

Where are the Learning Sciences in the MOOC debate ?

George Siemens & Pierre Dillenbourg

This title reflects the crawling scepticism of learning scientists with the respect to the hype of MOOCs. Beyond individuals, the learning science community is not much engaged. As MOOCs stand today, the activities proposed to student remain quite rudimentary compared to those developed in learning science. Let's consider the two mammals of learning sciences, socio-cultural theories and constructivism. The first one encounters some kind of renaissance through the so-called cMOOCs, for 'connectivist' MOOCs, but this renaissance occurs in the shadow of xMOOCs. At a first glance xMOOCs are in contradiction with constructivism. Their most salient part, video lectures, simply perpetuate a pedagogical practice, lecture, that remains ubiquitous in higher education despite empirical evidence of its low effectiveness. Actually, this critique fades out when one looks more closely at what students do in one the popular high stake MOOCs: they spend around 25% of their time watching videos, versus 75% doing the assignments defined by the teacher. Therefore, despite the lecturing component, an xMOOC could bring learners along rich problem solving or guided discovery activities that would have comfort Piaget. The bottle does not make the wine. Could the constructivist MOOCs become the agenda of learning sciences? Should learning sciences stay away from MOOCs or, conversely, go on board and try to influence their evolution?

This session will include 5 short presentations followed by a debate with the audience.

(1). Contributions of MOOCs to a Rich Landscape of Learning

Gerhard Fischer, University of Colorado, Boulder

Many of the discussions about MOOCs are based on economic perspectives and technology perspectives. Very few contributions analyze MOOCs from a learning science perspective and put them into a larger context with other approaches to learning and education. My contribution will postulate that MOOCs represent one approach in a rich landscape of learning. I will use two specific frames of reference ("learning about and learning to be" and "learning when the answer is known and is not known") to analyze the strengths and weaknesses of MOOCs.

Bio. Gerhard Fischer is a Professor of Computer Science, a Fellow of the Institute of Cognitive Science, and the Director of the Center for Lifelong Learning and Design (L3D) at the University of Colorado at Boulder. He is a member of the Computer Human Interaction Academy (CHI; 2007), a Fellow of the Association for Computing Machinery (ACM; 2009), and a recipient of the RIGO Award of ACM-SIGDOC (2012). His research has focused on new conceptual frameworks and new

media for learning, working, and collaborating, human-computer interaction, and design. His recent work is centered on social creativity, meta-design, cultures of participation, and rich landscapes for learning.

(2). Natural Language Processing: Opening MOOC Doors to Automatic Assessment and Enhanced Collaborative Dialog

Danielle McNamara, Arizona State University

After only a half decade following the dawn of MOOCs, it is clear that large-scale open access education opens up educational opportunities both for educators and learners that were previously beyond reach. Learning sciences has intrinsic interests in enhancing the design of MOOCs as well as capitalizing on their resultant big data. Among the many applications of learning sciences to MOOCs, automated scoring and natural language processing promise to have substantial impacts on the quality of instruction and collaboration. For example, students' written products can be automatically assessed and provided feedback using automated writing assessment. Collaborative interactions through chat rooms, blog posts, and other collaborative tools may be enhanced through algorithms that identify students' needs, interests, or attitudes. Such applications of natural language processing open up doors not only to improve online courses but also to widen our capabilities of developing automated scoring techniques and enhance our understanding of collaborative dialog.

Bio. Danielle S. McNamara is a Professor in the Psychology Department and Senior Scientist in the Learning Sciences Institute at Arizona State University. Her research involves the development and assessment of natural language processing (e.g., Coh-Metrix), game-based, intelligent tutoring systems (e.g., iSTART, Writing Pal), and the use of interactive dialog in automated tutoring systems. The overarching theme of her research is to better understand cognitive and motivational processes involved in reading, writing, memory, and knowledge acquisition and to apply that understanding to educational practice by creating and testing educational technologies. One focus of her work is on developing methods to improve comprehension and writing success for high school students. She has published over 270 articles and other scholarly writings (see solellab.com).

(3) How should learning sciences contribute to the MOOCs debate or how should it benefit from it?

Nikol Rummel, Ruhr-Universität Bochum, Germany,

As researchers in the Learning Sciences and, particularly, in CSCL, we have in the past decades accumulated ample experience with and evidence for instructional designs that work versus those that do not work. From our findings (i.e. based on scientific evidence), we have deduced educational principles for designing and orchestrating fruitful learning within computer-based and computer-supported environments. Witnessing the explosive development of so-called MOOCs in the recent years, my observation is that so far these courses/ learning environments do not yet live up to their potentials, as they are (often) being developed without building on well-established pedagogical knowledge. It is my firm conviction that in order to fully exploit the potential of what is technically possible for learning, developers and designers, as well as educational researchers and educators need to work hand in hand in the making of MOOCs. An area that will need particular attention in this process is the question of how to incorporate and support collaborative elements within MOOCs.

