Learning Engineering Special Event:
Why learning engineering, Why now?

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Background: Roughly two years ago, I began serving as Chair of the AI and Adaptive Technologies SIG for IEEE ICICLE (Industry Consortium on Learning Engineering). At kick-off, the allure of using emerging technologies to improve learning brought a wide array of interests to the table, including those in government training, corporate training, post-secondary education, and K12 education. Through our regular meetings and our preparations for the ICICLE conference last May, themes emerged related to (1) understanding what is currently feasible using AI and adaptive technologies, and what enabler technologies are required, (2) understanding in which learning contexts specific algorithms or technologies are most likely to be successful, and (3) understanding how teams are coming together to design and scale learning solutions that make the best use of these technologies. In addition, there was interest in understanding what technology may make feasible in the future, and in understanding how learning contexts may evolve with advances in learning sciences enabled by high volume, velocity, and variety data. Finally, challenges with adoption and extensibility were identified and discussed.

Discussion:

Talking Point #1: Why do we find investment in learning engineering, as a profession, now? What is creating the urgency?

The urgency for learning engineering as a profession is due to the confluence of rapidly advancing technical capabilities, advances in the learning sciences and psychometrics, demand from consumers for transparency and efficacy, and pressure on resources creating, curating, and evaluating learning experiences to reduce costs, increase availability, and keep pace with an information-rich world.

- Technological capabilities to sense learner events, in real- and near-real time, are widely recognized for their potential to assess progress and evaluating learner affect during the learning process, making way for personalized recommendations that may improve the efficiency of learning. Standards such as xAPI and the IMS Global Caliper Analytics have been developed with the hopes of providing streams of rich sensor data to multi-modal analytic engines tooled with AI and adaptive technologies ready to make decisions about what a learner should experience next. And yet, as those working closely with those standards recognize, there remains a gap between the technical decisions about the data fields, values, and streams and ensuring that data provides what is necessary for advanced analytics in support of effective and extensible learning solutions. AI at the Edge and continued advances in Human Computer Interaction may further this gap, unless we find the conduit through which technical and pedagogical decisions can be made with substantive understanding of trade-offs and risks in both arenas. [Enter, the learning engineer.]

- There is no question that the learning sciences and psychometrics are advancing at a rapid pace. These sciences continue to develop deeper understanding of how people learn, across all age groups. In addition, desires to consider learners holistically (e.g., ACT's Holistic Framework) have led us to substantial advances in social and emotional learning and teaching and assessing 21st century skills such as creativity and collaboration. Principled assessment design and assessment engineering, which consider the cognitive and learner context, in addition to inferences to be made from assessment results, are becoming more widely adopted. It is critical that algorithms built into any technology solutions for learning use a sound basis in current scientific research to build for the most effective learning possible. [Enter, the learning engineer.]
- Learning eco-systems are complex. Consumers of learning solutions are increasingly demanding transparency and evidence of efficacy as they make buying decisions. It is important to determine what an effective solution would solve, and for whom. For example, there are important trade-offs among time spent and depth of learner knowledge, which may differ in importance depending on the individual learner or their context. Buyers may have different definitions from teachers or learners about desired outcomes. Therefore, it is important to define what effective means, and for whom, and then to provide the rationale, transparency, and data that supports the choice to use the solution. [Enter, the learning engineer.]
- AI technologies tend, to date, to solve the following problems: (1) increase availability of a service, (2) increase reliability of a service, or (3) decrease cost of a service. Education is typically tightly resourced constrained, and these technologies hold promise to make education more available (e.g., MOOC), more reliable (e.g., consistent scoring), and less expensive (e.g., automatically curated or generated content, Adaptive Instructional Systems at scale). However, algorithmic decision making can sometimes lead to unintended consequences and possible risks to individuals. A deep understanding of necessary feedback loops, potential failure modes and risk is required to be able to navigate the complex trade-offs inherent in learning solutions supported by AI and adaptive technologies. [Enter, the learning engineer.]

Talking Point #2: How does learning engineering show up in individuals and in teams building instructional and learning solutions?

At ACT, to create our learning solutions, we currently create cross-functional teams with individuals who represent one or more aspect of learning engineering; typically, learning scientists, psychometricians, content subject matter experts, and technologists. At this time, we do not have a Learning Engineering job title.