

HOW PRE-SERVICE STUDENT TEACHERS COLLABORATE IN WORKING WITH A HYBRID MYSTERY GAME CONTAINING MULTIPLE TEXTS: AN OBSERVATIONAL STUDY

Wenke Mork Rogne, Marit Brekke, & Ingrid Saure
Volda University College (Norway)

Abstract

Pre-service training institutions have a responsibility to include lessons that enhance student teachers' critical thinking skills in a collaborative setting. In this study, six student teachers worked with a hybrid, commercial mystery game containing multiple texts after having a lesson on multiple-text comprehension. The aim of this qualitative intervention study was to investigate how the student teachers collaborate and interact when working with a commercial mystery game in an educational setting. We used Wineburg's heuristics and the framework Tech-SEDA to investigate video-recorded problem-solving conversations, focusing especially on how grades are initially proposed, negotiated, and decided through a series of actions that constitute the decision-making process. We investigated what types of conversation strategies were applied during the task, and how student teachers cooperated and reflected after the game-based inquiry task. Further, we examined how the student teachers expressed the transferability to their own practice as future teachers.

Keywords: *Hybrid game, problem solving, multiple texts, collaborative learning.*

1. Extended Summary

1.1. Aim

The main aim of this qualitative study was to investigate how student teachers collaborate and interact when working with a commercial mystery game in an educational setting.

1.2. Theoretical framework

Pre-service training institutions have a responsibility to include lessons that enhance student teachers' critical thinking skills in a collaborative setting. Game-based learning (GBL) has become an increasingly popular pedagogical approach to support learning for university students (Bai et al., 2020; Gonzalo-Iglesia et al., 2018; Hou et al., 2023; Owen & Licorish, 2020; Sanchiz et al., 2024; Tobias et al., 2014).

Gaming using non-educational board games have the potential to increase engagement, motivation, and meaningful learning in educational settings (Berland & Lee, 2021). However, applying various types of games for educational purposes in schools and higher education contexts is still limited (Allsop & Jessel, 2015; Persico et al., 2018), even though various types of traditional board games represent a growing global market (BusinessWire, 2023), and some have proved beneficial for motivation, user interaction, and social effects in schools (Saalem et al., 2022). Although many studies have claimed the potential benefits of GBL for content acquisition, deep learning, and engagement, its effectiveness in practice remains unknown (Crocco et al., 2016).

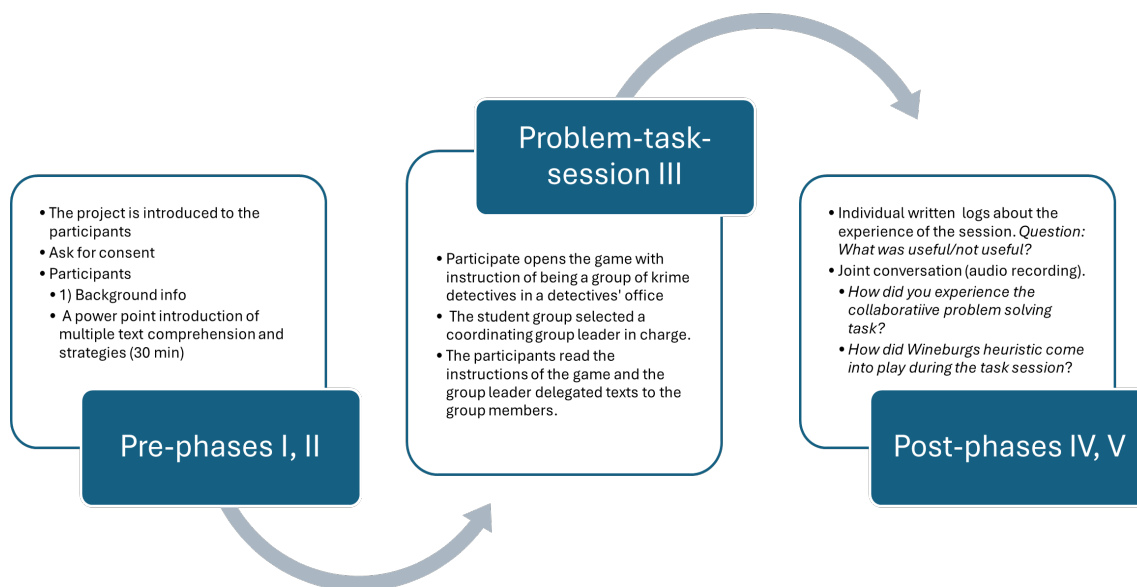
Over the years, gamification has been accepted as useful for generating more engaging educational environments (Saalem et al., 2022). Hamari and colleagues (2016) examined how flow—conceptualized as the balance between challenge and skill—together with engagement and immersion, influences learning outcomes in game-based learning environments. Their data were collected through a survey administered to players (N = 173) of two educational games. The findings indicate that engagement exerted a clear positive influence on learning. In contrast, results did not demonstrate a significant relationship with learning outcomes. Moreover, the level of challenge in the games positively affected learning both directly and indirectly through its contribution to heightened engagement (Hamari et al., 2016).

