THE PROBLEM: THE GREAT DIVIDE IN SERIOUS GAMES RESEARCH

As students in a serious games development and research laboratory, we feel that serious games research is often plagued by a specific issue: poor communication between the academic community and game developers. This issue is not due to a lack of interest or the disbelief that a dialogue would be mutually beneficial, but is instead caused by a language barrier disconnecting the two fields. Simply put, scientists speak one language and game developers another. Academics write and publish in journals that only academics from similar fields read and understand. No matter how great their theory-driven ideas and design guidelines may be, they are rarely put to proper use, remaining inaccessible to the non-scientist. If a researcher asks their production team to incorporate game features that promote metacognitive strategies so as to improve the players’ critical thinking skills, they will likely receive blank stares in return. The barrier extends both ways. Researchers may not be as familiar with games and might be unable to easily translate theory into game features.

The communications disconnect can be easily seen in the serious games literature. Johnson and Mayer (2010) recently published an interesting article on metacognition and self-explanation and how to best incorporate it in multimedia learning experiences. Their game-like intervention was used to teach students about electric circuits. The different ways of encouraging self-explanation included having players type why they made in-game choices versus selecting from a list of possible reasons. Those who chose from a list outperformed those who had to generate their own explanations on a transfer test. While this work provides great insight into ways we can improve learning using self-explanation, neither of these interventions are necessarily game features. Similarly, an article by Kim, Park, and Baek (2009) also suggests ways to include metacognition in games. Their work examined self-recording, where students wrote about learning goals and reflected on whether they were able to
reach those goals as a function of gameplay; modeling, in which students observed other players as they played the game; and thinking aloud, in which players verbalized their goals, formed plans for reaching those goals, and actively discussed aloud with peers why they made choices during gameplay. The researchers found that self-recording and modeling had a significantly positive effect on learning achievement. These were helpful findings, but the implementation of self-recording and modeling in the game was insufficient. There might be better ways to include these metacognitive strategies in games, ways that are more endogenous to play. For example, it might be a good strategy to include active self-recording in a game, similar to the journaling system found in Naughty Dog’s 2007 entertainment game, "Uncharted: Drake’s Fortune."

We are not suggesting that these researchers are doing poor work or do not know much about games (quite the opposite), nor are we suggesting this debate is one-sided; there are improvements game developers could implement from spending more time conversing with researchers. The point is we would like to see more creativity and more legitimately game-like interventions being examined from both academics and the individuals who actually make games. The hypotheses that scientists want to test and the modes of play that game developers want to create are not mutually exclusive. A researcher who wants to examine a given body of literature for how it relates to serious games and a developer who wants to develop a game with a specific set of innovative features might actually perfectly align. However, without a common language and an open channel of communication, the opportunity for synthesis may ultimately go unnoticed. This lost opportunity can be damaging. Without the ability of the two teams to feed off of one-another’s knowledge base, interests, and creativity, serious games that are both fun and effective are not likely to be made.

A POTENTIAL SOLUTION: INTERDISCIPLINARY TEAMS

In an effort to bridge the gap between the worlds of science and game development, the Recent and Emerging Technologies Research Organization (RETRO) laboratory was established by Drs. Janis Cannon-Bowers and Clint Bowers at the University of Central Florida. The lab has two very distinct sides, splitting efforts between a research team that does grant work and a production team that takes on contracts. The goal of the lab is simple: make better, more effective serious games by distilling complex scientific theories and models into a format that can be effectively used to achieve desired learning outcomes. Both teams work to inform the other, feeding off one another’s successes to create better games and better science under one roof.

It is because of this two-team design that our lab is populated with individuals from various backgrounds. Outside of our two faculty advisors and one post-doc, our teams are primarily composed of students and young programmers. No single program of study at UCF dominates the lab’s composition. Current research staff includes two Modeling and Simulation doctoral students, one of whom serves on both the research team and development team as an instructional designer, three Human Factors Psychology doctoral students, four Industrial/Organizational Psychology masters students, and two undergraduate research assistants, one studying Mechanical Engineering and the other studying Computer Science. The development staff is equally multifaceted. Our lead programmer has a diverse artistic background with several years of industry experience, and many of our developers are undergraduates pursuing degrees in Digital Media and Computer Engineering. Our artist, who also serves as the lab’s project manager, has a BA in Art with an emphasis in Digital Media as well as a BS in Medical Sciences.
The RETRO laboratory is extremely flexible. Each of us has our own game design and research interests and perspectives. While most of the work is shaped on the production side by the contracts we receive and on the research side by the grants we obtain, we do have a great amount of leniency and personal choice with the directions we take. If a researcher wants to know more about Massively Multiplayer Online (MMO) gaming as it relates to creating motivated learners, and a game developer wants to create a revolutionary new MMO-style game, both will come together to generate a potential game design and experimental method of validating the game’s goals. Researchers use the developing body of game design literature with input from the developers as well as using popular theory from their respective field to directly inform the game design. We then research and apply for relevant grants. As students, this collaborative process is extremely valuable. Not only are we able to learn from our advisors, but we are each given a chance to apply the diverse knowledge from our fields of study and to obtain alternative perspectives from colleagues. With our research and production teams working together so closely, we are better able to break down the communication barrier between the academic and development sides of serious games creation. Through exposure, researchers learn about the development process, computer programming, and game production while the developers learn about statistics, literature reviews, and research methodologies. This synergistic process not only results in the creation of well-rounded and well-informed serious games, but also fosters the development of competent young professionals capable of effectively integrating interdisciplinary viewpoints. These young professionals can then operate as integral members of both the research and development teams.

