



Exploring the Potential of Project Based Education in a Challenging and Motivating Approach for Students

Sjamsul Alam Noor¹, Muh Alqadri¹, Wahyu Ashari¹

¹Makassar State University

*Corresponding Author: Sjamsul Alam Noor

Email: symslalmnrr29@gmail.com

Article Info

Article History:

Received March 8, 2024

Revised April 26, 2024

Accepted: May 27, 2024

Keywords:

Project-Based Education,
Student Engagement,
Motivation, Learning Outcomes.

Abstract

The paper examines the possibility of Project-Based Education as an engaging and difficult learning strategy in teaching. The study sought to establish the impact of PBE on students' experience, motivation and the learning that occurs in relation to students' support from the teachers. The participants self-selected for the study included 20 students and 6 teachers from a diverse range of disciplines who had engaged in PBE in some form or another. Participants were given semi structured questionnaires and focus group discussions, and classroom observations in which data were analyzed using thematic analysis. The research proves that the use of PBE improved motivation by addressing realistic context and self-organizing learning. When the students were allowed autonomy in the selection of projects and organisation, they said they felt more involved in the lesson. The most salient finding during this study was that teacher support was an important antecedent for PBE, where teachers served as enablers and coaches, as well as being inspirational sources of encouragement. However, other issues that were observed when students collaborated included the problems that were associated with group dynamics as well as time management issues. This work enriches the further development of research results in the following ways: The key concept of PBE, such as implementation of a structured guideline and supportive teacher encouragement to facilitate pupils' motivation and interest. The research findings are used to make suggestions to teachers concerning how to facilitate scaffold, time and how the class setting can be conducive for PBE.

Introduction

Learning and teaching in the twenty first century require flexible creativity and innovative approaches in an attempt to meet individual learning needs as well as learning that develops critical thinking, creativity and skilled students. Because conventional and teacher gross domestic product centred approaches may not capture the students and or build these competencies, there has been shift to other forms of learning especially Project Based Education (PBE). PBE is underpinned by both the experiential and constructivist perspectives of learning, and asks students to work on various project-based tasks where they design solutions to real life problems based on knowledge from a range of disciplines obtained through investigations (Rigdel & Thapa, 2024). This introduction provides an insight of the background of adopting PBE, its significance and its goal of pursuing a motivating and rigorous education.

The increase in demand for skills which are widely seen as relevant in the current century such as problem solving, teaming, and flexibility has motivated the desire for pedagogies that disapprove rote memorization and student indulgence. In the traditional education models where the students' and society's needs were different, such models that entail fixed instructions and assessments prove inefficient (Putra, 2021). On the other hand, PBE matches the current learning objectives in terms of engagement and autonomy expecting that the students will be motivated to learn when their content seems relevant to the real world (Yemini et al., 2023). PBE provides a context linking technology and cross content area opportunities, enhancing the learning experience (Boz et al., 2024).

The importance of PBE as a theory is the assumption that students' interest and motivation level may be promoted by purposeful challenge. In line with this is the fact that motivation remains one of the greatest predictors to learning achievement as well as continued learning throughout ones' lifetime. Intrinsic motivation, more specifically, are known to operate under the self-determination theory, where learners are expected to self-regulate as they report high levels of autonomy, competence and relatedness in their educational setting (Filgona et al., 2020). PBE creates these conditions because the student owns learning, interacts with peers, and performs in contextually realistic manner (Wright et al., 2021). found that out of all the students who participated in project related activities, the students exhibited more interest and job satisfaction than their counterpart who worked on conventional assignments (Almulla, 2020). pointed out that since PBE employs open-ended inquiries, student interest is sustained by enabling students to follow topics of choice for long durations.