Furthermore, games have educational potential beyond engaging and motivating students. Games can also promote the acquisition of relevant knowledge, skills, and attitudes. There are contextual factors within the educational setting that might impact the outcome of the task. In a study by Saalem et al. (2021), 44 graduate students played the same word association board game, which was introduced either as a game or as a study activity. Results showed that the study activity setting increased recall compared to the gaming context. In another study by Saalem et al. (2022), 87 participants played the same game in the two previous contexts. The grouped analysis showed that the gaming context led to poorer learning than the study activity context for recognition and recall measures, even when considering prior knowledge, in-game behaviour, and prior gaming experience.

1.3. Methods

1.3.1. Procedure. This sequential intervention study is qualitative with some quantitative traits, structured into a pre-phase, problem–task session, and post-phase. The inquiry-based approach for PSTs consisted of five distinct general inquiry phases: I) Orientation, II) Conceptualisation, III) Investigation, IV) Conclusion, and V) Discussion (see Figure 1).

Figure 1. Overview of the phases in the sequential intervention design.



1.3.2. Materials. A hybrid mystery board game called “Murder on the Disco” (Norwegian: Mordet på russetreffet) aimed to position participants as detectives to reveal the truth about a murder mystery. The age group targeted is 14 years and older. There are explicit instructions for finding out who is lying and why, and who murdered the victim—a young girl at a local disco in Norway. The game includes approximately 40 different documents various genres in a box with three envelopes containing police reports, mobile logs, a map, pictures, newspaper articles, and digital links to YouTube clips and QR codes.

1.3.3. Observational data. The data analysed comprised three sequences of video recordings of six student teachers in one pre-service teacher institution in Norway, totalling approximately 90 minutes of recorded interaction. The video data were recorded with a Sony 4K Handycam positioned between the participants (for close-ups) and one camera capturing the activity from 2–3 metres away. The data were transcribed using Jefferson’s (2004) conventions for conversation analysis. All participants signed a letter of consent, and the project was approved by SIKT.

1.3.4. Data analysis. We used Wineburg’s (1991) three heuristics—sourcing, corroboration, and contextualisation—in categorising the data. Further, we investigated video-recorded problem-solving conversations using the newest version of Tech-SEDA (Technology Scheme of Educational Dialogue Analysis) by Hennessy (2025), focusing especially on how knowledge is initially proposed, negotiated, and decided through a series of actions that constituted the decision-making process. This is a tool for transcribing and analysing social interaction and includes micro-analysis of visual and verbal resources used in interaction (Hennessy, 2025; Sacks et al., 1974; Sidnell & Stivers, 2012). The focus in the analysis

is on the sequential unfolding of actions in interaction that participants perform successively through their turns at talk. Each turn can be inspected for its treatment of the prior according to the 'next-turn proof procedure' (Sacks et al., 1974).

1.3.5. Students' reflection logs. Using thematic analysis by Braun & Clarke (2021), the data from the written reflection logs were analysed horizontally, with the two questions serving as the foundation. During this phase, comparative principles were applied, allowing for the comparison of categories across all student teachers' reflections. Subsequently, these categories were condensed into subthemes through vertical analysis. This vertical analysis facilitated the comparison of different student teachers' reflections. Ultimately, the subthemes were cross-compared and categorised into main themes and core findings.

The preliminary results of the quantitative analysis showed that the most frequent category in Tech-SEDA during inquiry dialogue was Reasoned coordination—comparing, evaluating, and resolving tasks—followed by Invitation for reasoning and Challenge: query, doubt, and reject ideas. These categories align with the three heuristics found in Wineburg (1991). Traces of other categories in Tech-SEDA were also found.

2. Results

The preliminary results of the quantitative analysis showed that the most frequent category in Tech-SEDA during inquiry dialogue was Reasoned coordination—comparing, evaluating, and resolving tasks—followed by Invitation for reasoning and Challenge: query, doubt, and reject ideas. These categories align with the three heuristics found in Wineburg (1991). Traces of other categories in Tech-SEDA were also found. The results of the qualitative analysis of reflection logs show that student teachers enjoyed working with the game-based task, which emphasised greater awareness of how and when they applied different reading strategies during the game-based inquiry task. Moreover, the student teachers claimed that game-based play in an educational setting emphasised critical thinking skills and deeper learning, as well as social engagement and motivation.

3. Conclusion

The study demonstrates that student teachers verbalise all three strategies and actively collaborate when engaging with a mystery game involving multiple texts (Wineburg, 1991), which aligns with the most frequent categories found in the analysis using Tech-SEDA. Correction of overlapping and contradictory information occurs through negotiations within dialogue and the problem-solving process (Rogne & Gamlem, 2019). This study shows that this board game promoted these teacher students' critical thinking, playful learning, engagement, and collaboration (cf. Allsop & Jessel, 2015). However, there are some limitations of being a small-scale study with no intent to generalize. Larger, longitudinal studies are required to investigate the effects of learning during play. However, this study might have pedagogical implications for teacher training, promoting a variety of more collaborative, engaging board games in educational settings.

