Development of a Learning Sciences Lab to Support Faculty Research in Teaching and Learning

There are a number of assumptions prevalent in academia regarding research laboratories. For instance, we tend to assume that starting a research lab is something that tenure-track faculty do, and that you need to have funding in place before you can create a lab. Furthermore, we think of research labs as being led by one researcher and therefore organized around her research agenda. In this paper we will describe the innovative design, launch, development, and funding of a learning sciences research lab started by a postdoctoral research associate and collaboratively developed and led by a team of doctoral, masters, and undergraduate students.

Researcher Stance and Theoretical Foundations

The researchers both have extensive experience working in faculty development contexts in higher education. Our professional identities are grounded in a set of theoretical frameworks which guide our efforts. First, we see learning and faculty development through the lens of situated learning theory (Lave & Wenger, 1991), and therefore believe that learning is most powerful through engaging in and identifying with communities of practice. Second, we use transformative learning theory (Mezirow, 2018) to design contexts and experiences through which beliefs and assumptions are transformed. Related to this is complex conceptual systems theory (Authors, 2019) which argues that conceptualizations of learning are complex conceptual systems from which practices are emergent — and that the only way to facilitate changes in practices is to facilitate changes in conceptualizations of learning. Finally, we believe that powerful learning requires development of learner agency, autonomy, authority, and critical consciousness through learning experiences designed according to principles of constructivist learning (O'Donnell, 2012), constructionist learning (Kafai, 2006), and critical pedagogy (Kincheloe, 2008).

Context and Background

In 2019 the second author hired the first author as a postdoctoral research associate in a center for teaching and learning at a research university with the mandate of facilitating faculty development in designing, conducting, and disseminating Scholarship of Teaching and Learning (SoTL). We developed a community of scholars in which faculty members investigate learning theories in which to design learning experiences in their courses and collaboratively conduct SoTL research projects. As the first author neared the end of his first year and the community of scholars had grown to over a dozen members, he proposed the founding of a learning sciences lab to support the community of scholars. It was proposed that the community of scholars and the lab be designed to work collaboratively to design, conduct, and disseminate cutting-edge research and to do so as an agile and lean operation. The proposal for this lab was presented to

leadership and secured approval with funding for three years to cover two doctoral students, two master's students, and two undergraduate students to work 20 hours per week in the lab.

We wanted the lab to embody the theoretical foundations described above, and therefore developed a process through which to scaffold development of lab members' agency, autonomy, and authority. During the first few months of the lab, all lab members engaged in weekly lab meetings in which we used strategic planning and change leadership strategies to craft a mission statement, vision statement, values and principles statement, and a set of "big opportunity" statements describing the most urgent issues in teaching and learning in higher education. These will be described in the next section. Instead of assigning roles and responsibilities to each lab member, they were asked to collaboratively develop a set of roles needed for optimal functioning of the lab and then adopt the roles they believed best suited their skills, interests, and potential for development of desired abilities. In addition to adopting roles in which to take leadership, they also selected roles in which they would serve in support capacity. Also during this time the lab members joined meetings of the SoTL community of scholars and over time each lab member identified one or more SoTL projects on which to collaborate.

Mission and Principles

The lab mission and principles were collaboratively developed by the members of the lab through a process facilitated by the first author. The first element of the lab mission (see the center of Figure 1) was that we will conduct research involving learning experience designs which develop learner agency, empower learners, and engage learners in activities with immediate real-world impact. The second element of the mission is that we will contribute to theory with a focus on constructionist theory, situated learning theory, 4E cognition theory, and cultural-historical activity theory. Since only the first author and one of the lab members were acquainted with learning sciences literature, we also read and discussed learning sciences theories and methodologies each week. Simultaneously, lab members became acquainted with the research projects currently underway in the community of scholars (professors) and each lab member selected a number of projects to join as collaborators and provide logistics support. Although the first author provided leadership and management during the formation and early development of the lab, every lab member was mentored into leadership roles. This process involved weekly one-on-one meetings and activities designed to scaffold development of agency and leadership, but to gradually release scaffolding as quickly as possible in order to create a culture of collaborative leadership and day-to-day management of lab work.

