



## A LOOK INSIDE THE AAA LAB, WITH DAN SCHWARTZ

Interest amongst educators in gamification and game-based learning is on the upswing. However, designing a compelling product that makes a meaningful impact on learning, and proving its role in doing so, is no simple proposition. This quarter, Dan Schwartz shares about his Awesomely Adaptive and Advanced Learning and Behavior, or AAALab, and what it looks like at a shop that's developing and testing these education technologies and theories of learning. Three projects out of Schwartz' Lab, Stats Invaders, Critter Corral, and Teachable Agents, are being used to clarify whether games can develop informal experiences that prepare students for learning, and how digital technologies that provide specific feedback and social interaction can teach and motivate.

AAALab's Stats Invaders, a game in which users face alien attacks occurring along a variety of probability distributions, has contributed to the research about when to use gameplay. Intended to complement a class, Stats Invaders offers students experiences and opportunities to develop intuitions about statistical concepts—a domain in which many people have misconceptions—in preparation for learning explanatory content with a teacher. "Here the attempt is to look at what games are good at: building up lots of experiences and interactivity," says Schwartz. "We don't ruin the game by dropping in a paragraph about 'this is called the normal distribution.' We save that for the school part. By developing the experience, the debriefing that happens afterwards is much more powerful than if we had just said 'these are the rules.'" In order to test this theory on the role of the videogame, AAALab conducted a study with several conditions, including (1) videogame only, (2) reading passage only, (3) neither, and (4) both. They found that Stats Invaders prepared students to learn about statistics; students who played the game and then read a passage about statistics (4), showed much greater learning than students in the videogame only (1) and passage only (2) conditions. "The game gave students normative experiences and lifted out patterns in ways for them to experience it, which in turn prepared them to learn from formal instruction on the topic."

Whereas Stats Invader is intended to complement a class, Critter Corral, a game designed by AAALab's Kristen Blair, is designed for standalone play. Critter Corral teaches early

mathematical concepts to preschoolers, and is unique in the particular brand of feedback it provides where, if users make a mistake, they get to see how far off they are. (Contrastingly, most games for early learners allow unlimited guesses and give no performance feedback beyond 'wrong' or 'right'). Students in 14 Transitional Kindergarten classes in San Francisco Unified School District are using Critter Corral on iPads for a few minutes each day, as part of AAALab's research on whether the game and its feedback approach can help children develop a flexible understanding of, and see relationships between different kinds of quantities. Preliminary results indicate that Critter Corral is helping student progress (assessed on an external measure). Schwartz "wish[es] that there was more software like this for kids – a lot of the stuff that's out there just isn't very good pedagogically. This is a really adoptable model, and the idea is that if students play it in preschool, it will really give them a leg up with the formal instruction they receive in Kindergarten." He says that Critter Corral will be available on iTunes Store when the study is complete.

Within their efforts to examine social foundations of learning, AAALab has developed Teachable Agents, an online software that students use to teach a computer character by creating concept maps. The Agent then answers questions posed to it by traversing the links and nodes of its concept map, while the path of reasoning used is animated in order to visualize its model of thinking and provide feedback for students. They apply this feedback to revise their Agent's "brain," who can then compete online against other Agents.

Harper Franklin plays Critter Corral



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By organizing, observing, and refining their Agent's knowledge and reasoning patterns within the social role of "teacher," students build their own ability to integrate concepts and draw inferences. Teachable Agents can be used with any curriculum and is designed to be a complement to most models of instruction. AAALab has worked with the Menlo Park School District to use Teachable Agents with their Full Option Science System (FOSS) hands-on science curriculum. Using Teachable Agents was found to improve children's scientific reasoning; students teaching their Agents within the FOSS curriculum performed better on both FOSS assessments and external measures of student learning than those teaching their peers or those in other control conditions. These students were also more prepared to learn new science content from regular instruction, even when they were no longer using the software. Teachable Agents demonstrates how a learning technology can motivate students while being rooted within teacher practice. "Kids love it. The teachers can use it the ways they want. It's really a good technology, and in every study it has

“ The attempt is to look at what games are good at. - Dan Schwartz ”

worked well.”

