Available Online at www.e-iph.co.uk
Indexed in Clarivate Analytics WoS, and ScienceOPEN

E-B Environment - Behaviour Proceedings Journal

KICSS2024

Kedah International Conference on Social Sciences:
https://kicss2024.wixsite.com/kicss2024

e-IPH e-International Publishing House Ltd., United Kingdom

iCSSP2024: International Conference on Social Science & Public Policy
Virtual Conference, 23 & 24 October 2024

Organised by: Universiti Teknologi MARA, Kedah, Malaysia

Socially Shared Regulation of Group Performance and Good Influence in Education Practices: A Review

Raudzatul Fathiyah Mohd Said[1*], Syahanim Mohd Salleh[2], Teh Faradilla Abdul Rahman[1]
**Corresponding Author*

[1] Center of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia
[2] Faculty of Information Science & Technology, Universiti Kebangsaan Malaysia, 43600 Bangi Selangor, Malaysia

raudzahfathiyah@uitm.edu.my, syahanim@ukm.edu.my, tehfaradilla@uitm.edu.my
Tel: +603-89245450

Abstract
This paper explores the application of a socially shared regulation framework in an educational context, focusing on collaborative learning. The main objective of this research is to ascertain the relationship between performance and influence in a collaborative learning environment. This paper discusses the implications of the relationship between socially shared regulation, performance and positive affect in collaborative learning. The findings have practical implications for educators, offering valuable insights into designing effective collaborative learning frameworks and environments. Educators can improve learning outcomes and foster a learning environment by understanding the interplay between socially shared regulation.

Keywords: Socially shared regulation; collaborative learning; education

DOI: https://doi.org/10.21834/e-bpj.v10iSI30.6881

1.0 Introduction

The way students self-regulate their learning differs. Self-regulation is how individuals systematically activate and sustain their cognition, motivation, behaviours, and emotions to achieve a goal (Järvelä et al., 2019). Instead of focusing only on achieving the learning outcomes individually, there are tasks where students need to work in teams or collaboratively. In this case, they must share their regulatory strategies to reach the group goals. This is called Socially Shared Regulation of Learning (SSRL) (Hadwin et al., 2018). SSRL entails interdependent or collaboratively sharing and negotiating cognitive, behavioural, motivational, and emotional conditions to reach a common perception of a collaborative task and goal (Hadwin et al., 2018; Michalsky & Cohen, 2021; J. Zheng et al., 2019). Using strategic regulation, group members can control the cognitive, motivational, and inspirational processes occurring in the group and adapt their collaborative learning to the task objectives and shared standards (Järvelä et al., 2019). Thus, it has become a significant field in the context of self-regulation in learning theory.

Collaborative learning is an important approach in education that involves students working together in groups to achieve common goals or solve problems (Kalmar et al., 2022; Sotto, 2021). It is widely recognised as an effective teaching method that promotes active engagement, critical thinking, communication, and problem-solving skills (Kalmar et al., 2022; Sotto, 2021). This approach enhances understanding, critical thinking, and metacognitive skills while boosting students' motivation, involvement, self-confidence, and psychomotor skills through practical activities and group projects (Sotto, 2021). The students can learn from each other, share ideas,

eISSN: 2398-4287 © 2025. The Authors. Published for AMER by e-International Publishing House, Ltd., UK. This is an open access article under the CC BY-NC-ND license (http://c5eativecommons.org/licenses/by-nc-nd/4.0/). Peer–review under responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers
DOI: https://doi.org/10.21834/e-bpj.v10iSI30.6881

and build knowledge together (Kalmar et al., 2022). Therefore, it helps to develop important 21st-century skills such as communication, leadership, and conflict management

Socially shared regulation of learning (SSRL) is a critical aspect of collaborative learning that contributes to productive collaborative learning. This is due to the fact that SSRL involves the regulation of learning by a group of individuals working towards a common objective. The regulation process involves monitoring, controlling, and evaluating the learning activities. Research has shown that SSRL is an important prerequisite for successful collaborative learning regarding joint task achievements and the quality of productive collaborative interaction(Sobocinski et al., 2022).