Bio. Dr. Nikol Rummel is professor of Educational Psychology at the Institute of Educational Research at the Ruhr-Universität Bochum, Germany, and adjunct professor in the Human-Computer Interaction Institute at Carnegie Mellon University. Dr. Rummel's research interests center around instructional support for learning in computer-supported settings, and especially in computer-supported collaborative learning (CSCL) settings. Dr. Rummel has been or is PI and Co-PI on various research grants funded by different international organizations, such as: the DFG [German Science Foundation], the European Union, the US National Science Foundation (NSF), and the US Institute of Educational Services (IES). Dr. Rummel is associate editor of the Journal of the Learning Sciences, and editorial board member of the International Journal of Computer-Supported Collaborative Learning and of Learning and Instruction. She is elected member of the Board of Directors and co-chair of the CSCL community within the International Society of the Learning Sciences (ISLS), and was program committee co-chair of the 2013 CSCL conference.

(4) Scale as an opportunity

Pierre Dillenbourg, EPFL, Switzerland

A specific contribution would precisely to develop pedagogical models that maintain bring richness of small-scale environment to the scale of MOOCs. So far, scale is perceived as a great opportunity in terms of opening education but as a filter of pedagogical activities. Some learning activities scale well: how much John learns from watching a video or from answering quizzes will be the same whether there are 10 or 10'000 other students watching the same video. At the opposite, some

learning activities, manageable with small classes, do not scale up easily. Could learning sciences explore the opposite hypothesis, “scale as an opportunity”? An apprentice who works in a company 4 days per week and come to school on the 5th day, discovers the experience of the 19 other apprentices, the variety of responses they encounter to the same problem. Scale can be good. What if they are 10’000 ? Can students share experience, i.e. real shared meaning making, with 10’000 colleagues? Not with current models, but could learning science invent them? I propose a model of MOOCs as weighted geometric graphs that encompass a workflow. The operators of this workflow are technical structures that encompass a pedagogical idea. For instance, an operator that forms teams based on several criteria: if the criterion is the difference of opinions, it will trigger socio-cognitive conflict; if the criterion is the complementarity of knowledge, this will lead to Jigsaw script. Formalizing pedagogical scripts as graphs structures is proposed as a way to run rich learning activities at large scale

Bio. Pierre Dillenbourg is professor of learning technologies at Swiss Federal Institute of Technology in Lausanne (EPFL) and academic director of the Center for Digital Education, whose MOOCs obtained 265’000 registration in one year. Former teacher in elementary school, Pierre graduated in educational science (University of Mons, Belgium). He started to conduct research in learning technologies in 1984. He obtained a PhD in computer science from the University of Lancaster (UK), in the field of educational applications of artificial intelligence. . His lab, CHILI (“Computer-Human Interaction for Learning and Instruction”) explores the frontier between CSCL and HCI, namely novel interfaces for face-to-face collaboration (tangibles, paper computing), robotics, tangible-MOOCs, eye tracking, etc.

(5) Understanding and advancing the MOOC research landscape

George Siemens, Athabasca University, Canada

MOOC hype has produced skepticism amongst academics. The public conversation of MOOCs suggests broad systemic transformation of higher education while largely ignoring the research to date in learning science and online learning broadly. This perceived lack of research focus has resulted in growing resistance in many academic quarters to MOOCs as a suitable research domain for serious researchers. In spite of this resistance, research is advancing rapidly, often relying on artificial intelligence, machine learning, and learning analytics. Interestingly, much of this research is being undertaken in communities that have historically not been active in learning sciences. The research being conducted in these communities is not receiving much recognition as it is outside of the distance and online learning , CSCL, and learning sciences communities. This session will provide an overview of the research methods and academic domains that are participating based on a structured analysis of the MOOC Research Initiative submissions (www.moocresearch.com).

Through this analysis, it is expected that opportunities will be identified for increased presence of learning science researchers to participate in MOOC research.

Bio.

George Siemens is the Associate Director of the Technology Enhanced Knowledge Research Institute at Athabasca University, and a faculty member in the Centre for Distance Education, and an adjunct in the School of Computing and Information Systems. He has been active in planning, designing and delivering MOOCs since 2008. Recently, he led a Gates Foundation Grant on MOOC Research (funding a total of 28 MOOC grants across different education institutions and MOOC types).