Active learning is another significant feature of PBE since it meets all the principles of this approach to teaching. These methods are the most effective in enhancing knowledge retention as well as understanding and utilization of that knowledge in the classroom (Qadir, 2023). If implemented as part of the PBE curricula, active learning takes place within the questioning, research, design, and presentation learning-teaching cycles that involve responding to real-life problems. reports on a longitudinal study that produced evidence on mathematics classes based on project standards to outperform in tests and show higher levels of conceptual understanding than conventional students.

The programme of PBE is not without drawbacks. One of the most frequent challenges teachers' experiences is the change of context from teacher-centered paradigm to that of a facilitator inherent to PBE (Awacorach et al., 2020). it might be challenging to create learning activities that are as directed as to set out clear frameworks or structured as to allow the students work in learner autonomy. the availability of resources, time, and differences in the preparedness of the students working on the projects only make it harder to integrate PBE (Garcia et al., 2021). all those impediments can be managed via respective professional development, integration of staff collaboration and support from an institution.

The COVID-19 pandemic and the consequent adoption of digital and blended-learning environments have reasserted the importance of PBE. ICT support, especially in the form of computer-based group working, simulation, and multimedia, seem to increase the practicality and effectiveness of PBE through providing students not only with information and references, but also with platform for online cooperation (Shunkov et al., 2022). the use of digital story telling in PBE projects has been found enhance the students' ability in conveying information as well as their innovativeness as noted by Marshall & Galey (2024). Thus, virtual reality (VR) and augmented reality (AR) are highly effective tools to enhance students' understanding of the concepts, as it was proved by recent investigations in STEM field.

The fact that we observe the contextual flexibility of PBE also points to the solution's promise as an innovative introduction to pedagogy. Culturally and diversely, PBE offers prospects by

which students may appeal to their individualism and difference making, which generally promotes tolerance. This is especially the case when it comes to trying to close achievement gaps and create more equality in schools. have shown that delivers positive effects on equitable distribution of academic performance as PBE stimulates learners with learning disabilities to be active participants in their learning activities.

The importance of PBE is also reflected in its ability to prepare students for future challenges in an increasingly interconnected and complex world. Employers and higher education institutions alike value skills such as critical thinking, collaboration, and adaptability all of which are nurtured through PBE. As McArthur (2023) argue, education should focus on preparing students to transfer their learning to novel situations, a goal that PBE inherently supports.

Methods

This study employed a qualitative case study design to explore the experiences of students and teachers involved in Project-Based Education (PBE). The case study approach was particularly suited for this research as it enabled an in-depth investigation into the real-world application of PBE and its impact on both student motivation and engagement. Through this design, the study sought to capture the nuances of how PBE influenced learners' attitudes towards education and provided a deeper understanding of the challenges teachers faced in implementing this teaching method. This approach allowed for rich, detailed data to emerge from participants' lived experiences, offering a comprehensive view of PBE in practice.

Participants were selected using purposive sampling to ensure a diverse representation of individuals with direct experience in PBE. The study involved two primary participant groups: students and teachers. A total of 20 students, from various academic backgrounds and grade levels, participated in the research. These students had been actively involved in PBE as part of their curriculum, allowing for an exploration of their motivations, engagement levels, and challenges. In addition, six teachers who had incorporated PBE into their teaching methods were selected. These teachers provided valuable insights into the instructional and logistical aspects of PBE, including how they navigated challenges and leveraged the approach to foster student learning.

Data for the study were collected through three primary methods: semi-structured interviews, focus group discussions, and classroom observations. Semi-structured interviews were conducted with both students and teachers to gather in-depth information about their experiences and perceptions of PBE. The flexibility of the interview format allowed participants to discuss a wide range of topics, such as the impact of PBE on student motivation, the effectiveness of collaboration, and the barriers encountered during implementation. All interviews were audio-recorded and transcribed to facilitate detailed analysis. Additionally, focus group discussions were held with a subset of students to capture the collective experiences of peer interactions within PBE. These discussions provided an opportunity for students to reflect on how group work influenced their motivation and learning. Lastly, classroom observations allowed the researcher to examine how PBE was implemented in real-time, documenting the interactions between students and teachers, as well as the overall classroom dynamics.

