Enlichenment: Insights Towards AI Impact in Education through a Mycelial Partnership between Research, Policy, and Practice

Carolyn P. Rosé (Carnegie Mellon University; cprose@cs.cmu.edu)

Introduction

This column raises the question, as we begin to emerge from COVID 19, what is the role of the field of AI in this emerging reality? We specifically consider this in the face of tremendous learning loss and widening achievement gaps. In this wake, what specifically is the role of AI in the future of education as we move forward? This question bridges the worlds of basic research and the seemingly distant worlds of policy and practice.

History of AI in Education

Since Jaime Carbonell, pioneer in multiple areas of Artificial Intelligence, conducted landmark research on the SCHOLAR intelligent tutoring system in the early 70s, the field of AI and the fields of Human Learning and Teaching have partnered together to study how to use AI-enabled technology to understand and support human learning.

This partnership has birthed multiple interdisciplinary research societies, brought together under the umbrella of the International Alliance to Advance Learning in a Digital Era (IAALDE)[1], an international partnership involving at least 3,000 researchers worldwide. Nevertheless, despite tremendous growth in these research societies over the decades alongside advances in the core field of Artificial Intelligence, and notable large scale success of some learning technologies in large scale use, the emergency move to universal online learning at all levels over the past year has exposed gaps and breakdowns in the path from basic research into practice. As the new administration reacts by committing to invest substantial research dollars into addressing the COVID Melt, or learning loss, we must ask ourselves how to prepare for potentially future emergencies so that such tremendous and inequitable learning loss will not be repeated.

Addressing the Challenge through Public Engagement with Science

The researchers of IAALDE came to this project with the question: What does it mean for a meta-society dedicated to basic research like IAALDE to engage in partnership with the worlds of policy and practice? Adopting the metaphor of a mycelial network, IAALDE collaborated with the American Association for the Advancement of Science (AAAS)[2] to foster productive synergy between the worlds of research, policy, and practice.

Mycelial networks, not unlike neural networks in many ways, are the fungal networks that foster connection, communication, and ultimately the health and survival of forests and other large scale ecosystems. What might at the surface appear to be separate organisms living sometimes at great distance are in fact parts of an intricate and entangled system that thrives through symbiotic partnership. As a recent step, this IAALDE-AAAS collaboration has convened a public engagement project meant to engage the world of policy and practice in an emerging partnership to forge a new path forward in the image of a mycelium.

In the context of the IAALDE public engagement workshop[3], Administrators, policy makers, and implementors of policy were invited to engage with world class leading researchers across a broad spectrum of research in technology enhanced learning to accelerate the path from research into real educational impact through practice. The long term goal is for research, policy and practice going forward would benefit from more intensive, ongoing, discussion and coordination between communities. At the same time that greater awareness of research findings might offer opportunities to reflect and reconsider practices on the ground in schools. This discussion, involving over 100 delegates, was meant to lay the

[1] https://alliancelss.com/

[2] https://www.aaas.org/
[3] https://alliancelss.com/#publicengagement

foundation for documents, resources, and activities to move the conversation forward.

Highlights of Lessons Learned

Through interaction with colleagues across societies, in the AAAS, and other organizations, we designed the public engagement workshop to be collaborative and interactive. We began with a collaborative focus setting panel designed to offer a range of basic research topics within the expertise of the panelists and to engage the audience in ranking those topics and submitting specific pain points and questions related to the highlight ranked topics. The idea was to organize break out working sessions on the fly where there was a synergy of expertise, interest, and energy to bring together researchers and audience members to engage in problem finding and brainstorming related to shared concerns.

In particular, 23 experts, each representing one of the 10 partnering research societies, were divided into three panels of experts based on topic focus. For panel 1, the most interest from the audience was expressed in personalized learning at scale, the role of the teacher, and challenges in using data to improve instruction. Concerns included issues regarding orchestration challenges in heterogeneous classrooms, needed professional development to engage teachers in strategic thinking about use of data and adaptive systems in classroom teaching, fears of teachers regarding adoption of AI technologies such as facial recognition, and tensions between massification rather than personalization. For panel 2, the most support was expressed for topics related to offering support for teaching and learning, support for scientific reasoning and discourse, and providing instruction in low resource contexts. Concerns included a sense that available data might not be informative for the most important concerns, or that it might not seem directly meaningful to teachers, that deployed technologies might not be achieving the desired level of social presence, that the sets of deployed technologies have not yet been integrated into continua that support students along complete trajectories, and that in the absence to solutions for low resource conditions, the achievement gaps are widening. For panel 3, the most

support was expressed for topics related to reducing barriers to supporting equity, learning technologies and interventions to support large, diverse populations, and optimizing human learning for all learners. Concerns related to inclusively, racism, and equal access to resources. Not surprisingly, concerns related to AI fairness were expressed. More surprising were expressed concerns about the rapid pace of change in the AI space and fears about the infrastructure not being capable of keeping up the pace.

The majority of researchers who came and engaged in the discussion represented basic research that already engaged with practice within their own research programs. Participants who came from policy efforts, funding agencies, companies, non-profit organizations, and schools who spoke up were mainly ones who were familiar enough with research to join in a discussion with academics. What became clear is that while these researchers and these policy people and these practitioners might not have been typical of any of these groups, these may be the boundary-spanning people to push the communication forward from a network perspective. The next important step, which began during the workshop, is to synthesize wisdom across these local efforts and package it for large scale use.

On June 24 at 12pm EDT, there will be an ACM SIGAI Learning Webinar, which will expand on insights gained from the public engagement workshop. A link to the recorded webinar will be found online[4].

Carolyn P. Rosé is a Professor of Language Technologies and Human-Computer Interaction in the School of Computer Science at Carnegie Mellon University. She is a 2020-2021 AAAS Fellow under the Leshner Institute for Public Engagement with Science, with a focus on public engagement with Artificial Intelligence.

---

[4]https://webinars.on24.com/acm/rose