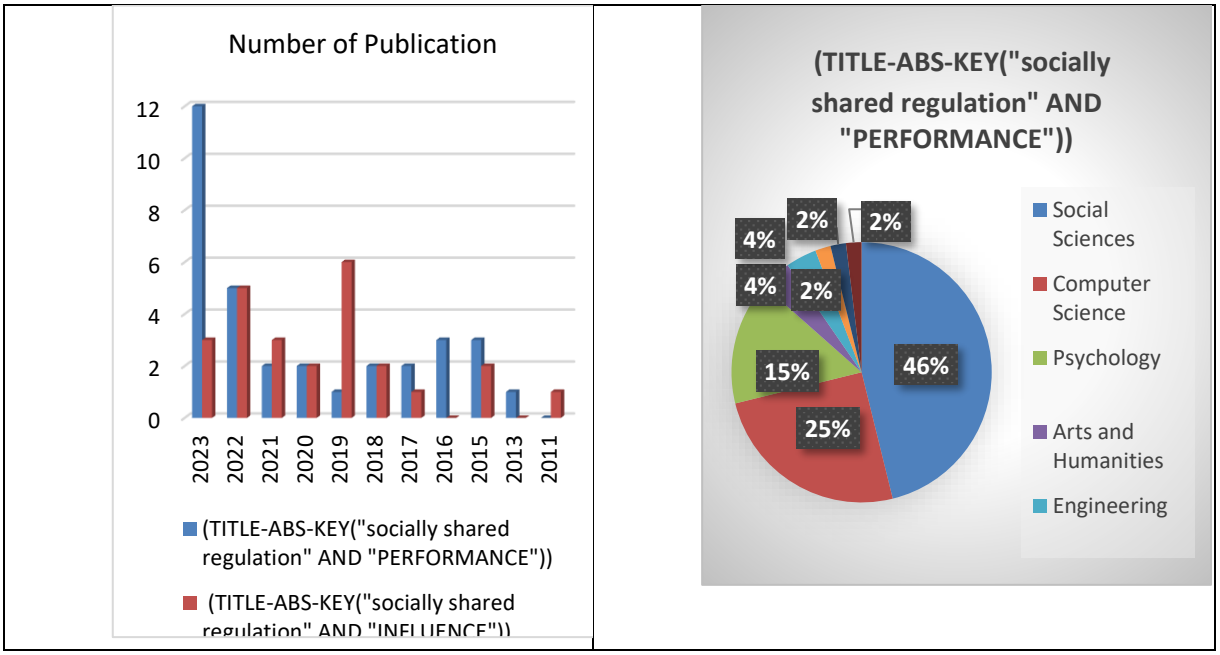

Figure 1 (a) The yearly publications of Socially Shared Regulation (b) The application of Socially Shared Regulation in many research fields

(source: Scopus search system 2023)

Previous research has established several foundational principles for regulating social and collaborative learning, particularly the importance of cultivating learners' metacognitive awareness and facilitating idea-sharing among peers. These socioemotional interactions are central to the mechanisms of Socially Shared Regulation of Learning (SSRL), which involves the co-construction of regulation strategies within group settings (Järvenoja et al., 2019; Törmänen et al., 2022). Therefore, designing effective collaborative learning environments requires a thorough understanding of how SSRL operates and the conditions that enhance its development. Informed insights into these mechanisms can guide the implementation of pedagogical practices and learning systems that explicitly promote SSRL across diverse educational settings.