The data collected through interviews, focus groups, and observations were analyzed using thematic analysis, which is well-suited to qualitative research. First, all audio-recorded interviews and focus group discussions were transcribed verbatim. The researcher then coded the transcripts, identifying recurring themes and patterns relevant to the research questions. The thematic analysis process allowed for the identification of key concepts, such as student

motivation, challenges in collaboration, and the role of the teacher in facilitating PBE. These concepts were grouped into broader categories, which were then analyzed for their significance within the context of the study. NVivo software was utilized to assist with the coding process and to organize the data into meaningful themes, enabling a comprehensive and systematic analysis of the findings.

Result and Discussion

This study sought to find out PBE as an approach to make students challenged and motivated. More so, it aimed at establishing the extent to which PBE impacts on students' engagement and motivation and whether teacher support has an impact on these aspects. This qualitative study employed self/structured Interviews, focus group discussions and classroom observations to establish the views of students and teachers who participated in PBE. The paper provides more insights into the context in which PBE practice occurs, as well as more ideas regarding the ways in which PBE can be utilised to optimise student learning.

Student Motivation and Engagement

Student motivation and engagement are fundamental to the success of Project-Based Education (PBE), and the study found that PBE significantly influenced both of these aspects. The students reported that the hands-on, real-world nature of PBE made learning more interesting and relevant to their lives. They highlighted how working on projects that mirrored real-world challenges gave them a sense of purpose and ownership over their learning. As one student stated,

“When we work on projects that have real-life applications, it feels like we’re actually learning something useful, not just memorizing for a test.”

This sense of purpose, as articulated by the students, contributed to higher levels of intrinsic motivation, where learning was viewed as a meaningful and enjoyable process rather than a mere academic requirement.

Moreover, students expressed that PBE fostered a collaborative learning environment, which enhanced their engagement. The opportunity to work in teams was highly valued, as it encouraged peer interaction, idea sharing, and mutual support. A student remarked,

“It was great to be part of a team where everyone brought in different ideas. We didn’t just sit in a classroom and listen to a lecture; we worked together, learned from each other, and solved problems as a group.”

This collaborative aspect of PBE allowed students to feel more connected to their peers and their learning experiences, creating an engaging environment where active participation was encouraged.

In addition to collaboration, the autonomy offered by PBE was another critical factor that fueled student motivation. The flexibility to choose topics or aspects of a project that aligned with their interests and passions empowered students to take ownership of their learning. One student shared,

“Being able to choose a topic I care about made a big difference. It wasn’t something imposed on me, and I was more invested in the outcome.”

This autonomy not only increased students' engagement in the learning process but also helped foster a sense of responsibility and accountability for their work.

Despite the clear benefits, some students expressed challenges related to maintaining motivation and engagement throughout long-term projects. These challenges primarily

stemmed from time management difficulties and the sometimes-overwhelming nature of group dynamics. One student mentioned,

“Sometimes, it was hard to stay motivated because the project felt like it was dragging on, and coordinating with others wasn’t always easy.”

While these challenges were noted, they were also seen as opportunities for growth, with many students mentioning that learning how to overcome these obstacles was an integral part of the PBE experience.

Overall, the findings indicate that PBE has a profound impact on student motivation and engagement by fostering a sense of relevance, autonomy, collaboration, and ownership in learning. Despite some challenges, students felt that PBE provided them with an enriching and empowering educational experience that promoted deeper involvement in their studies.

Benefits of Project-Based Education

The study revealed several key benefits of Project-Based Education (PBE) that were consistently highlighted by both students and teachers. One of the most significant advantages identified by students was the development of critical thinking and problem-solving skills. Through PBE, students were tasked with addressing real-world challenges, which required them to think critically, research solutions, and apply their learning in practical contexts. A student explained,

“PBE made me think differently. Instead of just memorizing facts, I had to figure out how to apply what I learned to solve a problem. It made learning feel more useful.”

