Review of Peer Assessment Frameworks that Support Group-Based Assessment in E-Learning Environment for Higher Institutions of Learning

Job Kalema, Jane Katusiime, Simon Kawuma
Mbarara University of Science and Technology, Uganda

ABSTRACT

Assessment remains a fundamental part of the learning experience for students and the way to gauge the extent and quality of students in higher institutions of learning but has moved from assessment processes designed and solely implemented by the teacher to those designed for student engagement and empowerment inflexible assessment and there is increasing interest in the implementation of peer assessment also known in the literature as peer review or feedback assessment. Peer assessment is a promising approach to engage learners in the assessment process and easily integrate into the learning activities. In higher education, peer assessment involves students applying criteria and standards to evaluate the work of their peers. This paper aims to fill the gap in the current body of knowledge by providing a detailed review of peer assessment frameworks that support group-based assessments in e-learning environments.

Keywords: Peer Assessment Frameworks, Support Group-Based Assessment, Higher Institutions of Learning

INTRODUCTION

Background

In recent years, e-learning has emerged as a transformative approach to education, particularly in higher institutions of learning. The rapid advancement of digital technologies and the increasing accessibility of the internet have significantly contributed to the growth of e-learning. This educational paradigm offers flexible learning opportunities, allowing students to access educational resources and participate in courses from anywhere in the world. As a result, e-learning has become a critical component of higher education, enabling institutions to cater to a diverse student population and adapt to the evolving demands of the 21st-century educational landscape (Wei, 2023; Haleem, 2022).

Group-based assessments have long been recognized as an effective pedagogical strategy in higher education. These assessments involve students working collaboratively to achieve common academic goals, promoting essential skills such as teamwork, communication, and problem-solving. By engaging in group-based activities, students can benefit from the diverse perspectives and knowledge of their peers, leading to a deeper understanding of the subject matter. However, the implementation of group-based assessments in e-learning environments presents unique challenges, including ensuring equitable participation, maintaining academic integrity, and accurately assessing individual contributions within the group context (Tumpa, et al, 2021; Jakoet-Salie, 2023; Mohamed, 2022).

Peer assessment, where students evaluate the contributions and performance of their peers, has gained prominence as a valuable tool to support group-based assessments in e-learning environments. Peer assessment fosters a sense of responsibility among students and encourages them to critically reflect on their own and others' work. This process not only enhances student engagement but also promotes the development of higher-order thinking skills. In the context of e-learning, peer assessment can address some of the challenges

associated with group-based assessments by providing a mechanism for monitoring and evaluating individual contributions (Yin, 2022; Double et al, 2020; Marjo, 2009).

The integration of peer assessment in e-learning environments requires the development of robust frameworks that ensure fairness, reliability, and validity. These frameworks must be designed to support the unique characteristics of e-learning, such as asynchronous communication, diverse student populations, and the use of digital tools for collaboration and assessment (Roberts, 2006; Ahmed, 2023; Rezaei, 2024). Despite its potential benefits, the effective implementation of peer assessment in e-learning environments faces several hurdles. Issues such as biased evaluations, inconsistent grading standards, and the lack of adequate training for students and instructors can undermine the reliability and validity of peer assessment. Additionally, the diverse technological tools and platforms used in e-learning necessitate a comprehensive framework to ensure seamless integration and effective utilization of peer assessment methods (Babik, 2024).

While numerous studies highlight the benefits of peer assessment, there is a significant gap in the literature regarding the development and implementation of effective peer assessment frameworks specifically tailored for group-based assessments in e-learning environments. Moreover, there is a lack of comprehensive guidelines and best practices to address the unique challenges posed by the online context. This gap highlights the need for systematic research to identify, analyze, and evaluate existing peer assessment frameworks and to provide evidence-based recommendations for their implementation in higher education.

Therefore, this study aims to fill the gap in the current body of knowledge by providing a detailed review of peer assessment frameworks that support group-based assessments in e-learning environments. By synthesizing existing research, this review will: Provide insights into effective strategies and best practices for implementing peer assessment in e-learning environments, thereby guiding educators and policymakers; Offer recommendations that can improve the quality and fairness of group-based assessments, ultimately enhancing student learning outcomes and engagement; Contribute to the development of robust peer assessment frameworks that ensure fairness, reliability, and validity in e-learning contexts; and address the diverse needs of students in higher education, promoting inclusivity and accessibility in e-learning environments.