This review synthesises empirical studies published between 2019 and 2023 to examine two critical dimensions: (1) the elements of SSRL that contribute to group performance and (2) the implications of SSRL in fostering positive influence within collaborative learning. While existing literature affirms SSRL's role in enhancing task coordination, emotional regulation, and group engagement (Hadwin et al., 2018; Michalsky & Cohen, 2021), it reveals key gaps in understanding which specific elements—such as goal-setting, shared monitoring, and equal participation—are most impactful in driving group success.

Moreover, the broader affective and motivational implications of SSRL remain underexplored. Although studies suggest links between SSRL and increased trust, empathy, and student motivation (Iqbal et al., 2021; Nakata et al., 2022), few have systematically examined how these outcomes emerge or are sustained over time. Challenges such as fluctuating participation, emotional disengagement, and interpersonal conflict (Hogenkamp et al., 2021) further complicate SSRL processes, yet they are rarely addressed in practical frameworks for classroom implementation. While promising approaches like multimodal analytics (Nguyen et al., 2023) are emerging, actionable strategies for educators remain limited.

Addressing these gaps, this review contributes by identifying the critical elements of SSRL that support productive group performance and highlighting its influence on the development of positive learning behaviours. It also advocates for the design of

inclusive instructional models that foster shared regulation through equitable participation, emotional support, and socio-cognitive scaffolding.

The qualitative analysis examines the development and progress of the students' socially shared regulation, from initial comments to final thoughts. Thus, this study intends to address the following research queries:

RQ1: What elements make Socially Shared Regulation of Learning good for group performance?
RQ2: What are the implications between Socially Shared Regulation of Learning and good influence?

This literature review examines the empirical data supporting SSRL and its implications for educational practice, specifically to answer the research question. By analysing current studies, this article aims to contribute to understanding this expanding topic.

2.0 Methodology

To conduct this review, the search begins by identifying the academic databases that address the topics of education, psychology, and related disciplines of socially shared regulation of learning. Databases such as GoogleScholar, ResearchGate, ACM, IEEE, WOS and SpringerLink have been chosen.

Due to relevancy and currency matters, the publication year of the articles must be between 2019 and 2023. The search string "socially shared regulation of learning" was applied to the full text (matching anywhere in the title, abstract, keywords, and article body) of all publications in the database collection. Due to the many articles published on this topic, refined searching was applied by adding BOOLEAN (i.e., AND, OR) operators.

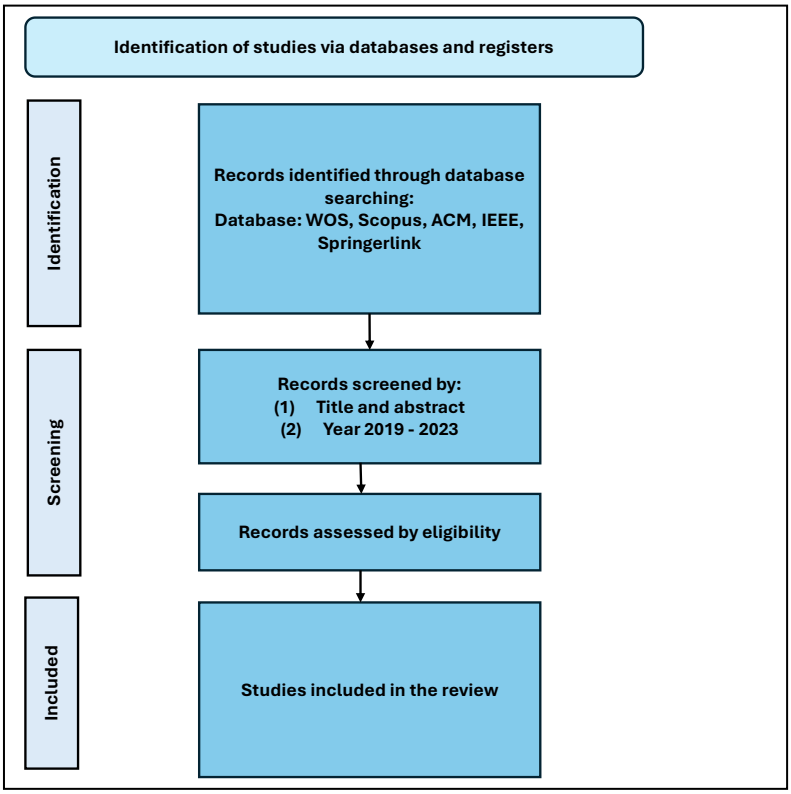

Figure 2. Searching and classification process (source: Researcher's own)