This emphasis on real-world application encouraged students to actively engage with the material, rather than simply receiving passive instruction, thus developing important cognitive skills that would benefit them beyond the classroom.

Another major benefit of PBE, as observed by both students and teachers, was the enhancement of collaboration and teamwork skills. In project-based environments, students often worked in groups, where they had to negotiate, communicate, and cooperate with peers. These collaborative projects not only promoted social interaction but also helped students develop valuable interpersonal skills, such as effective communication, conflict resolution, and leadership. One teacher shared,

“The projects allowed students to work together and share ideas. Many students who would normally be quiet or reserved in class thrived in group settings because they had a chance to contribute in a way that was more hands-on and less formal.”

This aspect of PBE was particularly appreciated as it helped students become more comfortable working with others and prepared them for collaborative tasks in future professional environments.

Additionally, PBE was found to increase student engagement by connecting learning to real-life contexts, making the educational experience more relevant and meaningful. Instead of focusing solely on theoretical knowledge, students engaged in projects that had practical applications, which helped them see the direct connection between what they were learning and how it could be applied in the real world. As one student reflected,

“Working on projects that involved real issues or questions made me realize that school isn’t just about getting grades. It’s about solving real problems that matter.”

This sense of relevance motivated students to invest more time and effort into their learning, enhancing their overall educational experience.

Furthermore, PBE fostered creativity and innovation. Students were given the freedom to explore topics in depth and encouraged to think outside the box to develop unique solutions to the problems they encountered. This creative freedom was particularly valuable in helping students build confidence in their ability to innovate and take risks in their learning. A teacher noted,

“PBE encourages students to come up with creative solutions to problems. They’re not just following a set formula; they’re thinking about how to approach challenges in new ways, which helps them build confidence in their creativity.”

The opportunity to explore creative approaches not only made learning more enjoyable but also allowed students to develop a sense of ownership and pride in their work.

The Role of Teacher Support

The role of teacher support was pivotal in the success of Project-Based Education (PBE), with both students and teachers acknowledging its importance in fostering a positive learning environment. The study found that teachers played a crucial role in guiding students through the complexities of project-based learning by providing not only academic support but also emotional encouragement and motivation. One student shared,

“Our teacher was there to guide us when we were stuck. She didn’t just give us answers; she helped us figure out how to get there ourselves. That made all the difference.”

This type of teacher support, where the teacher acts as a facilitator rather than a traditional instructor, helped students feel more confident in their ability to navigate the challenges of PBE and solve problems independently.

Teacher support extended beyond academic guidance to include providing a structured framework within which students could operate. The open-ended nature of PBE, while beneficial, could sometimes be overwhelming for students who struggled with managing their time and tasks. Teachers were instrumental in helping students break down complex projects into manageable steps and set achievable goals. One teacher explained,

“In PBE, students need to take ownership of their projects, but they also need guidance on how to structure their work. I made sure to provide them with timelines and checkpoints so that they didn’t feel lost in the process.”

This support helped students stay focused and motivated, reducing feelings of confusion or frustration that could otherwise hinder their engagement in the project.

Another critical aspect of teacher support was fostering a supportive classroom atmosphere where students felt safe to take risks and explore creative solutions. PBE, by its very nature, encourages innovation, which often involves trial and error. Teachers played a key role in ensuring that students felt comfortable experimenting and learning from their mistakes. As one student reflected,

“Our teacher always told us it was okay to make mistakes. She made the classroom a safe space to try new things without worrying about failing.”

This positive reinforcement not only encouraged risk-taking but also helped students develop resilience and confidence in their problem-solving abilities.

Furthermore, the emotional and motivational support provided by teachers was crucial in keeping students engaged throughout long-term projects. The often-extended duration of PBE projects could lead to waning motivation, particularly when students encountered setbacks.

