iSocial Demo: A 3D Collaborative Virtual Learning Environment

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Abstract: iSocial is an innovative 3D Collaborative Virtual Learning Environment (3D CVLE) to provide access to educational programming for special needs students who live in small and rural school districts. The demonstration will show an implementation of iSocial to develop social competency for students who have been identified with Autism Spectrum Disorders (ASD). The demonstration will focus on aspects of iSocial designed to support social interaction, encourage pro-social behavior, and foster social learning.

iSocial Demonstration

Our demonstration has 4 objectives:

1. Show the iSocial 3D CVLE learning environment so that the audience participants can envision the learning experience of students in iSocial. We will do so by setting up a session with partners back in Columbia so that the audience can see the live environment. This live part of the demo will walk through several of the learning contexts designed to support collaborative learning, such as in the hull of the pirate ship where students need to work collaboratively to identify items to take to the island.
2. Highlight and show key innovations for supporting the social and collaborative experience in iSocial. This will include orthotics for student social behavior such as pods and learning spaces and mechanisms for the teacher to observe and manage behavior such as Live Images and a Token System.
3. Show through video clips students participating in a few key lesson sequences.
4. Discuss the demonstration so as to answer questions and engage issues brought up by the audience and to learn from the audience about their perspective and thoughts for development, implementation and research.

Website: iSocial.missouri.edu

Purpose of iSocial

Small and rural schools are often limited in the range of educational programming they can offer and in the expertise of their teachers to deliver specialized educational programming. Distance Education (DE) is a growing phenomenon in these schools as a means for meeting student needs for courses such as foreign languages and advanced placement. A 2005 survey (Hannum et al., 2009) conducted by the National Research Center on Rural Education Support showed that 85% of surveyed districts had used DE and identified DE technology as a key strategy (nearly 10 million students attend rural schools) to provide a full range of courses and to overcome difficulties in attracting and maintaining qualified and experienced teachers. Unfortunately typical DE is limited in how it provides support for affective and social learning which is often critical to addressing students with special needs.

3D Collaborative Virtual Learning Environments (3D CVLE), as implemented in iSocial, have potential for addressing the needs of small and rural districts for DE programming that brings students together for peer interaction, experiential learning through collaborative effort, and guidance by an expert teacher. The iSocial implementation to be demonstrated is a translation of a curriculum (Social-Competence Intervention for Adolescents, SCI-A) with demonstrated efficacy for developing social competence for the target population of youth between 11 and 14 years of age with a diagnosis of ASD and an IQ of 75 and greater (Stichter, et al., 2012). Our team has translated the program that is typically delivered in face-to-face, small group (4 to 6 youth) sessions into a form that can be delivered over the Internet so as to enable participation by youth who do not have ready access to such interventions in their local schools and communities. In the process of undertaking this translation our team has designed solutions (1) for assuring fidelity between the 3D CVLE experience and the cognitive and behavioral processes and objectives of the face-to-face curriculum, and (2) for encouraging, supporting and sustaining appropriate social behavior and interaction in the virtual world, especially considering that our target students have social limitations.

iSocial Implementation

The iSocial VLE for developing social competence delivers the SCI-A curriculum via 34 lessons of 45 minutes each with lessons scheduled for 2 to 3 times per week which is consistent with delivery of the face-to-face version. The lessons are packaged in 5 curriculum units: facial expression, sharing ideas, turn taking, feelings

and emotions, and problem solving and delivered in a series of 3D virtual worlds. Figure 1 shows a top view of the 5 worlds.

