Mapping student online actions
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Publication date:
2015

Document Version
Peer reviewed version

Citation for published version (APA):
1. Keeping track of student learning

In this study, we investigate how students in a physics course on neutron scattering use a web-based wiki-formatted textbook while they are in class [2]. Inspired by [1], we use server log-files to track and construct networks of user sessions on a web-site for learning.

Network analysis have previously been employed to online forum discussions [3,4]. We focus on behaviours while solving problems that are related to learning.

We have constructed so called wiki-problems. In solving these problems, we aim for students to make use of hints, solutions and other parts of the web-site.

We ask the question: “What patterns of engagement can we discern from network representations of student interactions?”

2. Student online actions while learning as networks

The learning situation

navigate to page
show hint
show solution
navigate to problem
indeed: neutron?
A
B
Be neutron?
show hint
show solution
navigate to page
navigate to problem
show hint
navigate to chapter
navigate to problem
show solution
hide solution
end session

As part of the course, students spend time in class solving online problems with hints. Student online actions during these web sessions are recorded with web-analytics software OWA (http://www.openwebanalytics.com/).

Specifically, we record ip-adresses, where, when, and on what they click on the web-site pages, and the unique id for each session.

We have collected data from three different iterations of the course (2012, 2013, and 2014) with approximately 15 students each year.

We use networks and network measures to characterize student sessions as these are logged by the server. For example, target entropy [5] is a measure of how predictable student interactions are. Using educational research to help us interpret the results [3,4], we argue that a high a entropy network likely signifies more student active engagement (rather than passively reading the a page).

We want to investigate different online strategies and link these to student learning outcomes. We are in the process of identifying strategies.

3. Comparison between students from different years

We compare sessions recorded during the weeks in which students engage with online material.

We only consider sessions with duration d>5 min.

Using non-parametric tests, we find the target entropy for 2014 is significantly higher than for 2012 and for 2013 (p<0.01).

The plots show that students focus their engagement early in the course. This is also when they are given time during class to solve these problems.

Selected References