Collaboration at Scale: How and Why are Instructors Using Collaborative Learning Management System Tools?

Andrew E. Krumm, Richard J. Waddington, Steven Lonn, Stephanie D. Teasley,
University of Michigan, School of Education, 610 E. University, Suite 2211, Ann Arbor, MI 48109
Email: aekrumm@umich.edu, rjwadd@umich.edu, slonn@umich.edu, steasley@umich.edu

Abstract: This paper examines how and why university instructors use collaborative tools within learning management systems (LMS). Using questionnaire data from fifteen universities and system log data tracking instructors' use of an LMS at one university, we found that instructors' (1) perceptions of value for collaborative LMS tools are related to institutional context, (2) use of collaborative LMS tools varies between academic units within one university, and (3) perceptions of value for collaborative LMS uses are not consistent predictors for whether an instructor uses a collaborative LMS tool.

Introduction

Over the past ten years, colleges and universities have witnessed the rapid diffusion of learning management systems (LMSs) (Smith, Salaway, & Caruso, 2009). LMSs are a class of web-based technologies that support a wide range of functionalities such as posting assignments, managing grades, exchanging digital resources, and supporting student-to-student collaboration—all within a comprehensive online environment. The purpose of this paper is to better understand factors that affect an instructor's use of collaborative tools contained within an LMS. Given their wide-scale diffusion, LMSs offer a compelling case that can be used to better understand how and why instructors use collaborative tools to support learning. Moreover, identifying factors that may affect an instructor's use of collaborative LMS tools represents a line of research that can lead to specific points of leverage for future computer-supported collaborative learning (CSCL) interventions and provide important insights into the implementation and scalability of CSCL tools (e.g, Roschelle, Tatar, Shechtman, & Knudsen, 2008).

Methods

To explore instructors' use of collaborative LMS tools, this study used questionnaire data collected from 15 universities and system log data that tracks instructors and students' use of LMS tools from one university. We examined instructors' perceptions and actual use of the following LMS tools: Chat, Discussion, Forums, and Wiki. The Chat tool supports synchronous interaction between and among participants on a course site; the Discussion tool supports threaded, asynchronous interaction; the Forums tool is similar to the Discussion tool, but has several more finely grained options and permission settings; and the Wiki tool supports collaborative document creation by all members of a course site. This study is organized around the following research questions: What factors help to explain an instructor's use of collaborative LMS tools (RQ #1)? To what degree do instructors across 15 universities value collaborative LMS tools and uses differently (RQ #2)? To what degree do differences in LMS use exist between academic units within one university (RQ #3)? To what degree are instructors' beliefs about LMS tools related to their actual use of collaborative LMS tools (RQ #4)?

Our analysis began by examining instructors' perceptions of value for collaborative LMS tools as captured by a questionnaire distributed to instructors at 15 universities. To analyze questionnaire data we developed several categories that captured an institution's context: International or US; enrollments greater or less than 10,000 undergraduate students; and research, teaching, or mixed orientation. Using these categories, we compared instructor's perceptions of value for collaborative LMS tools (RQ#2).

After identifying patterns in questionnaire data, we focused on one institution and analyzed instructors' use of collaborative LMS tools. To examine differences in LMS use within and between academic units (RQ#3), we developed variance components models using the following nesting strategy: tool use/non-use modeled at Level-1, instructors at Level-2, and academic units at Level-3. After decomposing the variance in LMS use across multiple academic units, we included several predictor variables in multiple, conditional 3-level hierarchical logistic regression models that were constructed to examine the likelihood of an instructor's use of individual collaborative LMS tools (RQ#1). The following variables were included in prediction models: dummy variables indicating an instructor's job category (graduate student instructor, tenure-track, or lecturer/other); a dummy variable indicating gender; a 5-point Likert scale variable indicating one's perceived value of LMS for course activities; a 5-category variable indicating the number of courses for which one has used the LMS; a 5-category variable addressing how often one visits the LMS in an academic term; a 4-category variable indicating how much one uses generic information technologies for course activities; a 5-category variable assessing how many years one has been an instructor; a collaborative LMS use factor score that was comprised of four items; and the number of students enrolled in a course. These prediction models, along with

several cross tabulations of system log data with an instructor's perceptions of value of collaborative LMS tools, were used to assess the degree to which an instructor's beliefs about LMS tools are related to their use of specific LMS tools (RQ#4).