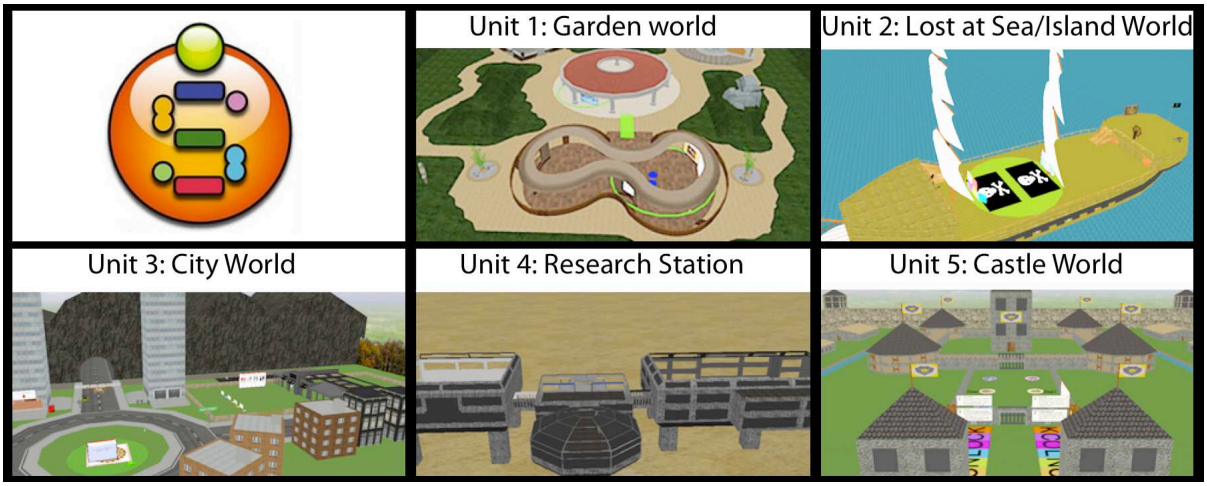

Figure 1. iSocial worlds across the five curricular units

Students are represented in the world as an avatar that communicates primarily through audio but also with text and gesture. Through these communication mechanisms iSocial attempts to provide the essential opportunities for synchronous learning with the teacher and peers to match what can be experienced in the face-to-face classroom. The learning experiences are delivered through a structured sequence that moves from teacher-directed introductions, to modeling, to structured practice, to naturalistic practice and then review. In addition, the VLE provides multiple additional real time experiences and affordances with materials not available in standard face-to-face learning. To provide a sense of what the learning experience is like, the following scenario briefly depicts the experience of a youth participating in a lesson activity. We have selected the "Lost at Sea" activity from the third lesson of unit two which has a goal of teaching the students to identify and apply the role of speaker and listener in order to better share ideas. By the time the youth gets to this activity, the youth is well oriented to his group of three to five peers and his teacher, who we call the online guide (OG), as well as to the general methods and tools of iSocial. We start with the OG providing positive feedback to the group on completing the prior activity and asking them to move to the area where they will decide which roles they will take on for the upcoming "Lost at Sea" task (see Figure 2).

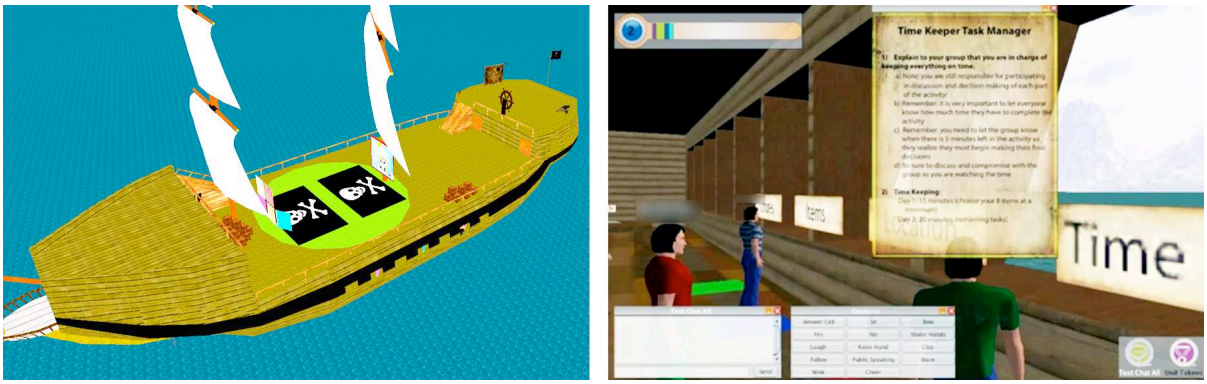

Figure 2: On the left is the ship where students undertake the lesson. On the right, students and the Online Guide gather in an area on the ship to discuss their roles for the upcoming activity. Students get guidance for carrying out their role by standing on the colored pod.