Then, reviewing the abstracts and titles of the publications found from the initial search. So, papers that specifically address SSRL or strongly emphasise collaborative learning and self-regulation can be discovered. Only publications from respectable journals and conference proceedings are selected. Examine the abstracts of the chosen papers to determine their applicability and relevance to the research topic. Next, a selection of articles that connect with the research goals and offer insights into SSRL ideas, empirical investigations, techniques, or conceptual frameworks were done.

2.1 Exclusion Criteria

The papers that did not focus on the specific topic of performance regulation and socially shared influences in educational practice were excluded. This is to ensure that the review remains focused and relevant to the research question. Moreover, the studies that were not published in English or Bahasa Melayu were excluded. This is because, other than these languages, studies require reliable translation, which is not always feasible. Studies published before 2019 were excluded to ensure the review was up-to-date. These exclusion criteria

serve to guide the literature selection process, ensuring that the review remains focused, reliable, relevant and current. The authors did not intend to degrade any research, but they are necessary to maintain the integrity and usefulness of a systematic literature review.

2.2 Inclusion Criteria

This part outlines the inclusion criteria for a review on socially shared regulation of performance and influence in educational practices. The study design is an important consideration. Qualitative and quantitative studies are included, encompassing various research designs such as experimental, observational, case, and survey. This allows for a comprehensive overview of the existing literature, capturing a wide range of perspectives and methodologies. Peer-reviewed journal articles, conference papers, and proceedings are included. These sources are typically subject to rigorous review processes, ensuring the quality and reliability of the findings.

3.0 Findings

Video-recorded observation data is frequently employed to characterise SSRL phenomena. Additionally, a combination of qualitative and quantitative data collection approaches, along with technology-enhanced learning and computer-supported collaborative learning (CSCL), were also used.

Jarvela et al. (2019) emphasised the need to capture regulation's dynamic and cyclical character in social learning environments such as collaborative learning and CSCL. There are methodological suggestions to understand the dynamic social aspects of SSRL, such as multimodal analytics (Järvelä et al., 2023). This method has been used by Nguyen et al. (2023) to examine SSRL and shared physiological arousal events in collaborative learning. Another method used is temporal and sequential analysis (Järvelä et al., 2019; J. Zheng et al., 2019) and gathering in-situ students data (Järvelä et al., 2019).

SSRL focuses on cognition and discusses the correlation between motivation, behaviour, and emotion among group members, which are considered social aspects of learning. It is about achieving team goals through social interactions and working together to construct knowledge by sharing cognitive, emotional, and behavioural control. There is also a good influence on group interaction and learning participation when SSRL occurs in the learning process (Michalsky & Cohen, 2021). This study focused on two (2) factors, elements, and implications of SSRL towards group performance.

RQ1: What elements make socially shared regulation of learning good for group performance?

Research conducted between 2019 and 2023 discusses a positive relationship between Social Sharing Regulation of Learning (SSRL) and group performance. L. Zheng et al. (2023) found significant improvements in the experimental over the control groups in group learning engagement, group performance, collaborative knowledge development, and social sharing regulation. Using SSRL, students can monitor, reflect, evaluate and review group results. This has been proven by a study by Long et al. (2023), who found that the analysis of group learning engagement and feedback approach has increased significantly, positively affecting group performance using the framework of social sharing rules. This also shows that the active involvement of group members in learning improves their regulation and overall performance. (Lai, 2021; Michalsky & Cohen, 2021; J. Zheng et al., 2019) also explored the relationship between SSRL and group performance. (Lai, 2021) found that groups that apply SSRL perform significantly better than individual learning. It has also been revealed that this regulation can encourage students to put more effort into goal setting, monitoring, and group work, where students organise their goals and plan to complete their tasks. In doing so, students monitored their task time by keep reminding their group members to work together.