“We view ourselves as starters,” says Schwartz, “we develop ideas and models that others can use.” Through their design of and research on digital games and learning technologies including Stats Invaders, Critter Corral, and Teachable Agents, AAALab is clarifying whether, when, and how gameplay can provide informal experiences, foundational understanding, and social interactions that prepare and teach students.

To learn more, visit [aaalab.stanford.edu](http://aaalab.stanford.edu).

## GSE-IT'S HOME-GROWN INFORMATION KIOSKS: PAST AND FUTURE

Public kiosks are increasingly appearing in a variety of spaces and domains around Stanford University. GSE-IT's survey of these information terminals, however, revealed a lack of user engagement amongst displays built on a static PowerPoint or website, or an inability amongst administrators to update content within systems developed by external vendors. For these reasons, one year ago, GSE-IT began developing its own kiosk system in-house. "There were no out-of-the-box solutions that did everything," says Chief Technology Officer, Paul Kim, "so our goal became to build something that combines desired features, uses our own existing data, and allows us to maintain flexibility, control, and the ability to update. It should incorporate GSE branding in an interface that is noticeable to visitors, intuitive, and recovers from user errors."

In addition to information retrieval and interface design, developing their own touchscreen kiosk systems posed some novel and interesting concerns, including determining which software and hardware combinations provided the best touch support, and how to automatically pull and update data from the [ed.stanford.edu](http://ed.stanford.edu) site in order to provide current information and avoid duplication. After about 6 months of planning and development, the first kiosks were installed in the CERAS Lobby and second floor entrance in Spring 2013, with plans for one other machine, which will be located in the Cubberley Lobby. Built on custom front-end HTML5 and Javascript and a PHP backend, the terminals currently display GSE events, news, faculty and staff profiles, and campus and individual building maps with detailed 3D floor plans of GSE facilities. The kiosks also provide QR codes for taking this information "to go."

GSE-IT's next steps for the kiosks include social media integration, expanding user-interaction through mobile, and offering partnerships with faculty, research groups, or degree programs to feature their work. "We hope to leverage these resources and partner with the GSE community to provide a different level of interaction and experience to community members. We want these tools to go beyond providing information to becoming a new learning or meeting space where people can interact with their mobile devices and our system," says Paul Kim.

Use the kiosk to feature and promote your work and events! For submissions and inquiries, contact Lyudmila Christie at [lyudmila@stanford.edu](mailto:lyudmila@stanford.edu).



## ZOOM

GSE-IT has tried many video conferencing tools, and has chosen Zoom, an easy-to-use cloud-based virtual meeting space, with high-quality audio, video, screen-sharing, screen-recording, and mobile whiteboarding. Participants can join an online meeting from any mobile or desktop device, without needing a login. GSE-IT has also integrated Zoom into Canvas, to support its use in courses and for office hours.

Faculty and Staff interested in using or trying Zoom for your work, contact Shawn Kim at [shawnkim@stanford.edu](mailto:shawnkim@stanford.edu).

## Stanford Information Security Mandate for All Faculty and Staff iOS and Android Devices

Stanford is undertaking several initiatives to improve the security of the University's IT environment and protect the privacy of information stored on our systems. Stanford has issued an information security mandate that all Faculty and Staff personal and Stanford-owned iOS and Android mobile devices used to access Stanford data (research, teaching, or email) must be encrypted using Mobile Device Management (MDM) by 2/28/14.

For more information about this security requirement and installing MDM, visit <https://itservices.stanford.edu/service/mobiledevice/management> or for help submit a HelpSU.

## UPCOMING EDTECH WORKSHOPS

- THU 2/13** Crowdsourcing and collaboration in the classroom  
2-3 PM  
CERAS 308
- THU 2/20** Creating and displaying content on interactive  
2-3 PM  
CERAS 308
- WED 2/26** Virtual conferencing and collaboration tools  
10-11 AM  
VIRTUAL
- WED 2/26** Computing inter-rater reliability  
2-3 PM  
CERAS 308
- THU 2/27** GoogleDrive tools for managing student work and providing feedback  
2-3 PM  
CERAS 308