Results and Discussion

Results from the multiple 3-level hierarchical logistic regression models, which are reported as odds ratios (OR), revealed no consistent predictive factors for the collaborative LMS tools examined (RQs #1 & #4). Across each of the four collaborative LMS tools, the constructed factor score was a significant predictor for the Wiki tool, where, holding all else constant, instructors who highly score highly on the factor score are less likely to use the Wiki tool (OR = .806; p < .05). The numbers of years for which an instructor has taught was a significant negative predictor for the Discussion tool (OR = .899; p < .001), which means that the longer one has been an instructor, the less likely he or she is to use this tool. How much technology an instructor self-reported using in his or her classroom was a significant positive predictor for the Forums tool (OR = 1.957; p < .01). How often an instructor self-reported visiting the LMS was a significant positive predictor for one's use of the Forums (OR = 1.417; p < .01), Chat (OR = 1.719; p < .001) and Discussion (OR = 1.297; p < .01) tools. The number of courses for which one has used an LMS was a significant positive predictor for the Wiki tool (OR = 1.309; p < .05). How much one values an LMS for course activities as well as gender were not significant predictors across any model. Differences between job categories among instructors were significant for the Discussion tool (OR = 1.912; p < .001), whereby tenure-track instructors, on average, were more likely to use this tool as compared to the reference category, lecturer/other. The number of students enrolled in a course was a significant negative predictor only for the Discussion tool (OR = .997; p < .001).

While we did not identify consistent explanatory variables across the four collaborative LMS tools, we did identify several important indicators that speak to how and why instructors use these tools. For example, comparisons across each of the institutional categories reveals that (1) instructors in international schools value collaborative LMS uses more than instructors in US schools, (2) smaller schools value collaborative LMS uses more than larger schools, and (3) non-research institutions value collaborative LMS uses more than research institutions (RQ #2). Differences between academic units within one university on the probability that an instructor uses a specific LMS tool were identified (RQ #3). Between-academic unit variation was minimal, however, relative to other sources of variation in that, on average, 6 times more variation was present *within* academic units as compared to *between* academic units.

In further analyses of the relationships between perceptions of collaborative LMS uses and actual use of the system (RQ#4), instructors who more highly valued collaborative LMS tools, on average, (1) deployed one more LMS tool of any type on their course site, (2) used at least one collaborative LMS tool as compared to the more typical instructor who did not use any, (3) had 10.66% less of their total course site activity dedicated to only one tool, and (4) averaged 53.38 more per-student events than those instructors who did not highly value collaborative LMS tools.

Conclusion

The purpose of this study was to better understand how and why instructors use collaborative LMS tools in their classrooms. Examining the use of collaborative technologies within an LMS presented several advantages: (1) capture a large number of instructors and (2) simultaneously examine users and non-users of collaborative tools. Based on the findings from the hierarchical logistic regression models, no single factor was predictive across all collaborative LMS tools, which signals that collaborative LMS tools may be distinct enough from one another and may afford different uses in classrooms that these tools do not easily align with the individual traits of an instructor.

A great deal of CSCL research examines learning environments and tools on a relatively small scale, and the limited scales at which a great deal of CSCL research is conducted often prohibits a comprehensive understanding of why an instructor would chose to deploy these tools in his or her classroom (e.g., Dillenbourg, 1999). Therefore, measuring actual use of collaborative tools—at scale—represents an important line of inquiry that can inform the diffusion and adoption of CSCL tools.

References

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