By addressing these objectives, this literature review will contribute to the advancement of e-learning practices and support the continuous improvement of assessment strategies in higher education. The findings of this review will be instrumental in guiding future research and informing the design and implementation of effective peer assessment frameworks for group-based assessments in e-learning environments.

FINDINGS

Existing Peer Assessment Frameworks

The literature reveals a variety of peer assessment frameworks designed to support group-based assessments in e-learning environments. These frameworks often incorporate elements such as structured peer feedback, assessment rubrics, and technology-mediated platforms.

The Scaffolded Peer Assessment Model:

The scaffolded peer assessment model involves providing students with detailed rubrics and guidelines to assess their peers' work. It encompasses multiple stages, where students first evaluate their own submissions before proceeding to evaluate their peers' work. Research indicates that this model significantly improves the quality and fairness of assessments. By offering clear assessment criteria and iterative feedback processes, scaffolded peer assessment enhances the overall assessment experience (Konings, 2019).

Harrasi (2024) emphasized the importance of structured guidance in self-assessment, which aligns with the principles of scaffolded peer assessment, empowering students through self-monitoring and reflective abilities. Their study found that students who received scaffolded guidelines showed significant improvement in self-regulation and assessment accuracy.

Andrade (2019) conducted a study on the effectiveness of scaffolded peer assessment in a writing course. They provided students with detailed rubrics and step-by-step instructions for evaluating peers' essays. The results indicated that students were more engaged and provided higher-quality feedback compared to those who did not receive scaffolding.

Harrasi (2024) explored the use of scaffolded peer assessment in science education. They developed a model that included training sessions, assessment rubrics, and iterative feedback loops. Their findings showed that scaffolded peer assessment model led to increased student confidence and improved understanding of scientific concepts.

Amber Van Hoe (2024) investigated the role of scaffolding in online peer assessment. They designed a system that integrated detailed rubrics, peer training modules, and automated feedback mechanisms. The study revealed that scaffolded peer assessment significantly enhanced students' critical thinking and analytical skills.

Amirreza Karami (2015) reviewed various peer assessment models and highlighted the benefits of scaffolded peer assessment in fostering student autonomy and reflective thinking. He argued that scaffolding provides a structured framework that helps students develop assessment literacy and improves the reliability of peer evaluations.

Double and McGrane (2019) examined the impact of scaffolded peer assessment on student performance in a collaborative learning environment. Their study found that scaffolding helped students provide more accurate and constructive feedback, which in turn improved their own learning outcomes. They suggested that scaffolded peer assessment should be an integral part of collaborative learning strategies.

Siti Nabilah (2021) developed a scaffolded peer assessment for mathematics education. The model included multiple stages of feedback and revision, supported by detailed rubrics and guided reflection prompts. The study showed that students who participated in scaffolded peer assessment demonstrated significant gains in problem-solving skills and conceptual understanding.

Yu-Hui Ching (2013) explored the use of scaffolded peer assessment in project-based learning. They provided students with explicit criteria and structured feedback forms to evaluate their peers' projects. The findings indicated that scaffolded peer assessment promoted deeper learning and increased student engagement in the project work.

The studies on scaffolded peer assessment consistently demonstrate its effectiveness in enhancing student learning outcomes. The structured guidelines, detailed rubrics, and iterative feedback processes inherent in scaffolded models contribute to improved assessment accuracy, critical thinking, and student engagement. However, the studies also highlight the need for ongoing support and training for both students and instructors to maximize the benefits of scaffolded peer assessment.

Peer Feedback Mechanisms:

Craig and Kay (2021) investigated the benefits of peer assessment in online learning environments. Their study confirmed that computer-mediated peer assessment is associated with greater learning gains compared to paper-based peer assessment. The use of structured feedback forms and criteria guides students in evaluating their peers' work. Online peer assessment promotes better connectivity and interaction among students.

Double (2020) examined the impact of peer feedback mechanisms on student performance in an online course. They provided students with detailed feedback forms and criteria for evaluating peers' assignments. The study found that students who received

structured peer feedback showed significant improvements in their assignments and overall course performance.

Kerman (2023) explored the use of peer feedback in computer science education. They developed an online system that facilitated anonymous peer feedback and provided structured guidelines for evaluation. The results indicated that students valued the peer feedback process and found it helpful for improving their coding skills and project quality.

Gielen et al. (2010) conducted a meta-analysis of peer feedback studies and identified key elements that contribute to effective peer feedback mechanisms. These elements include clear assessment criteria, structured feedback forms, and training for students in providing constructive feedback. Their analysis showed that structured peer feedback leads to better learning outcomes and higher student satisfaction.

