Continuous Data-Driven Group Learning Support: Case Study of an Asynchronous Online Course

Changhao Liang, Rwitajit Majumdar, Hiroaki Ogata
Kyoto University
majumdar.rwitajit.4a@kyoto-u.ac.jp

Abstract: Conducting group work often needs careful scripting and alignment to the learning objectives for a particular class. However, there are challenges such as anonymity among participants when the group work goes online. To facilitate the orchestration of such group work, a learning analytics (LA) enhanced approach is described in this work. Potential for future research related to cultivating peer evaluation skills based on the platform is also highlighted.

GLOBE Framework for data-driven group work support

Conducting group work in the is essential for cultivating soft skills (Aminu et al., 2021). Online courses have become imperative among global pandemics nowadays. Compared with traditional group work, online participation has several challenges (Table 1). Utilization of the log data generated in systems deserves further exploration to provide a socio-technical solution for online group works. This paper presented the practice of a learning analytics-enhanced technical framework, GLOBE (Liang et al., 2021) for an asynchronous online course.

Table 1

Issues for teachers to conduct online asynchronous group work and solution approach in GLOBE framework

No.	Issues of online asynchronous group work	Solution approach
1	Unfamiliarity with students (Abou-Khalil et al., 2021)	Use prior learning logs
2	Difficulty to evaluate performance (Kasch et al., 2021)	Peer evaluation system with feedback
3	Low reliability of peer evaluation (Piech et al., 2013)	Reliability estimation using learning logs

Figure 1 presents the continuous data feedforward of a reading-based group work implemented following GLOBE. The group formation system can group students homogeneously or heterogeneously based on their learning log data from different sources such as BookRoll ebook reader (Flanagan & Ogata, 2018). The ratings of the current group work evaluated by the teacher and peer evaluation as well as group work engagement data such as forum posts can be used for the next group formation and reliability estimation (Piech et al., 2013). Thus, feeding forward the data within the GLOBE phases ensures a systematic and continuous usage of data to support group work with the same students.

Figure 1

Continuous data feedforward during online reading-based group work
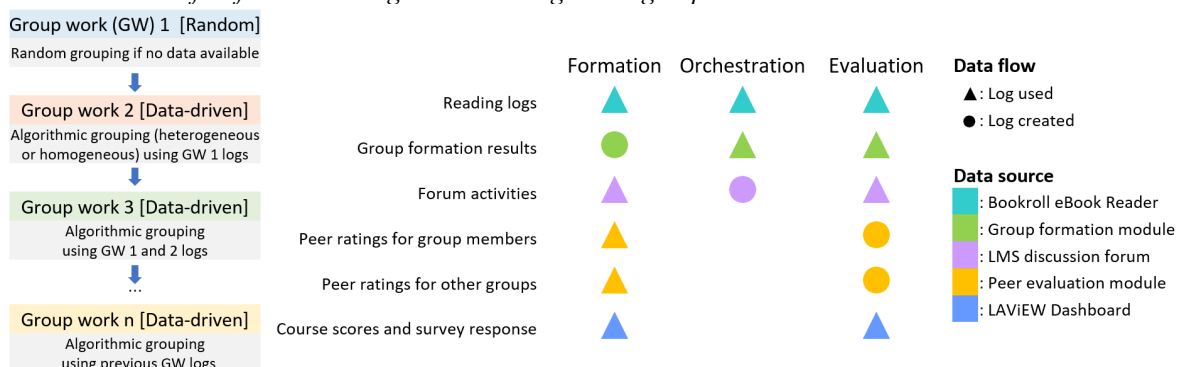

Case study of collaborative reading in online course

An implementation was conducted in a Japanese university's elective course titled "Readings in Humanities and Social Sciences: Education Technology and AI". The course lasted 14 weeks consisting of online lectures and after-class activities. 36 learners registered in the course and they had to read and summarize several research articles as after-class group work across the semester. During the online session, each group will present their reading outcomed after the main lecture by the teacher. Each student was asked to evaluate their group members

and the presentation of other groups using the peer evaluation system. For the first trial, random groups were formed for lack of student model data. Then group work engagement data and evaluation data were collected. From the next group work, heterogeneous groups were formed using reading logs in BookRoll and previous group work performance (Figure 2(a) & (b)). The teacher can view their previous performance data and identify students who may need special attention (Figure 2(c)). For the peer evaluation, peer ratings were visualizaed (Figure 2(d)) and weighted scores were calculated considering students' previous performance as the reliability indicator (Figure 2(e), Piech et al., 2013). In their final report, students admitted the idea of peer evaluation was novel to them and helpful for mutual learning, and evaluating the presentation of other groups incited reflection of their work as well, which conformed with the findings of related studies (Aminu et al., 2021).

