Abstract

As technology advances rapidly, computer-supported collaborative learning (CSCL) approaches are more and more implemented in educational contexts. Unlike traditional e-learning approaches, CSCL emphasizes the collaborative dimension, which offers learners opportunities to construct knowledge through social interaction. However, the assessment of learning processes in CSCL is still a challenge for both teachers and students. Trace data (e.g., from log files), which is objective and can be collected in an unobtrusive way, provides great opportunity to investigate and assess learning process.

The present study is integrated into the ongoing SLAM project funded by the Academy of Finland and led by the Learning, Education, and Technology (LET) research unit of the University of Oulu. It explored high school students’ (N = 12) navigation behavior on a web-based learning environment during a face-to-face advanced physics course. Open edX learning environment was chosen to implement the course as it is open source allowing for customization. The course was implemented in a collaborative learning context and the learning activities were loosely scripted. Students were instructed to work collaboratively on certain tasks during each lesson session. The study investigated students’ navigation profiles at three different levels, (i.e., class level, group level, individual level), and the possible relationship between students’ navigation profiles and their final learning outcomes.

The study used a quantitative research methodology. The log data of students’ navigation behavior was automatically recorded by the Open edX learning environment during the whole course. The data analysis process was mainly divided into two phases: log file preprocessing and descriptive analysis. 14590 logs were first reduced to 1623 students’ navigational events by filtering out non-navigational event logs or other logs irrelevant to the purpose of this study. There were eight variables/fields extracted in the cleaned data table after recoding original variables and adding new variables. In the second phase, descriptive and correlation analyses were conducted on the cleaned data table.

The findings of this study suggest that overall students were following the collaborative script during the whole course. At class level, some navigation behavior (i.e., navigated to course plan chapter) manifests students’ presence of planning and monitoring behavior, which demonstrates students’ self-regulated learning skills in collaborative learning. At group level, there was a clear pattern found in terms of group navigation frequency across different chapters, which indicates that all the groups were following a same script during the whole course. However, the active level in terms of navigation frequency varied across groups. It was also found that each collaborative group consisted of different combination of individual navigation profiles, which was a sign of students’ unequal participation during the collaborative learning course. There is also a significant correlation found between students’ total navigation frequency and their final exam grade, which is in line with the theoretical claims and several previous studies. The implication for students’ navigation profile as a formative assessment tool in CSCL are discussed.

The small sample size imposes a limitation of the generalizability of the results. Due to the non-experimental nature of this study, it was impossible to run inferential statistical test to find cause and effect relationship. In future research, it is suggested to investigate students’ navigation behavior from multiple dimensions (e.g., sequential pattern, linearity of navigation) rather than a single factor (navigation frequency). Some other research possibilities are also proposed.

Keywords: collaborative learning, computer supported collaborative learning, navigation, scripting, web-based learning environment