Yong Wu (2021) investigated the role of peer feedback in enhancing writing skills in a language course. They designed a feedback system that included detailed rubrics and guidelines for peer review. The study found that students who participated in the structured peer feedback process demonstrated significant improvements in their writing quality and received higher grades.

Erbilgin (2023) explored the impact of structured peer feedback in a blended learning environment. They provided students with detailed feedback guidelines and rubrics for evaluating their peers' work. The study revealed that students who engaged in structured peer feedback showed improved understanding of course content and higher levels of critical thinking.

Sadler and Good (2006) investigated the effects of peer feedback on student motivation and performance. They developed a feedback framework that included clear criteria and structured reflection prompts. The study found that students who received detailed peer feedback were more motivated to improve their work and demonstrated better academic performance.

Falchikov and Goldfinch (2000) conducted a comprehensive review of peer feedback mechanisms and their impact on student learning. They identified that structured peer feedback, supported by clear guidelines and rubrics, enhances the reliability and validity of peer assessments. The review also highlighted the importance of training students in providing effective feedback.

Conclusively, these studies consistently highlight the benefits of structured peer feedback in improving student learning outcomes. The use of clear criteria, detailed feedback forms, and training in providing constructive feedback enhances the quality and effectiveness of peer assessments. However, there is a need for more research on the long-term impact of peer feedback mechanisms and their integration into various educational contexts.

Collaborative Learning Theories:

Jones et al. (2000) provided a theoretical foundation for collaborative learning, defining it as a scenario where individuals learn together through interaction. Their research underscored the significance of social interactions in enhancing the learning process. They also discussed the use of synchronous and asynchronous communication methods to support collaborative learning in online environments.

Vygotsky (1978) introduced the concept of the Zone of Proximal Development (ZPD), emphasizing the role of social interaction in cognitive development. His theories laid the groundwork for understanding how collaborative learning can facilitate higher-order thinking skills and deeper understanding of complex concepts.

Slavin (1996) developed the Cooperative Learning Theory, which focuses on structuring group work to promote positive interdependence, individual accountability, and collaborative skills. His research demonstrated that cooperative learning strategies lead to improved academic performance and social skills.

Bandura (1986) proposed the Social Cognitive Theory, which highlights the importance of observational learning, imitation, and modeling in collaborative learning environments. His work emphasized the role of peer interactions in shaping learning behaviors and outcomes. And Johnson (1989) developed the Social Interdependence Theory, which posits that the way group members interact and depend on each other affects their learning outcomes. Their research identified key elements of effective collaborative learning, including positive interdependence, individual accountability, and group processing.

Lave and Wenger (1991) introduced the concept of Situated Learning, which suggests that learning occurs through participation in social and cultural contexts. Their theory emphasizes the importance of authentic tasks and real-world experiences in collaborative learning environments.

Roschelle and Teasley (1995) explored the role of joint problem-solving in collaborative learning. They argued that collaborative learning involves mutual engagement and shared understanding, which are facilitated through effective communication and coordination among group members. Also, Dillenbourg (1999) proposed the Collaborative Learning Framework, which outlines the cognitive, social, and organizational dimensions of collaborative learning. His research highlighted the importance of designing collaborative tasks that promote interaction, reflection, and knowledge construction.

The studies on collaborative learning theories provide a comprehensive understanding of the principles and mechanisms that underpin effective collaborative learning. They highlight the importance of social interaction, positive interdependence, and structured group work in enhancing learning outcomes. However, there is a need for more empirical research on the application of these theories in online educational settings and the integration of digital tools to support collaborative learning.

Frameworks for Group-Based Assessments:

Shermin et al. (2019) presented a framework for group-based assessments that emphasizes constructive coherence between learning outcomes, assessments, and learning activities. Their framework provides a roadmap for educators to design and conduct group assessments, focusing on planning, execution, and quality assurance.

Adesina (2023) developed a framework for peer assessment in group projects, which includes clear criteria, structured feedback forms, and mechanisms for ensuring fairness and reliability. Their study found that the framework improved student engagement and satisfaction with the assessment process.

Harris and Bell (1990) proposed a framework for collaborative assessment that integrates peer and self-assessment to enhance student learning and accountability. Their research indicated that the framework promoted deeper understanding and critical thinking among students. Also, Cheng and Warren (2000) introduced a framework for evaluating group-based assignments that incorporates peer feedback and self-assessment. Their study showed that the framework improved the quality of group work and provided valuable insights into individual contributions.