Teachers, by providing encouragement and recognizing students' efforts, played an essential role in maintaining morale. One teacher noted,

“I made it a point to celebrate small wins with my students whether it was a breakthrough in research or completing a project milestone. That recognition kept their spirits high.”

This consistent emotional support helped students persevere through challenges and stay focused on completing their projects.

This study explored the potential of Project-Based Education (PBE) as a motivating and challenging approach for students. The findings align with and expand upon existing research on PBE, particularly regarding its role in increasing student motivation, enhancing engagement, and fostering collaborative learning. In contrast to previous studies, which have primarily focused on the theoretical benefits of PBE, this research provides an in-depth, qualitative analysis of how these benefits are experienced by both students and teachers in real-world educational settings.

This study highlighted another important revelation which was that implemented PBE positively influenced students' motivation level. Other researchers Subramaniam (2020) for instance showed that with PBE, students are engaged because knowledge is contextualized. Similarly, the current study showed that, students who experienced PBE had more perceived sense of relevance and control over their learning resulting to high level of self- motivation (Soucy et al., 2024; Üztemur & Dere, 2023). the students said that it made learning more worthwhile when they were solving assignments that resembled actual problems because, PBE brings learning closer to life experiences (Tan et al., 2023; Markula & Aksela, 2022; Sevinc et al., 2024). this study builds on such by also showing that this increase in motivation is further driven by factors that include relevance to real-life situations as well as student choices to identify projects of interest on their own. This extends Kuhn (2024) work in the context of PBE by focusing on the role of autonomy in increasing motivation, not previously discussed in the prior research.

The study confirmed previous findings regarding the role of collaboration in PBE (Rigdel & Thapa, 2023). Students in this study expressed that working in groups increased their engagement and fostered the development of key interpersonal skills, such as communication and conflict resolution. This finding corroborates the work of Mann et al. (2021), who argued that PBE encourages collaboration among students and helps develop essential 21st-century skills. the current study also revealed the challenges students faced in managing group dynamics, which were not always addressed in previous literature. students noted the difficulties of coordinating tasks with peers and managing differences in workload (Wildman et al., 2021; Weinberg, 2020; Ahmed & Opoku, 2022). These challenges highlight an important area for further research and practical implementation in PBE settings, as addressing group dynamics could further optimize the benefits of collaboration.

Another important contribution of this study is its exploration of the role of teacher support in facilitating successful PBE. While existing literature (Xu et al., 2020) acknowledges that teachers play a crucial role in guiding and supporting students through PBE, this study adds depth to this understanding by emphasizing the need for teachers to provide not only academic support but also emotional and motivational guidance. Teachers in this study were found to be essential in helping students structure their projects, navigate challenges, and maintain motivation over time. This aligns with the findings of Noor (2024), who argued that teacher guidance is critical in ensuring the success of PBE. this study highlights the importance of teacher emotional support in maintaining student engagement throughout the project, an area

that has been less thoroughly explored in previous research. By recognizing the emotional aspects of PBE, the study contributes to the growing body of literature that emphasizes the teacher's role as a facilitator, mentor, and motivator.

The study also identified that while PBE offers significant benefits, it requires careful planning and support to be effective. Students in this study expressed challenges related to time management and the long-term nature of projects, a concern that has been raised in the literature but often underexplored in practice. have pointed out that PBE can be overwhelming without proper guidance, yet few studies have examined how teachers can address these challenges on a practical level. This study contributes to the field by providing insights into how teachers can structure PBE activities, provide timelines, and set achievable goals to help students manage their projects more effectively. These findings offer practical recommendations for teachers who are looking to implement PBE in their classrooms, particularly in terms of providing scaffolding to ensure students stay on track and remain motivated.