Michalsky & Cohen(2021) found that students who received SSRL support showed improved participation. Each student brings their own learning style, challenges and abilities. Therefore, this support makes the group able to face their team members with different challenges and difficulties, such as maintaining motivation and controlling emotions and behaviours that can arise during collaboration. In a study conducted by (Morgan, 2020), he stated that there is a relationship between socially shared controlled learning and group performance. This connection occurs due to the existence of shared mental models and goals among group members for effective control and successful collaborative learning. To promote social sharing, it is important for students or group members to set common goals collaboratively and build a shared mental model of the task (Nguyen et al., 2023). This collaborative understanding of common tasks and goals improves their coordination and performance.

According to a study(Ito & Umemoto, 2022) SSRL positively affects group performance on creative tasks. The study showed a positive relationship between SSRL and the level of regulation at the start and final phase of collaboration. During the observation, students tried to generate as many ideas as possible during the early and final stages of collaboration. Even though students focus more on the number of ideas instead of quality, it causes all group members to deepen their understanding and thinking. As a result, it leads the students to achieve creative performance.

RQ2: What are the implications of the Socially Shared Regulation of Learning and good influence?

Hwang et al., (2021) found that the SSRL framework positively influenced student behaviour and achievement in mathematics subjects. The group that received support using the SSRL framework scored better than the others. In addition, students are also influenced by positive behaviour, such as actively engaging in collaborative sessions. One factor that contributes to a positive impact is the students have the opportunity to collaborate or discuss while learning activities are underway. This opportunity instils an attitude to

interact with friends and share knowledge and information. Using the SSRL framework encourages students to take responsibility and set goals for themselves and the group.

Research has shown that a positive classroom atmosphere, coupled with trust, respect, and cooperation, increases student engagement in SSRL (Goñi et al., 2020). Michalsky & Cohen (2021) also agreed on this active engagement. This factor, along with the achievement of knowledge and information, are among the factors that positively influence the use of SSRL during collaborative sessions. Students who receive support from the SSRL framework have a positive influence in terms of student engagement in deepening knowledge and understanding it.

Students' willingness to share knowledge is a key aspect of SSRL. When students actively share their knowledge, experiences, and perspectives, they contribute to collective understanding and group rules (Salimi et al., 2022). This situation encourages collaboration, critical thinking and deeper learning. In addition, there is an improvement from various SSRL phases related to an effective support system in facilitating group learning. The study found that SSRL can improve student learning, especially in the STEM field, and promote good relationships between students during collaborative sessions.

Equal participation may impact the students to have a strong motivation. Strong motivation leads to good learning behaviour, another positive influence when students apply SSRL in learning (Hogenkamp et al., 2021). Somehow, there is a challenge at the cognitive level when there are problems in understanding everyone's reasoning. The challenge has happened because every student has different learning goals and expectations. When students are supported by equal participation, they show a higher level of SSRL in their collaboration. Having equal participation in collaboration encourages knowledge-sharing, social support and positive social interactions.