After having spent several lessons on the ship, students are told that the ship is sinking. Their mission during this lesson is to decide on roles for each member, collectively decide on which eight (out of 15) items to take with them, escape to the rescue boat while negotiating which part of the island is best for their survival, and arrive on the chosen part of the island. The lesson is designed to require discussion and negotiation among the students through activities that the OG facilitates to build students' social competence accessing targeted curricular-based skills. The OG facilitates the students' choosing their roles such as "items task manager" and "location manager for the campsite." The students negotiate who will do what, and why they think they should have a certain role of their choosing.

After the role selections are completed, the OG leads students into the cargo hold where they choose items to take with them to the island. Each student must express what they think would be good to take and why. Disputes over what would be most important to take with them to the island lead to the negotiation of agreed-upon items and their worth on a deserted island. The timekeeper warns the team to get to the rescue boat because the ship is sinking. As they decide upon items, the items disappear from the environment and appear in their inventory. The team hurries to negotiate quickly and make final decisions, after which they escape to the rescue boat. The next activity begins with the students discussing the pros and cons of locations on the desert island while continuing to practice the roles of speaker and listener.

Unique Approach and Attributes of iSocial

Over the past 10 years a number of projects have been developed in the 3D CVLE genre with some of the most significant being River City, Quest Atlantis and EcoMUVE. River City is a multi-user 3D VLE developed for middle-school students to learn skills of hypothesis formation and experimental design as well as content related to national standards and assessments in biology (Clarke et al., 2006). Quest Atlantis is a set of multi-user 3D VLE for knowledge quests and interactive tasks for learning through transformational play (Barab, Gresalfi & Ingram-Goble, 2009). EcoMUVE (Metcalf, Clarke & Dede, 2009) is a multi-user 3D VLE implemented as a two-week module focused on teaching students complex causality in ecosystem environments. Each of these systems demonstrates that 3D VLE is engaging and shows some promise for impacting student outcomes. However, they differ strikingly from the implementation of iSocial (Schmidt, Laffey & Stichter, 2011; Laffey et al, 2009a). These systems emphasize individuals performing certain tasks in a world and reporting back to peers or an instructor using text chats or written submissions. Interactions are typically multiple choice and with non-player characters or objects in the world. Typically these systems are implemented in classrooms while supporting and encouraging interaction and collaboration with classmates and teachers outside the virtual world. In contrast iSocial is designed so all the learning activity and social interaction take place in the virtual world and the teacher is a character in that world rather than a presence in the physical classroom. This configuration is part of our design because our delivery model envisions youth across a number of rural school districts coming together in an iSocial course, where the only contact point is through the virtual medium.

In order to implement a virtual world that facilitates audio communication and supports co-presence of members we built iSocial using Open Wonderland, a Java-based open source toolkit, for creating virtual worlds. Using an iterative design research approach we have explored, tested and eventually settled on designs for a number of mechanisms that support being social and being on task for the students and behavioral management for the OG (see figure 3 for a sample screen for the OG showing numerous mechanisms for managing the course and student behavior).

