

Interdisciplinary game design process in Anonymous Communications
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Abstract: It is important for experts in computer science to develop skills in identifying the senders and receivers of anonymous communications to be able to defend against cyber attacks and to intercept malicious communications. The current study is an NSF-funded project, the purpose of which is to develop a course in Anonymous Communications for undergraduates with a simulation video game-based experience as a major component for learning. The research team is made up of two computer science professors and two education professors. Interdisciplinary efforts are mostly considered valuable to education, but they also present significant challenges, including that discourse surrounding research involves advanced and discipline-specific terminology. Experts from different disciplines may have difficulty conversing on high levels utilizing the diverse sets of terminology. This is precisely the challenge experienced in the current research study and discussed in this presentation. The purpose of this presentation is to present and discuss the challenges of interdisciplinary research and game design and to seek feedback from conference participants based on others' experience and knowledge.

Keywords: game-based learning, game design, interdisciplinary curriculum development

Introduction

Anonymous online communication, at its core, refers to the ability of a person to send and/or receive messages online without being identified. Realistically, anonymity occurs on a spectrum or continuum, given that it is possible to partially identify a source online without necessarily discovering the full identity of the sender or receiver (Scott, 2004). It is important for experts in computer science to develop skills in identifying the senders and receivers of anonymous communications to be able to defend against cyber attacks and to intercept malicious communications (Grahm, Forss, & Pulkkis, 2014).

Digital games can help students learn by creating real-world scenarios (Shih, Jheng, & Tseng, 2015), fostering competition (Plass, et al., 2013), as well as utilizing collaborative techniques (Wendel, Gutjahr, Göbel, & Steinmetz, 2013). Video games have successfully been used for a variety of educational purposes, including to develop graduate skills (Barr, 2017), mathematics and other content area skills (Plass, et al., 2013), ethical decision-making (Schrier, 2017), and social and emotional strategies (Whitmer, 2017).

Interdisciplinary efforts are mostly considered valuable to education (Ntiri, Schindler, & Henry, 2004), but they also present challenges to maintaining coherence of the curriculum

(Gantogtokh & Quinlan, 2017; Rives-East & Lima, 2013). There are also significant challenges to interdisciplinary research, including that discourse surrounding research involves advanced and discipline-specific terminology (Wear, 1999). Experts from different disciplines may have difficulty conversing on high levels utilizing the diverse sets of terminology. This is precisely the challenge experienced in the current research study and discussed in this presentation.

Context: The Current Study

The current study is an NSF-funded project. The purpose of the project itself is to develop a course in Anonymous Communications for undergraduates with a simulation video game-based experience as a major component for learning. The university at which this will take place is urban and serves a high percentage of minority students, as well as students of low socioeconomic status. The goal is to create a course outline, syllabus, and simulation game that can be used or replicated by other similar institutions.

The research team for this project is made up of two computer engineering professors and two educational research/educational psychology professors who also have expertise in digital games and learning. As a major component of the course, the team will be developing a video game through which students will practice their skills in a competitive team format. It is a work in progress; we are still in the planning and design stages of the project. There have been some challenges with regard to developing the game and assessments, based on the varying expertise and knowledge of the team members.

Presentation: Challenges in Interdisciplinary Research

The purpose of this presentation is to present and discuss the challenges of interdisciplinary research and game design and to seek feedback from conference participants based on others' experience and knowledge. Our challenges have been centered around the game development, specifically because of our interdisciplinary efforts. While interdisciplinary curriculum development and research is usually beneficial to educational outcomes, it can also be very challenging to communicate when each team member has different expertise and technical language, but the team needs to be able to combine these areas of expertise and work together. In this case, the two education research experts have been able to envision a design and learning scenarios that would be ideal according to educational principles, but do not have any expertise in the technologies required to program such a game. The two computer science experts understand the limits of programming available to us as well as what will be required in the game, but do not always have an understanding of the concepts being conveyed by the education professors. In meetings, we often rehash the same sets of knowledge and proposals for how the game will look or work, but without anyone who has expertise in both areas, we are left in a sort of stalemate.

Our process in working toward our goals has been to meet monthly to discuss the curriculum, the game and related technologies required, as well as the evaluation and assessments. We began with a syllabus for the course, developed by one of the computer science professors, followed by an assessment plan from the educational research professors. We then discussed general game design principles for learning and the goals of the game. We spent an

extended amount of time discussing the game format, details of design, and technologies required for its development. Concurrently throughout these meetings, we devoted time to discussion of evaluation and assessment instruments. Our meetings have included the following:

1. The educational research professors have presented game design principles and some principles that should be followed in the layout and format of the game. They have also suggested some possibilities for the general look of the game, but do not know anything about the practical possibilities involved with programming.
2. The computer science professors have presented information about the tasks students should be able to do as part of the course and game, as well as information about the types of games and the types of technology to be used.
3. The educational research professors have presented instruments to use for evaluation and assessment, but they need to be modified to fit the content of the course.

The challenge is putting these items together to create and finalize a simulation game and assessments. While we have all presented our knowledge and areas of expertise, there must be some way to put them together. The education professors do not know enough about programming to make those final decisions, and the computer science professors do not know enough about the educational and game design principles to proceed with the game design. Further, the education professors cannot modify the instruments in accordance with the course material without having an understanding of the course material, but the computer science professors do not have a deep enough understanding of the assessments to know how to properly modify the items to fit their curriculum.

In this presentation we will explore methods we have attempted and will attempt for communicating and proceeding when there are different areas of expertise, including things such as:

1. modifying or refraining from using technical language
2. using illustrations, examples, and metaphors
3. learning basic knowledge and skills from the other discipline to facilitate communication
4. including additional members to help communicate between disciplines.

Perhaps more importantly, we will also seek feedback from others who have experienced the same challenges and have overcome them, and accumulate a set of ideas for ourselves and others to try.

Benefits and Implications

The benefits of the overall project itself will be to provide a course outline and simulation-style digital game that can be used or replicated in other universities, with the goal of having more computer science students who are well-trained in the area of Anonymous Communications. The benefits of this presentation will be to offer some ideas and, more importantly, seek feedback from others with the goal of brainstorming ideas for overcoming challenges in interdisciplinary research and game development.

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