Additionally, students working at the RETRO laboratory are provided an opportunity to directly apply the knowledge they learn in the classroom. This hands-on component is essential for fostering a deeper understanding of the material. While coursework helps students understand the underlying theories behind certain methods and why they are used, the lab teaches their proper application and how best to employ them. Assigned readings and homework may teach the basics of what is seen and used “in the real world,” but RETRO personnel have the added benefit of practicing and improving these skills before moving forward in their careers. Class-learned skills such as survey creation and management, statistical analyses, 3D animation, and storyboard production are all regularly employed in the lab and their student practitioners are striving to find better ways to apply and advance these skills. In a similar vein, since the lab is run with the primary purpose of teaching and training its students, employees are able to develop their skills more effectively than they would working an entry-level position in an organization focused on “the bottom line.”

IMPLICATIONS FOR OTHER SERIOUS GAMES RESEARCHERS

Because of our experiences at RETRO, we have some ideas on how to address the communication problem in other serious games research laboratories. The creation of interdisciplinary teams of both researchers and developers seems to be our greatest strength, but simply bringing together programmers and scientists is not enough—you need to create opportunities for them to communicate. Researchers should be present for the production team’s game design meetings to experience the development process firsthand. This is a great way to provide researchers insight into the work that game developers do. Researchers will gain a better understanding of the game creation process as well as the considerations that are important to developers. Researchers will also start picking up on the “developer language” commonly used, including key terms such as ‘aspect ratio,’ ‘screen real-estate,’ and ‘isometric viewpoint.’

Another way to bring researchers and developers together is through the use of lab
workshops and journal clubs. Once or twice a semester our advisors will present a research problem either related to a student’s specific interests or from a grant we are currently working on, such as how to improve the shipboard navigation skills of Navy recruits by training mental rotation ability. The researchers are asked to look to the published scientific literature to find ways of addressing this problem specifically using video game technology. Then they must present their findings to the entire lab, to other researchers and developers alike, by breaking down the underlying theory and conclusions. The developers are able to provide additional insight by applying their enormous wealth of game knowledge to a developed body of literature. Such an activity prompts a candid, group-wide discussion of how to improve upon past research and game development efforts with respect to ways of directly translating theory into specific game features. This exposes the development team to research and allows for creative collaboration. What results are ideas and designs informed by two disparate camps, the composite of which leads to the creation of more robust, interesting, and effective serious games.

These are only two examples of the potential ways to help improve collaboration and break down the communication barrier between the academic and production aspects of serious games research. There are numerous other things that we have found to help researchers and developers reach a common ground, such as letting researchers test alpha builds of games still in development, or arranging the physical workspace so that researchers and developers are able to communicate with and work alongside one another on a daily basis. We also encourage researchers to play and enjoy as many video games as they can as well as read entertainment game publications. If the entire lab is familiar with games, it is far more likely that both teams will begin to speak the same language anyway. Further, it allows researchers to draw upon their own experiences as gamers to better inform the science. This insider’s perspective allows researchers to be inspired by the already innovative entertainment game industry. We have found that this has often led to applying commercial off-the-shelf games in interesting new ways. We have also learned to borrow imaginative and motivating gameplay mechanics to address research problems in our own games.

As a final note, we believe that beyond addressing the communication problem, there are a few other things we want our advisors and programs to know regarding what we feel is missing from the student experience. As students, we are curious about the game industry. Academic labs are typically small, and it would be great to be exposed to the larger development houses. Visiting game studios as a lab and talking with developers from the entertainment industry could be of real value as well as bringing in speakers with experience in both entertainment and serious games. Also, we would like to collaborate with other universities who are studying serious games. As students, it is difficult to begin networking outside of conferences. Having advisors open the lines of communications between our lab with similar research and development groups could expose us to different ideas and ways of doing things, as well as provide opportunities for us to receive outside feedback on our own work. We would also like more experience with grant writing for game projects. Selling funding agencies on an unfamiliar technology application and convincing them of the potential positive return on investment adds a level of complexity to typical grant writing and we would like more practice.

Overall, being a student in an academic game development lab affords many opportunities for personal growth and collaboration. The heterogeneous composition of researchers from a number of diverse backgrounds and experienced programmers, game designers,
and artists helps us bridge the communication gap between the academic and development sides of creating effective serious games and we learn a lot from the constant dialogue. We are fortunate to have this unique experience as students and encourage others to try it in their own labs.

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REFERENCES