References

- Allsop, Y., & Jessel, J. (2015). Teachers' experience and reflections on game-based learning in the primary classroom: Views from England and Italy. *International Journal of Game-Based Learning*, 5(1), 1–17.
- Bai, S., Hew, K. F., & Huang, B. (2020). Does gamification improve student learning outcome? *Educational Research Review*, 30, 100322. <https://doi.org/10.1016/j.edurev.2020.100322>
- Bartolucci, M., Mattioli, F., & Batini, F. (2019). Do board games make people smarter?: Two initial exploratory studies. *International Journal of Game-Based Learning*, 9(4), 1–14. <https://doi.org/10.4018/IJGBL.201910010120>
- Berland, M., & Lee, V. R. (2011). Collaborative strategic board games as a site for distributed computational thinking. *International Journal of Game-Based Learning*, 1(2), 65–81. <https://doi.org/10.4018/ijgbl.2011040105>
- Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, 18(3), 328–352. <https://doi.org/10.1080/14780887.2020.1769238>
- BusinessWire. (2023). *Global board games market report 2023–2028*.

- Crocco, F., Offenholley, K. & Hernández, C. (2016). A Proof-of-Concept Study of Game-Based Learning in Higher Education. *Simulation & Gaming* 47(4), 403–422. <https://doi.org/10.1177/1046878116632484>
- Danielowich, R. M. (2013). Shifting the reflective focus: encouraging student teacher learning in video-framed and peer-sharing contexts. *Teachers and Teaching*, 20(3), 264–288. <https://doi.org/10.1080/13540602.2013.848522>
- Gonzalo-Iglesia, J. L., Lozano-Monterrubio, N., & Prades-Tena, J. (2018). Noneducational board games in university education. *Revista Lusófona de Educação*, 41, 45–62. <https://doi.org/10.24140/issn.1645-7250.rle41.03>
- Hamari, J., Shernoff, D., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, 54, 170–179. <https://doi.org/10.1016/j.chb.2015.07.045>
- Hennessy, S. (2025). Analysing educational dialogue around shared artefacts in technology-mediated contexts: a new coding framework. *Classroom Discourse*, 16(2), 172–206. <https://doi.org/10.1080/19463014.2024.2339346>
- Hou, H.-T., Fang, Y.-S., & Tang, J. T. (2023). Designing an alternate reality board game with augmented reality and multi-dimensional scaffolding for promoting spatial and logical ability. *Interactive Learning Environments*, 31(7), 4346–4366. <https://doi.org/10.1080/10494820.2021.1961810>
- Jefferson, G. (2004). Glossary of transcript symbols. In G. Lerner (Ed.), *Conversation analysis: Studies from the first generation*.
- Owen, H. E., & Licorish, S. A. (2020). Game-based student response system: The effectiveness of Kahoot! on junior and senior information science students' learning. *Journal of Information Technology Education: Research*, 19, 511–553. <https://doi.org/10.28945/4608>
- Persico, D., Bailey, C., Buijtenweg, T. P., Dagnino, F. M., Earp, J., Haggis-Burridge, M., Manganello, F., Passarelli, M., Perrotta, C., & Pozzi, F. (2018). Final Research Report. Gaming Horizons Deliverable D 1.8. In *Gaming horizons: alternative framings for a new role of gaming in education and society :deliverables: Horizon 2020 research and innovation programme* <https://www.gaminghorizons.eu/wp-content/uploads/sites/18/2018/03/D1.8-final.pdf>
- Rogne, W. M., & Gamlem, S. M. (2019). Pupils' information processing. *Scandinavian Journal of Educational Research*, 63(4), 520–533. <https://doi.org/10.1080/00313831.2017.1402369>
- Sacks, H., Schegloff, E. A., & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking. *Language*, 50, 696–735. <http://dx.doi.org/10.2307/412243>
- Saalem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification applications in e-learning. *Tech Know Learn*, 27, 139–159. <https://doi.org/10.1007/s10758-020-09487-x>
- Sanchiz, M., Gimenes, M., & Lambert, E. (2024). Learning With Board Games: Interplay of Context and Students' Prior Knowledge. *The Journal of Experimental Education*, 1–24. <https://doi.org/10.1080/00220973.2024.2414025>
- Sidnell, J. (2015). *Conversation analysis*. Wiley Blackwell.
- Sidnell, J., & Stivers, T. (2012). *The handbook of conversation analysis*. Wiley Blackwell.
- Tobias, S., Fletcher, J. D., & Wind, A. P. (2014). Game-Based Learning. In M. Spector, M. D. Merrill, J. Elen & M. J. Bishop (Eds.), *Handbook of Research on Educational Communications and Technology* (pp. 485–503). Springer.
- Wineburg, S. S. (1991). Historical problem solving. *Journal of Educational Psychology*, 83(1), 73–87. <https://doi.org/10.1037/0022-0663.83.1.73>