The implementation of SSRL aims to make students regulate their learning collectively. This has been shown that the application of SSRL is closely related to positively influencing students' motivation to learn (Nakata et al., 2022).–This leads to the existence of emotional intelligence, which is the ability to recognise, understand, and manage one's own emotions and the emotions of others (Iqbal et al., 2021). Students with higher emotional intelligence are more willing to control their emotions during collaborative learning and engage in positive SSR. They are more empathetic, supportive, and able to manage conflict, leading to increased group dynamics and learning outcomes. They also listen attentively to the teacher's instructions and explanations. In fact, the application of SSRL in collaborative learning can create a positive classroom environment where all students are aware of their group members and motivate each other (Nakata et al., 2022)

Zhang and Hsu (2021) explained that the complex relationship between regulation learning and collective decision-making affects students' ability to decide on socio-scientific issues. It is important for students to be able to take control of their learning so that they can deal with complex socio-scientific issues and make informed decisions. (Gyasi & Zheng, 2023) found that high-performance groups showed higher elaboration of ideas, refining or building ideas and making evaluations. This shows that using this framework allows each group member to actively generate and improve ideas and contribute to better performance. In addition, specific learning strategies are associated with decision-making performance, namely monitoring, evaluation and metacognitive strategies. Students who use this strategy have demonstrated that they are able to critically evaluate information, discuss with team members from multiple perspectives, and make good decisions. Based on the results, the authors agree that involvement in SSRL can help students make informed decisions through productive consultation activities.

Together, these findings imply that social coordination, emotional involvement, and cognitive regulation are a number of interconnected components of successful SSRL. While many affirm the benefits of SSRL in academic and interpersonal domains, few offer comprehensive models for its implementation. This signals a need for future empirical studies to explore the causal pathways and context-specific strategies that optimise SSRL in collaborative education.

4.0 Discussion

The findings of this review offer practical implications for integrating Socially Shared Regulation of Learning (SSRL) into digital learning platforms and teacher training programmes. In online environments, SSRL strategies can enhance collaborative engagement, emotional awareness, and shared accountability. Nguyen et al. (2023) demonstrated that multimodal learning analytics can be used to capture SSRL behaviours and physiological responses, enabling platforms to incorporate real-time monitoring tools that support collaborative regulation. Likewise, Gyasi and Zheng (2023) underscored the importance of iterative reasoning and peer engagement in cross-cultural virtual learning, highlighting the need for systems that promote reflection, shared dashboards, and structured peer interaction.

For educators, teacher training modules should include SSRL components such as goal-setting facilitation, equal participation strategies, and socioemotional scaffolding. Michalsky and Cohen (2021) showed that such structured SSRL interventions can improve both participation and creativity in group-based learning. Moreover, Nakata et al. (2022) emphasized the importance of equipping teachers with strategies to support emotion regulation during group tasks, particularly in remote learning contexts. These systemic applications ensure that SSRL principles are effectively translated into practice, strengthening both instructional design and learning outcomes.

.

5.0 Limitations and Future Recommendations

This review highlights several limitations that provide valuable direction for future research and practical application. Firstly, the study focused only on publications from 2019 to 2023, retrieved from selected academic databases, which may have excluded relevant studies published in other platforms or languages. Additionally, the reviewed literature was primarily concentrated on SSRL in STEM and higher

education contexts, offering limited insights into its application in early education or across diverse disciplines. A formal meta-analysis was not conducted, limiting the depth of statistical interpretation.

Given these limitations, future research should adopt broader inclusion criteria to ensure a more comprehensive understanding, especially finding how SSRL develops over time and in various learning environments. Further exploration is needed to uncover how social elements such as trust, empathy, and shared responsibility influence group satisfaction and learning outcomes. Researchers should also address learners' challenges in regulating emotions and motivation during collaboration. Moreover, there is a need to design and implement instructional models, digital tools, and pedagogical strategies that promote equitable participation, emotional regulation, and social cohesion in collaborative learning environments. These efforts are crucial to sustaining SSRL effectively across educational contexts.

6.0 Conclusion

This review explored the role of Socially Shared Regulation of Learning (SSRL) in collaborative learning, focusing on two dimensions: the elements that enhance group performance and the implications of SSRL in fostering positive influence among learners. The synthesis of recent empirical studies identified shared goal-setting, mutual monitoring, emotional regulation, and equal participation as core SSRL components that promote group coordination, task engagement, and academic outcomes. These elements empower students to co-construct knowledge, navigate interpersonal dynamics, and sustain collaborative efforts. In addressing positive influence, SSRL was shown to contribute to positive socio-emotional outcomes, including increased empathy, trust, and shared responsibility, particularly critical in online learning environments. Practical applications such as multimodal analytics and teacher training modules informed by SSRL principles offer scalable strategies to support inclusive collaboration.