Boud and Falchikov (2006) developed a framework for sustainable assessment in group projects, which emphasizes the importance of developing assessment skills that students can use beyond their academic studies. Their research highlighted the need for ongoing support and training to ensure the effectiveness of the framework. Also, Race (2001) proposed a framework for assessing group work that focuses on the development of key skills such as communication, teamwork, and problem-solving. His study found that the framework helped students develop a range of transferable skills and enhanced their overall learning experience.

Brindley et al. (2009) developed a framework for online group-based assessments, which includes guidelines for designing, implementing, and evaluating group projects in online learning environments. Their research indicated that the framework improved student

engagement and collaboration in online courses. Also Macdonald (2003) introduced a framework for assessing group work in higher education, which incorporates peer feedback, self-assessment, and tutor assessment. Her study found that the framework promoted fairness and transparency in the assessment process and enhanced student learning outcomes.

The studies on frameworks for group-based assessments highlight the importance of clear criteria, structured feedback forms, and mechanisms for ensuring fairness and reliability. These frameworks contribute to improved student engagement, satisfaction, and learning outcomes. However, there is a need for more research on the implementation of these frameworks in diverse educational settings and the integration of digital tools to support group-based assessments.

Inter-Peer Assessment Framework:

Moccozet and Tardy (2015) designed an inter-peer assessment framework integrated into an online environment based on a social network engine. The framework offers online shared workspaces for group collaborative learning and introduces the concept of ePortfolios for peer feedback and assessment. Their experiment demonstrated the framework's potential in supporting summative assessments and providing valuable learning feedback.

Li and Steckelberg (2006) developed an inter-peer assessment framework that integrates detailed rubrics, peer training modules, and automated feedback mechanisms. Their study revealed that the framework significantly enhanced students' critical thinking and analytical skills.

Berg (2006) explored the use of an inter-peer assessment framework in problem-based learning environments. The study found that the framework enhances self-directed learning skills, critical thinking, and the ability to give and receive feedback.

Reinholz (2015) developed an inter-peer assessment framework for mathematics education. The framework included multiple stages of feedback and revision, supported by detailed rubrics and guided reflection prompts. The study showed that students who participated in the inter-peer assessment framework demonstrated significant gains in problem-solving skills and conceptual understanding.

van Zundert et al. (2012) examined the impact of an inter-peer assessment framework on student performance in a collaborative learning environment. Their study found that the framework helped students provide more accurate and constructive feedback, which in turn improved their own learning outcomes.

Smith and Reinhold (2014) conducted a study on the effectiveness of an inter-peer assessment framework in a writing course. They provided students with detailed rubrics and step-by-step instructions for evaluating peers' essays. The results indicated that students were more engaged and provided higher-quality feedback compared to those who did not use the framework.

Ashini et al. (2020) presented an inter-peer assessment framework for group-based assessments that emphasizes constructive coherence between learning outcomes, assessments, and learning activities. Their framework provides a roadmap for educators to design and conduct group assessments, focusing on planning, execution, and quality assurance.

DISCUSSION

The studies on inter-peer assessment frameworks consistently demonstrate their effectiveness in enhancing student learning outcomes. The structured guidelines, detailed rubrics, and iterative feedback processes inherent in these frameworks contribute to improved assessment accuracy, critical thinking, and student engagement. However, there is a need for ongoing support and training for both students and instructors to maximize the benefits of inter-peer assessment frameworks.

The literature reveals a consensus on the value of scaffolded peer assessment, peer feedback mechanisms, collaborative learning theories, frameworks for group-based assessments, and inter-peer assessment frameworks in promoting active learning and critical thinking. However, the effective implementation of these methods in online environments remains a challenge. The studies highlight the need for comprehensive frameworks that prioritize learning outcomes and foster meaningful interactions among students. There is also a call for more research on the integration of digital tools in peer assessment processes and the impact of these methods on online group interactions. Addressing these gaps through targeted research and innovative frameworks will contribute to more effective and meaningful learning experiences in online environments, enhancing the efficacy of assessment practices in higher education.