This study builds upon existing literature by providing a qualitative, real-world perspective on the impact of Project-Based Education. It highlights the multifaceted nature of teacher support, the role of student autonomy, and the importance of collaboration in enhancing student engagement and learning outcomes. By addressing gaps in the literature, particularly regarding the emotional support provided by teachers and the practical challenges students face in managing long-term projects, this study offers valuable insights for both educators and researchers looking to improve the effectiveness of PBE.

Conclusion

This study has provided valuable insights into the potential of Project-Based Education (PBE) as a motivating and challenging approach for students. By exploring the experiences of both students and teachers, it has highlighted the significant role of teacher support, the importance of student autonomy, and the benefits of collaboration in fostering engagement and learning. The findings confirm and expand upon existing literature, particularly by addressing gaps related to the emotional and motivational support provided by teachers and the practical challenges students face in managing long-term projects. Ultimately, this study underscores the effectiveness of PBE in enhancing student motivation, critical thinking, and real-world problem-solving skills, offering practical recommendations for educators seeking to implement this approach in their classrooms.

References

- Ahmed, V., & Opoku, A. (2022). Technology supported learning and pedagogy in times of crisis: the case of COVID-19 pandemic. *Education and information technologies*, 27(1), 365-405. <https://doi.org/10.1007/s10639-021-10706-w>
- Almulla, M. A. (2020). The effectiveness of the project-based learning (PBL) approach as a way to engage students in learning. *Sage Open*, 10(3), 2158244020938702. <https://doi.org/10.1177/2158244020938702>
- Awacorach, J., Jensen, I., Lassen, I., Olanya, D. R., Zakaria, H. L., & Tabo, G. O. (2021). Exploring Transition in Higher Education: Engagement and Challenges in Moving from Teacher-Centered to Student-Centered Learning. *Journal of Problem Based Learning in Higher Education*, 9(2), 113-130.
- Boz, T., Hammack, R., Lux, N., & Gannon, P. (2024). Technology-rich engineering experiences in Indigenous and rural schools. *International Journal of Education in Mathematics, Science and Technology*, 12(4), 1090-1108. <https://doi.org/10.46328/ijemst.4129>

- Filgona, J., Sakiyo, J., Gwany, D. M., & Okoronka, A. U. (2020). Motivation in learning. *Asian Journal of Education and social studies*, 10(4), 16-37. <https://doi.org/10.9734/ajess/2020/v10i430273>
- Garcia-Aracil, A., Monteiro, S., & Almeida, L. S. (2021). Students' perceptions of their preparedness for transition to work after graduation. *Active learning in higher education*, 22(1), 49-62. <https://doi.org/10.1177/1469787418791026>
- Kuhn, B. (2024). *Strengthening Resilience: The Impact of Place-Based Education on Early Adolescent Students' Social-Emotional Development* (Doctoral dissertation, University of Wyoming Libraries). <https://doi.org/10.15786/wyoscholar/9854>
- Mann, L., Chang, R., Chandrasekaran, S., Coddington, A., Daniel, S., Cook, E., ... & Smith, T. D. (2021). From problem-based learning to practice-based education: A framework for shaping future engineers. *European Journal of Engineering Education*, 46(1), 27-47. <https://doi.org/10.1080/03043797.2019.1708867>
- Markula, A., & Aksela, M. (2022). The key characteristics of project-based learning: how teachers implement projects in K-12 science education. *Disciplinary and Interdisciplinary Science Education Research*, 4(1), 2. <https://doi.org/10.1186/s43031-021-00042-x>
- Marshall, S. L., & Galey-Horn, S. (2024, September). STEM leaders promoting resilience within equity-centered K-12 STEM education organizations. In *Frontiers in Education* (Vol. 9, p. 1331358). Frontiers Media SA. <https://doi.org/10.3389/educ.2024.1331358>
- McArthur, J. (2023). Rethinking authentic assessment: work, well-being, and society. *Higher education*, 85(1), 85-101. <https://doi.org/10.1007/s10734-022-00822-y>
- Putra, S. H. J. (2021). The Effect of Science, Environment, Technology, and Society (SETS) Learning Model on Students' Motivation and Learning Outcomes in Biology. *Tarbawi: Jurnal Ilmu Pendidikan*, 17(2), 145-153.
- Qadir, J. (2023, May). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. In *2023 IEEE Global Engineering Education Conference (EDUCON)* (pp. 1-9). IEEE. <https://doi.org/10.1109/EDUCON54358.2023.10125121>
- Rigdel, K. S., & Thapa, M. R. (2023). Students' perception of community as classroom for learning Geography in middle secondary school. *International Research Journal of Science, Technology, Education, & Management (IRJSTEM)*, 3(3), 88-102. <https://doi.org/10.5281/zenodo.8435269>
- Rigdel, K. S., & Thapa, M. R. (2024). Exploring the opportunities and challenges of using community as classroom for learning geography. *International Journal of Instruction*, 17(3), 61-78.
- Sevinc, S., Cross Francis, D., Hudson, R., & Liu, J. (2024). The development of elementary teachers' personal meanings of problem-solving through engaging in open-ended tasks. *Mathematics Education Research Journal*, 1-27. <https://doi.org/10.1007/s13394-024-00493-1>
- Shunkov, V., Shevtsova, O., Koval, V., Grygorenko, T., Yefymenko, L., Smolianko, Y., & Kuchai, O. (2022). Prospective directions of using multimedia technologies in the training of future specialists. <https://doi.org/10.22937/IJCSNS.2022.22.6.93>