After developing the lab mission, the lab members worked together to develop a set of lab principles (see outer ring of Figure 1). Because the learning sciences can be described as a design science (Hoadley, 2018), the first principle states that all research conducted in the lab be research related to the design of powerful learning experiences. The second principle emphasizes developing learner agency and empowering learners from underrepresented or marginalized communities through what we are calling "radical empathy" — empathy accompanied by action. This concept was inspired by Freire's (1970/2005) definition of praxis as reflection and action in the world. The third principle describes designing affordances for learner agency (Withagen, de

Poel, Araújo, & Pepping, 2012) by organizing the lab to be collaboratively led and managed by lab members, and that lab members would be co-equal collaborators in strategic planning, role negotiation and assignment, and research project planning. The fourth principle requires research be grounded primarily in learning sciences literature. The fifth principle defines learning as simultaneous processes of 1) becoming and 2) individual, collaborative, and collective construction of knowledge (Authors, 2019). The sixth principle incorporates design-based research methodology whenever possible (Barab, 2014). The seventh principle encourages fearlessness in innovating new data collection, generation, and analysis methods and tools (Kincheloe, 2005).

Function and Impact

The newly-founded lab started in August, 2020 with six student research assistants (four doctoral, one master's, and one undergraduate) and has since grown to ten members. The lab members are now working on thirteen research projects, a grant proposal, and developing faculty development workshops. In some of the research projects, lab members have started developing innovations in research methods, particularly in using network analysis in ways it has never been used before. Lab members have also developed and secured funding for a faculty fellows program which allows the SoTL community of scholars members to devote more time to engaging in SoTL research, a program which is managed by the lab members. Lab members have produced 35 conference papers (12 of which have been presented), 7 peer-reviewed journal articles and book chapters, and 3 faculty development workshops. More importantly, we have seen all of the lab members developing skills in leadership, research design, data analysis, academic writing, communication, public speaking, collaboration, and creativity.

Discussion

The model through which this lab was developed is unique in a number of ways. First, by situating the lab within a center for teaching and learning we have access to thousands of faculty members with whom we can potentially collaborate in conducting research in university courses. Second, the lab was designed and launched by a postdoctoral research associate. Third, the lab was collaboratively organized and developed by the lab members. Finally, the lab is structured to continue indefinitely in a sustainable way without depending on a lab leader, and to operate seamlessly when lab members leave and new lab members join. We encourage others to experiment with founding their own labs, and adopt relevant aspects of our model. We are already seeing indications of impact aligned with the lab mission of developing learner agency, empowering learners, promoting real-world impact, and contributing to knowledge and theory. There is still much work to be done, but much progress has been made in living up to the lab principles of designing powerful learning experiences, developing radical empathy, collaborative leadership, grounding in learning sciences literature, developing new conceptualizations of learning, using design-based research methodology, and innovating new research methods.

References

Authors. (2019).

Barab, S. (2014). Design-based research. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed., pp. 151-170). NY: Cambridge University Press.

Freire, P. (1970/2005). *Pedagogy of the oppressed* (Thirtieth anniversary ed.). Continuum.

Hoadley, C. (2018). A short history of the learning sciences. In F. Fischer, C. E. Hmelo-Silver, S. R. Goldman, & P. Reimann (Eds.), *International handbook of the learning sciences* (pp. 11-23). NY: Routledge.

Kafai, Y. B. (2006). Constructionism. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 35-46). Cambridge University Press.

Kincheloe, J. L. (2005). On to the next level: Continuing the conceptualization of the bricolage. *Qualitative Inquiry, 11*(3), 323-350.

Kincheloe, J. L. (2008). *Critical pedagogy primer* (2nd ed.). Peter Lang.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Mezirow, J. (2018). Transformative learning theory. In K. Illeris (Ed.), *Contemporary theories of learning: Learning theorists... in their own words* (2nd ed., pp. 114-128). Routledge, Taylor & Francis Group.

