application. ~220 graduate student hours @ $23/hr I already have access to a Hololens and Hololens 2 (once released) through a colleague.

8. Describe the anticipated outcomes of your project.
In addition to the development of the AR application itself, an important outcome of the project is an understanding of the affordances and challenges of implementing AR for teachers in authentic classroom settings, including the how we visualize real-time student data.

9. What is the proposed timeline for your VR project?
12 months

10. Additional information
no answer provided