- Soucy, A. R., Rahimzadeh-Bajgiran, P., De Urioste-Stone, S., Eitel, K., Jansujwicz, J., & Brownlee, M. (2024). Impact of a place-based educational approach on student and community members' experiences and learning within a post-secondary GIS course. *Journal of Geoscience Education*, 1-16. <https://doi.org/10.1080/10899995.2024.2379194>
- Subramaniam, K. (2020). A place-based education analysis of prospective teachers' prior knowledge of science instruction in informal settings. *International Journal of Educational Research*, 99, 101497. <https://doi.org/10.1016/j.ijer.2019.101497>
- Tan, A. L., Ong, Y. S., Ng, Y. S., & Tan, J. H. J. (2023). STEM problem solving: Inquiry, concepts, and reasoning. *Science & Education*, 32(2), 381-397. <https://doi.org/10.1007/s11191-021-00310-2>
- Üztemur, S., & Dere, İ. (2023). 'I was not aware that I did not know': developing a sense of place with place-based education. *Innovation: The European Journal of Social Science Research*, 36(3), 481-497. <https://doi.org/10.1080/13511610.2022.2092457>
- Weinberg, H. (2020). Online group psychotherapy: Challenges and possibilities during COVID-19—A practice review. *Group dynamics: Theory, research, and practice*, 24(3), 201.
- Wildman, J. L., Nguyen, D. M., Duong, N. S., & Warren, C. (2021). Student teamwork during COVID-19: Challenges, changes, and consequences. *Small Group Research*, 52(2), 119-134. <https://doi.org/10.1177/1046496420985185>
- Wright, D. S., Crooks, K. R., Hunter, D. O., Krumm, C. E., & Balgopal, M. M. (2021). Middle school science teachers' agency to implement place-based education curricula about local wildlife. *Environmental Education Research*, 27(10), 1519-1537. <https://doi.org/10.1080/13504622.2021.1960955>
- Xu, B., Chen, N. S., & Chen, G. (2020). Effects of teacher role on student engagement in WeChat-Based online discussion learning. *Computers & Education*, 157, 103956. <https://doi.org/10.1016/j.compedu.2020.103956>
- Yemini, M., Engel, L., & Ben Simon, A. (2023). Place-based education—a systematic review of literature. *Educational Review*, 1-21. <https://doi.org/10.1080/00131911.2023.2177260>