Despite growing research interest, gaps remain in understanding how SSRL can be systematically implemented across diverse educational contexts. Future studies should explore how cultural, technological, and pedagogical factors shape the sustainability of SSRL. As a conclusion, this review provides a comprehensive understanding of SSRL's impact and offers insights for educators and researchers seeking to enhance collaborative learning through structured, socially grounded regulation strategies.

Acknowledgements

We would like to express our gratitude to Universiti Teknologi MARA (UiTM) and Universiti Kebangsaan Malaysia (UKM) for their financial support. Their support has been invaluable in advancing our work, and we deeply appreciate their commitment to fostering research excellence.

Paper Contribution to Related Field of Study

This study makes several key contributions to the existing body of knowledge on socially shared regulation. It introduces an understanding of the application of SSRL in collaborative learning. Also, the findings have significant implications for teaching methods as well as class management. This paper offers a guideline for future studies in education.

References

Goñi, J., Cortázar, C., Alvares, D., Donoso, U., & Miranda, C. (2020). Is Teamwork Different Online Versus Face-to-Face? A Case in Engineering Education. Sustainability. https://doi.org/10.3390/su122410444

Gyasi, J. F., & Zheng, L. (2023). Idea Improvement and Socially Shared Regulation Matter in Cross-Cultural Online Collaborative Learning. Sage Open. https://doi.org/10.1177/21582440221148625

Hadwin, A., Järvelä, S., & Miller, M. (2018). Self-regulation, co-regulation, and shared regulation in collaborative learning environments. In Handbook of self-regulation of learning and performance, 2nd ed. (pp. 83–106). Routledge/Taylor & Francis Group. https://doi.org/10.4324/9781315697048-6

Hogenkamp, L., Van Dijk, A. M., & Eysink, T. H. S. (2021). Analysing Socially Shared Regulation of Learning during Cooperative Learning and the Role of Equal Contribution: A Grounded Theory Approach. Education Sciences, 11(9), 512. https://doi.org/10.3390/educsci11090512

Hwang, G.-J., Wang, S.-Y., & Lai, C.-L. (2021). Effects of a social regulation-based online learning framework on students' learning achievements and behaviors in mathematics. Computers & Education, 160, 104031. https://doi.org/10.1016/j.compedu.2020.104031

Iqbal, J., Qureshi, N., Ashraf, M., Rasool, S. F., & Asgher, M. (2021). The Effect of Emotional Intelligence and Academic Social Networking Sites on Academic Performance During the COVID-19 Pandemic. Psychology Research and Behavior Management. https://doi.org/10.2147/prbm.s316664

Ito, T., & Umemoto, T. (2022). Socially Shared Regulation and Performance in Group Work on Creativity Tasks: Analysing Regulation Utterances. Journal of Education and Learning, 11(4), 74. https://doi.org/10.5539/jel.v11n4p74

Järvelä, S., Järvenoja, H., & Malmberg, J. (2019a). Capturing the dynamic and cyclical nature of regulation: Methodological Progress in understanding socially shared regulation in learning. International Journal of Computer-Supported Collaborative Learning, 14(4), 425–441. https://doi.org/10.1007/s11412-019-09313-2

Järvenoja, H., Näykki, P., & Törmänen, T. (2019b). Emotional regulation in collaborative learning: When do higher education students activate group level regulation in the face of challenges? Studies in Higher Education, 44(10), 1747–1757. https://doi.org/10.1080/03075079.2019.1665318