O'Donnell, A. M. (2012). Constructivism. In K. R. Harris, S. Graham, T. Urdan, C. B. McCormick, G. M. Sinatra, & J. Sweller (Eds.), *APA educational psychology handbook, Vol 1: Theories, constructs, and critical issues*. (pp. 61-84). American Psychological Association.

Withagen, R., de Poel, H. J., Araújo, D., & Pepping, G.-J. (2012). Affordances can invite behavior: Reconsidering the relationship between affordances and agency. New Ideas in Psychology, 30(2), 250-258.
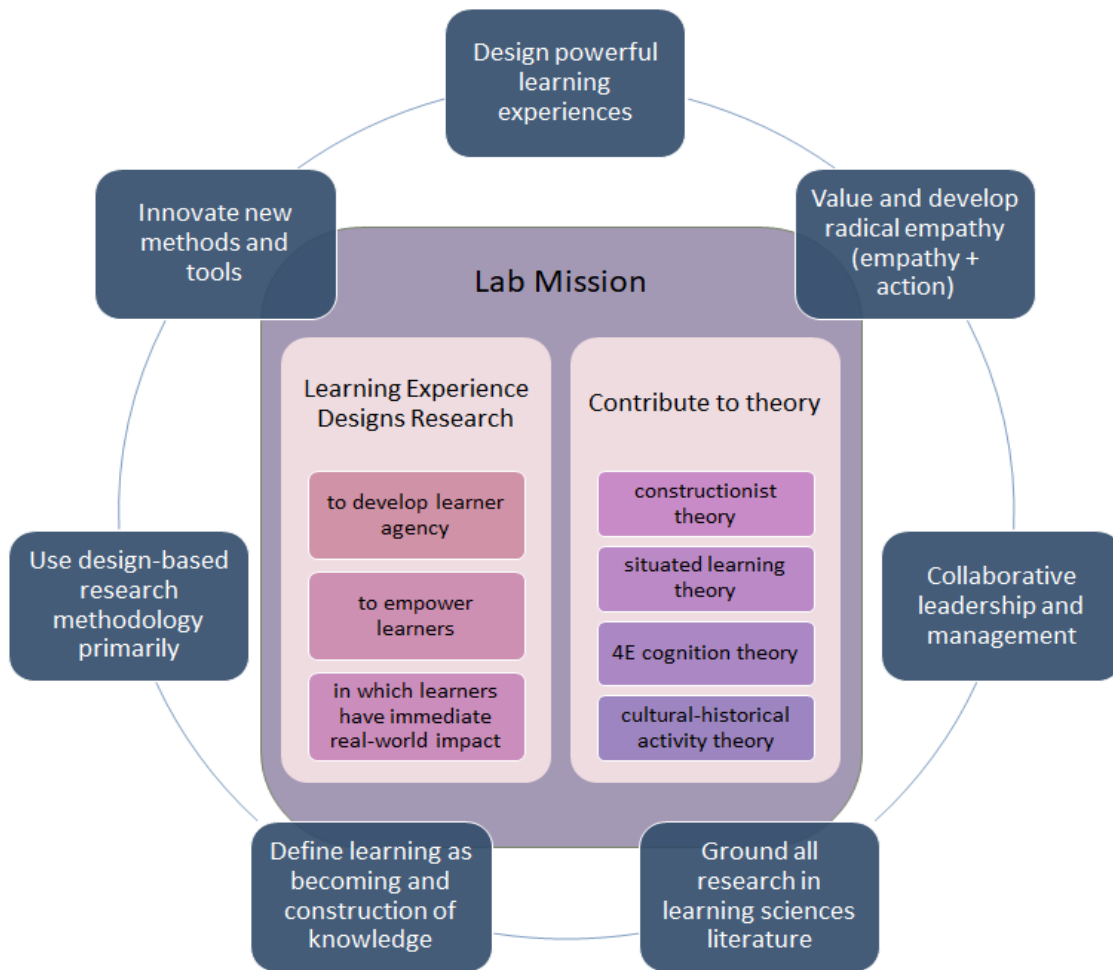
Tables and Figures

Figure 1. Lab Mission and Principles.