

University of Maryland College of Information Studies (iSchool)

**Seminar on Digital Educational Infrastructures:
Practice, Theories, and Evidence of Sociotechnical Systems**

Spring, 2018

This new seminar will focus on digital educational infrastructures using a sociotechnical frame. These technologies have become increasingly important across both K-12 and higher education. They span settings—classrooms, schools, departments—to support educational work. Some infrastructures such as learning management systems (LMSs) support classes. Another example is learning analytic platforms that support organizational decisions. Still others such as collections of open educational resources (OERs) can be used by educators in different schools and at different times. As they take increasing roles in the fabric of everyday practice, these infrastructures are interconnected (for example, a LMS can provide data for learning analytics) forming an important digital component of the educational enterprise.

These infrastructures present special challenges in both the academy and systemic leaders, including:

- Difficulty to study using traditional evaluation methods
- Literatures that are often weak theoretically and methodologically
- Rapidly evolving and interconnected designed artifacts

Systems leaders often look for guidance that university researchers should be able to provide. This seminar will provide students an opportunity to become leaders work with these core infrastructures by using a *sociotechnical frame* that is focuses across ecosocial levels (ex: classrooms, departments, districts) and timescales. It is a frame that accommodates a range of literatures and design-based improvement.

Learning Goals

This seminar will involve both common and project-specific learning goals. Common goals are those that all students will master in the course and project-specific goals will be unique to projects and will be similar across projects, but expressed in different ways.

Common Learning Goals:

- Students will develop/strengthen their understanding of the role of research literature in framing academic and research problems.
- Students will understand the contemporary literature around digital infrastructures including their adoption/adaption over various timescales
- Students will learn about and comment on literature in the area of educational digital infrastructures, including online learning, learning analytics, and open educational resources.
- Students will learn about participatory disciplinary engagement—how to be part of a community of scholars
- Students will learn how to develop a new element in the fabric of academic thought as might be found in a poster or paper.

Project-specific Learning Goals:

The project-specific learning goals relate to a particular educational technology (infrastructure) that the students are working with. For the project topic they will develop an understanding of:

- Current state of the research literature and relevant policy or sociological motivations for the technology
- Understand some gaps and opportunities for improvement in the understanding of the technology or infrastructure

Grade Components

The course will have the following grade components:

30% - Attendance and productive engagement/participation

20% - Literature review paper

5% - Project proposal

15% - Final project technical component

25% - Final project scholarly product

5% - Individual research topic presented to the class of student's choice

Project-based seminar structure

Graduate and advanced undergraduate students will work in teams to engage with a real-world project to advance scholarship around a particular education infrastructure. Students will learn about some of the evidentiary challenges of studying infrastructures whose use can play out across multiple timescales and involve adoptive and adaptive processes. The ideal student team will include four to five members with at least two with a technology focus and two having a background in the educational area the infrastructure supports. The goal for each team will be to not only work with an infrastructure to understand how it is or can be used, including how design changes might impact its use, but to then share information about their insights in a way that can inform others.

The lesson structure will feature two parallel tracks. One will involve concepts and theories from academic and peer reviewed publications (see below). The other will be a practicum where teams evaluate the usefulness and impact of their infrastructure and then identify possible incremental enhancements. These enhancements may be technological or procedural. The team will use evidence (broadly considered) as the rationale for their enhancement and design an approach to assess the impact (broadly considered) They will begin by learning about different approaches to educational research and different ways to measure and assess impact. They will then study different sociotechnical theories while also identifying strengths and deficits of their project and targeting an incremental improvement to be made and then as a final course assignment develop a publishable product for a professional conference or journal.

Possible Readings

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- Dede, C., Honan, J. P., & Peters, L. C. (2005). *Scaling Up Success: Lessons Learned from Technology-Based Educational Improvement*. Jossey-Bass, An Imprint of Wiley. 10475 Crosspoint Blvd, Indianapolis, IN 46256.
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- National Research Council. (2002). *Scientific research in education*. National Academies Press.
- Piety, P. J., Hickey, D. T., & Bishop, M. J. (2014, March). Educational data sciences: framing emergent practices for analytics of learning, organizations, and systems. In *Proceedings of the Fourth International Conference on Learning Analytics and Knowledge* (pp. 193-202). ACM.
- Ribes, D., & Finholt, T. A. (2009). The long now of technology infrastructure: articulating tensions in development. *Journal of the Association for Information Systems*, 10(5), 375.
- Rogers, E. M. (2010). *Diffusion of innovations*. Simon and Schuster.
- Simon, H. A. (1996). *The sciences of the artificial*. MIT press.
- Tukey, J. W. (1977). *Exploratory data analysis*.