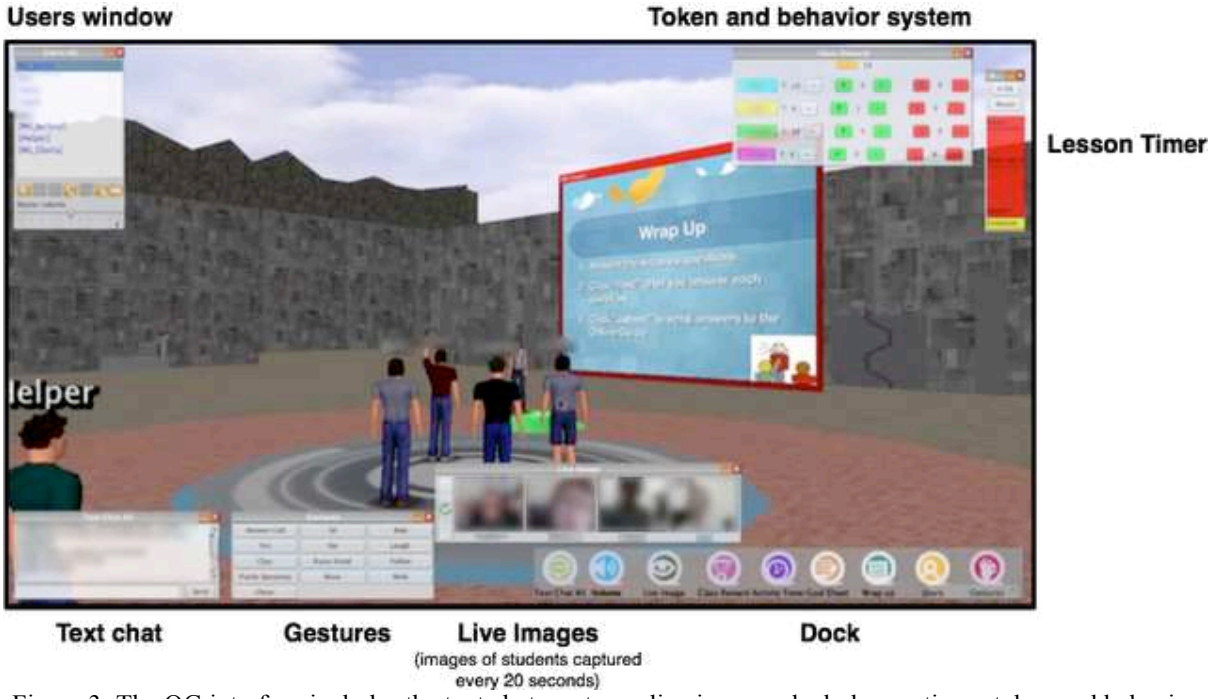

Figure 3: The OG interface includes the text chat, gestures, live images, dock, lesson timer, token and behavior system, and users window. The OG dock has access to items that the student does not. The student view has dock, visual tokens and strikes, gestures, and chat.

We worked systematically through five units with each unit representing our best ideas and capabilities at the time, and then through a usage test of the unit to teach us how to improve both our ideas and capabilities. At the conclusion of the five units of development each unit was upgraded as appropriate. Our team created many new innovations and customized the features of Open Wonderland to optimize our curriculum translation. See *http://bit.ly/isocial-functions* for a description of many of the key technology innovations. Some notable examples of innovations from this outline include:

1. The Media Board is a white-board for displaying and interacting with multiple forms of media in the virtual world and includes allowing students to take pictures of themselves with a webcam, such as when displaying a facial expression, for sharing with the online guide (OG) and peers. The student, OG and peers can then discuss the images and arrange them on a continuum so as to give feedback to the student.
2. Pods, Spaces and Barriers have been developed as behavior management devices (we call them social orthotics) (Laffey et al, 2009b; Laffey, Stichter & Schmidt, 2010) to aid the OG in managing individual and group behavior during lesson activities. These devices act like furniture to invite students to move to appropriate places and orientations and also can be secured to prevent unwanted distractions during lessons.
3. Live Images is a device for helping the OG manage and facilitate behavior. Before Live Images the OG could see avatar movements and listen to the student talk, but did not have any visual cues about the physical presence. Live Images gives the OG a snapshot of each student every 20 seconds as well as on-demand so as to monitor physical behavior. Full video streaming would be too great a drain on network resources but every 20 seconds seems to be a good compromise between technology concerns and behavioral concerns.

While there is still much to learn and numerous challenges to address the iSocial design and implementation identifies a new form of computer support for learning that depends on high quality collaboration between students and teachers and among students. This form of CSCL seems highly relevant for addressing special needs populations that not only need high quality learning opportunities, but teachers with specialized knowledge and training to overcome barriers to students engagement and performance in learning situations.

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