Figure 2

Teacher's interface of the group work module based on GLOBE (Liang et al., 2021)
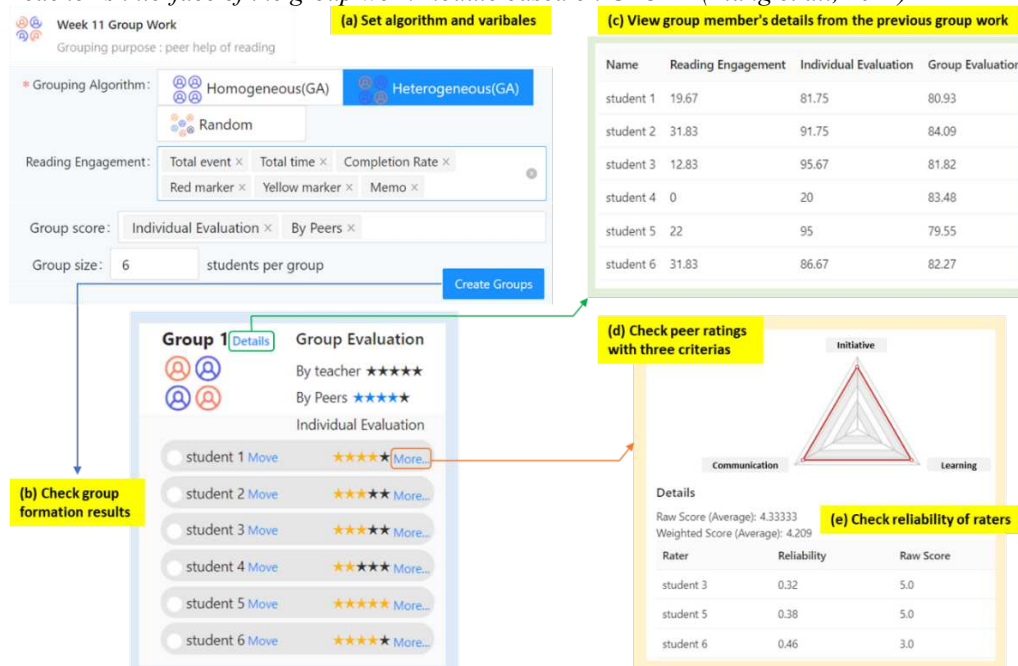
Conclusion and future work

The study contributes to the GLOBE framework with a practical workflow and data cycle in an online learning environment and provides solutions to common issues of asynchronous group work. In the future study, we will focus on the further pedagogical implications of the system to cultivate group work-related capabilities.

References

Abou-Khalil, V., Helou, S., Khalife, E., Chen, M. A., Majumdar, R., & Ogata, H. (2021). Emergency online learning in low-resource settings: Effective student engagement strategies. *Education Sciences*, *11*(1), 24.

Aminu, N., Hamdan, M., & Russell, C. (2021). Accuracy of self-evaluation in a peer-learning environment: An analysis of a group learning model. *SN Social Sciences*, *1*(7), 1–17.

Flanagan, B., & Ogata, H. (2018). Learning analytics platform in higher education in Japan. *Knowledge Management & E-Learning: An International Journal*, *10*(4), 469-484.

Kasch, J., van Rosmalen, P., Lohr, A., Klemke, R., Antonaci, A., & Kalz, M. (2021). Students' perceptions of the peer-feedback experience in MOOCs. *Distance Education*, *42*(1), 145–163.

Liang, C., Majumdar, R. & Ogata, H. (2021). Learning log-based automatic group formation: system design and classroom implementation study. *Research and Practice in Technology Enhanced Learning*,*16*(1), 1–22.

Piech, C., Huang, J., Chen, Z., Do, C., Ng, A., & Koller, D. (2013). Tuned models of peer assessment in MOOCs. In *Proceedings of The 6th International Conference on Educational Data Mining* (EDM 2013).

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