October 2020 Ambitious Mashups Webinar Q&A Transcript

Question: AI theme: What are some of the likely to be enduring outcomes of AI-based research? And also enduring challenges?
Answer: We are preparing to release a report from an AI expert panel we convened that discusses these questions, so stay tuned!

Some of the key points of the report related to the future uses of AI to orchestrate individual, collaborative, and community learning experiences; to augment human-intelligence by working in partnership with teachers and facilitators to expand their capabilities to provide students with support; to facilitate natural, rich interactions between people and systems; to broaden the competencies that can be assessed and supported to include higher-order metacognitive and social practices; and to derive insights about learning processes using data mining and machine learning. Challenges identified were potential difficulties in protecting student privacy, reducing bias in assessment, and meaningfully partnering with teachers and other stakeholders so that AI-based educational technologies can be employed in ways that support the people involved in meeting their goals.

Question: What are you doing to not suffer the problems that other AI systems suffer by not truly understanding human meaning?
Answer: This is an important question to be taken up by the community as a whole. Across multiple projects people are working to involve stakeholders early and often in the design process. By focusing on how AI can augment human intelligence and work, it may be that people's skills can offset the limitations of AI and vice versa. There are more reflections on this and similar topics in the report from the AI expert panel that we are about to release.

Question: Could you say more about what kinds of mid-scale infrastructure seem most relevant? **and Question**: Can you define "mid-scale" infrastructure. Where would ASSISTments lie on the scale?
Answer: NSF is actively seeking proposals that are education- or learning-oriented for its [mid-scale infrastructures program](). In our understanding, a mid-scale infrastructure project provides a resource or capability that broadly helps the field. NSF leaders have shown interest in understanding not only what infrastructure would be helpful, but also what sorts of learning research questions could be tackled with an infrastructure that cannot be tackled now.

In with regard to Emerging Technology for Teaching and Learning, three possible types of mid-scale infrastructure include:

- A common experimentation platform that would make it easier and faster for a wide range of investigators to design and test their innovations. ASSISTments could be seen as an example; it can let a wide range of investigators build and test ways to help math learners to solve problems.
- A common data platform would collect and organize data to allow for a range of teaching and learning investigations. LearnSphere is an example.
- Common design research toolkits could be an additional focus. For example, during the lifetime of the prior CIRCL center, a group became highly engaged with how many projects could work on addressing how people can learn data science. The CoDAP tool became one possibility that many different research teams could use to conduct separate investigations.

Please note that these suggestions are meant to inspire and not to limit your creativity.

Question: What are existing biases of AI design?
Answer: As we go forward we will continue to think on this issue, but some potential biases we discussed with AI Experts at our meeting in Summer 2020 include the following. When AI is orchestrating learning, it could be amplifying inequitable participation. When AI is augmenting human intelligence, it could be amplifying a biased form of reasoning. When AI is expanding natural interactions, it might present obstacles to learners with certain disabilities, preferences or needs (or tackle overcoming those obstacles) or the designs for interactions may encode a historical bias that harms particular student groups. When AI is broadening our sense of measurable competencies, it may not give all people a fair opportunity to demonstrate those competences. When AI is revealing connections, these new findings may be used either to help or harm people.

Question: How might we synthesize findings from learning with technology into learning models or patterns that would help to inform the use of theories in experience designs?
Answer: Thank you for asking. Answering this question is core work CIRCLS would like to do together with the research community. If we remain only weakly able to synthesize across separate exploratory learning research projects, we worry that funding for this area will eventually evaporate. Available research synthesis methods (like meta-analysis or best-evidence reviews) do not align to the goals of exploratory design research. Together, we need to create a method that fits the nature of the work and generates insights that a wide constituency would value. If you'd like to join a task force to work on this, let us know!

Question: Implementing equity is an engagement practice, not an innovation or technology innovation - can you speak to the ways in which learning practices in/out of school have adapted and evolved usefully to connect deep technical understanding and literacies with human- and community-centered rituals and routines? **and Question**: What are some examples of equity issues?

Answer: The [keynotes from CL'19](#) are great for getting into this, both Safiya and Angela were very provocative.

Question: How do we do research eliminating bias in machine learning algorithms that may fuel these educational systems?

Answer: This is an important question for our community to be asking and talking about. CIRCLS is planning to initiate an anti-racism task force for our community members, with the hope that it will lead to a list of best practices and perhaps to primers that the group can write to educate the community. This group would consist of researchers and practitioners. Hopefully, this will help researchers to understand how to address these issues when they write proposals for new projects. The keynotes mentioned above address bias in machine learning, and would be a good place for the task force members to start. Anyone interested in being part of this group should visit the [CIRCLS website](#).

Question: What changes in fairness and equity themes did you notice? For example, was there a greater effort to include more diverse populations or were there didn't types of technologies emerging to address equity/fairness?

Answer: One theme that emerged about halfway through was the need to pay attention to special needs, neurodiversity, learner variability and like themes. An analysis suggested that not enough projects were incorporating even the basic recommendations in this area.

Question: I have a question about finding AI experts. As someone who is not already in the AI field, does CIRCL have any tips on how I should find some AI experts to tack onto my projects?

Answer: CIRCLS can help — you could send us an email with what you are looking for. Also, NSF program officers can help.

Question: I feel like something about instructional design is missing — I know it's in there but not sure how it shows up in the big picture of theories and AI, etc.

Answer: Agreed. Instructional Design and Learning Sciences appear to touch different parts of the overall design problem. We observe that instruction design has somewhat more of an engineering emphasis, and learning sciences somewhat more of an emphasis on pushing the edge of theory about how people learn. One edited volume that worked on tackling their

intersection is *[The Sciences of Learning and Instructional Design: Constructive Articulation Between Communities.](#)* Our advisors discussed this issue a great deal in the meeting, and there is much we, as a community need to do. Look for Expertise Exchanges on this topic in the future and join us.

Question: One can come away with the impression that learning theories reflected here pay insufficient attention to the role of natural language discourse in teaching and learning. Is this fair?

Answer: The most common tag on projects was collaborative learning and a lot of attention to discourse there. See the CIRCL tag map: https://circlcenter.org/projects/tag-map/

Question: As we think about applying theories of individual and collaborative learning, what do we need to know/consider/explore as it relates to individual and group identities, and their intersections?

Answer: Yes, "identity" and "digital identity" were big cyberlearning themes — and there's much more to do! Please join future work in the community if you have an interest.