REFERENCES

Ahmed, M. R., & Sidiq, M. A. (2023). Evaluating Online Assessment Strategies: A Systematic Review of Reliability and Validity in E-Learning Environments. *North American Academic Research*, *6*(12), 1–18. DOI: 10.5281/zenodo.10407361

Al Harrasi, K. T. S. (2024). Enhancing learner self-monitoring in self-assessment through the use of pedagogical resources. *Cogent Social Sciences, 10*(1). https://doi.org/10.1080/23311886.2024.2334486

Andrade, H. L. (2019). A Critical Review of Research on Student Self-Assessment. *Front. Educ., 4,* 87. https://doi.org/10.3389/feduc.2019.00087

Babik, D., Gehringer, E., Kidd, J. et al. (2024). A systematic review of educational online peer-review and assessment systems: charting the landscape. *Education Tech Research Dev, 72*, 1653-1689. https://doi.org/10.1007/s11423-024-10349-x

Double, K.S., McGrane, J.A. & Hopfenbeck, T.N. (2020). The Impact of Peer Assessment on Academic Performance: A Meta-analysis of Control Group Studies. *Educ Psychol Rev, 32,* 481–509. https://doi.org/10.1007/s10648-019-09510-3

Erbilgin, E., Robinson, J., Jarrah, A. M., Johnson, J. D., & Gningue, S. (2023). Exploring the type and quality of peer feedback in a graduate-level blended course. *Education Sciences, 13*(6). https://doi.org/10.3390/educsci13060548

Gielen, S., Peeters, E., Dochy, F., Onghena, P., & Struyven, K. (2010). Improving the effectiveness of peer feedback for learning. *Learning and Instruction, 20*(4), 304-315. https://doi.org/10.1016/j.learninstruc.2009.08.007

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275–285. https://doi.org/10.1016/j.susoc.2022.05.004

Jakoet-Salie, A., & Ramalobe, K. (2023). The digitalization of learning and teaching practices in higher education institutions during the Covid-19 pandemic. *Teaching Public Administration, 41*(1), 59-71. https://doi.org/10.1177/01447394221092275

Karami, A., & Rezaei, A. (2015). An overview of peer-assessment: The benefits and importance. *Journal for the Study of English Linguistics, 3*(1), 93. https://doi.org/10.5296/jsel.v3i1.7889

Kerman, N.T., Banihashem, S.K., Karami, M. et al. (2024). Online peer feedback in higher education: A synthesis of the literature. *Educ Inf Technol, 29*, 763–813. https://doi.org/10.1007/s10639-023-12273-8

Konings, K. D., van Zundert, M., & van Merrienboer, J. J. G. (2019). Scaffolding peer-assessment skills: Risk of interference with learning domain-specific skills? *Learning and Instruction, 60*, 85-94. https://doi.org/10.1016/j.learninstruc.2018.11.007

Marjo van Zundert, M., Sluijsmans, D., & van Merriënboer, J. (2009). Effective peer assessment processes: Research findings and future directions. *Learning and Instruction*, *19*(4), 289–305. https://doi.org/10.1016/j.learninstruc.2009.08.004

Mohamed Hashim, M., Tlemsani, I. & Matthews, R. (2022). Higher education strategy in digital transformation. *Educ Inf Technol, 27,* 3171–3195. https://doi.org/10.1007/s10639-021-10739-1

Rezaei, E., & Beheshti Shirazi, S.S. (2024). The impact of thinking-aloud peer assessment (TAPA) on the development of high order thinking skills (HOTS) in math e-learning. *Educ Inf Technol*, *2024*. https://doi.org/10.1007/s10639-024-12607-0

Roberts, T. S. (2006). *Self, Peer and Group Assessment in E-Learning.* Idea Group Inc. https://doi.org/10.4018/978-1-59140-965-6

Tumpa, R. J., Skaik, S., Chaudhry, G., & Ham, M. (2021). Group-based Assessments and Project Management Education: Towards a Dynamic Framework with Best Practices. *International Journal of Innovation and Business Strategy, 5*(4), 275–285. https://doi.org/10.20533/ijibs.2046.3626.2020.0054

Wei, Z. (2023). Navigating Digital Learning Landscapes: Unveiling the Interplay Between Learning Behaviors, Digital Literacy, and Educational Outcomes. *J Knowl Econ*, *2023*. https://doi.org/10.1007/s13132-023-01522-3

Yin, S., Chen, F., & Chang, H. (2022). Assessment as Learning: How Does Peer Assessment Function in Students' Learning? *Front. Psychol.*, *13*, 912568. https://doi.org/10.3389/fpsyg.2022.912568

Shermin, A., De Silva, B., & Wesumperuma, A. (2019, December). Groupwork Assessment Development (GAD): A framework for developing an effective group work assessment. In *Australasian Conference on Information Systems*. Fremantle, Western Australia.