Järvelä, S., Nguyen, A., Vuorenmaa, E., Malmberg, J., & Järvenoja, H. (2023). Predicting regulatory activities for socially shared regulation to optimise collaborative learning. Computers in Human Behavior, 144, 107737. https://doi.org/10.1016/j.chb.2023.107737

Kalmar, E., Aarts, T. F., Bosman, E., Ford, C., Kluijver, L. d., Beets, J., Veldkamp, L., Timmers, P., Besseling, D., Koopman, J., Fan, C., Berrevoets, E., Trotsenburg, M. v., Maton, L., Remundt, J. v., Sari, E. N., Omar, L.-W., Beinema, E., Winkel, R., & Maarten C. A. van der Sanden. (2022). The COVID-19 Paradox of Online Collaborative Education: When You Cannot Physically Meet, You Need More Social Interactions. Heliyon. https://doi.org/10.1016/j.heliyon.2022.e08823

Michalsky, T., & Cohen, A. (2021). Prompting Socially Shared Regulation of Learning and Creativity in Solving STEM Problems. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.722535

Morgan, T. (2020). Exploring socially shared regulated learning in PBL using group digital learning diaries: A study design. Proceedings of the 22nd International Conference on Engineering and Product Design Education. The 22nd International Conference on Engineering and Product Design Education. https://doi.org/10.35199/EPDE.2020.14

Nakata, Y., Nitta, R., & Tsuda, A. (2022). Understanding motivation and classroom modes of regulation in collaborative learning: An exploratory study. Innovation in Language Learning and Teaching, 16(1), 14–28. https://doi.org/10.1080/17501229.2020.1846040

Nguyen, A., Järvelä, S., Rosé, C., Järvenoja, H., & Malmberg, J. (2023). Examining socially shared regulation and shared physiological arousal events with multimodal learning analytics. British Journal of Educational Technology, 54(1), 293–312. https://doi.org/10.1111/bjet.13280

Salimi, G., Heidari, E., Mehrvarz, M., & Safavi, A. A. (2022). Impact of Online Social Capital on Academic Performance: Exploring the Mediating Role of Online Knowledge Sharing. Education and Information Technologies. https://doi.org/10.1007/s10639-021-10881-w

Sobocinski, M., Malmberg, J., & Järvelä, S. (2022). Exploring Adaptation in Socially-Shared Regulation of Learning Using Video and Heart Rate Data. Technology, Knowledge and Learning, 27(2), 385–404. https://doi.org/10.1007/s10758-021-09526-1

Sotto, R. J. B. (2021). Collaborative Learning in the 21st Century Teaching and Learning Landscape: Effects to Students' Cognitive, Affective and Psychomotor Dimensions. International Journal of Educational Management and Innovation. https://doi.org/10.12928/ijemi.v2i2.3325

Törmänen, T., Järvenoja, H., Saqr, M., Malmberg, J., & Järvelä, S. (2022). A Person-Centered Approach to Study Students' Socio-Emotional Interaction Profiles and Regulation of Collaborative Learning. Frontiers in Education, 7, 866612. https://doi.org/10.3389/feduc.2022.866612

Zhang, W.-X., & Hsu, Y.-S. (2021). The interplay of students' regulation learning and their collective decision-making performance in a SSI context. International Journal of Science Education, 43(11), 1746–1778. https://doi.org/10.1080/09500693.2021.1933250

Zheng, J., Xing, W., & Zhu, G. (2019). Examining sequential patterns of self- and socially shared regulation of STEM learning in a CSCL environment. Computers & Education, 136, 34–48. https://doi.org/10.1016/j.compedu.2019.03.005

Zheng, L., Long, M., Niu, J., & Zhong, L. (2023). An automated group learning engagement analysis and feedback approach to promoting collaborative knowledge building, group performance, and socially shared regulation in CSCL. International Journal of Computer-Supported Collaborative Learning, 18(1), 101–133. https://doi.org/10.1007/s11412-023-09386-0