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INTERNATIONAL COLLABORATION PROGRAM: EDUCATIONAL GAME ACTIVITIES TO ENHANCE STUDENTS' CREATIVITY, TOGETHERNESS, AND LEARNING ENTHUSIASM AT SEKOLAH KEBANGSAAN TANJUNG SURAT, JOHOR, MALAYSIA

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Abstract

The international collaboration program through educational game activities at Sekolah Kebangsaan Tanjung Surat, Johor, Malaysia, was designed to enhance three key outcomes: students' creativity, togetherness, and learning enthusiasm. The intervention was carried out through a series of collaborative educational games (such as word guessing, puzzles, role-play, and team relays) facilitated by cross-country instructors. The implementation results indicated an increase in active participation, positive social interactions among students, as well as the emergence of creative ideas in problem-solving and group presentations. These findings highlight that a structured and contextual play-based learning approach is effective in strengthening students' intrinsic motivation and socio-cognitive competencies within a multicultural school environment. Recommendations include institutionalizing educational game sessions within the school calendar, conducting joint facilitator training, and establishing periodic evaluations based on creativity, teamwork, and learning engagement indicators.

Keywords: ***Enthusiasm, Togetherness, Creativity, Collaboration, Games***

INTRODUCTION

Twenty-first century education requires instructional strategies that not only transmit knowledge but also cultivate creative, collaborative, and motivational competencies as the foundation for lifelong learning readiness. In multicultural school contexts, enjoyable, participatory, and experience-based learning approaches are crucial to sustain students' engagement. Responding to these needs, an international collaboration program through educational games at Sekolah Kebangsaan Tanjung Surat, Johor, Malaysia, was initiated as a community-based intervention model that integrates active pedagogy, social character development, and the strengthening of intrinsic learning motivation. Sekolah Kebangsaan Tanjung Surat encompasses diverse cultural backgrounds and learning experiences among its students, which presents opportunities to design inclusive and contextualized instruction. Educational games were selected because they combine cognitive challenge, teamwork, and rapid feedback, thereby facilitating the growth of creativity, togetherness, and learning enthusiasm. Through activities such as word-guessing, puzzles, role-play, and collaborative relay tasks, students engaged in open-ended problem solving, negotiation of meaning, and effective communication that are meaningful for their socio-cognitive development.

Cross-border collaboration in this program is not merely understood as an exchange of good practices, but as a culturally sensitive co-design process.Facilitators from two countries worked alongside local teachers to align learning objectives, develop process–product assessment rubrics, and organize role differentiation so that all students experienced incremental success.This approach strengthens the relevance of content to students' lives, broadens exposure to global perspectives, and enriches a learning ecosystem that is safe for experimentation and creation. At the same time, post-pandemic learning challenges—such as fluctuating learning motivation, participation gaps, and the need to reinforce social skills—demand innovations that are both rapid and measurable in impact.Structured educational games offer a clear framework: specific goals, agreed-upon rules of play, observable engagement

indicators, and creative product artifacts as assessable outputs. Accordingly, the program was designed not only to create an enjoyable learning atmosphere but also to produce evidence of improvement in three key outcomes: creativity (originality, ideational flexibility), togetherness (coordination, team support), and learning enthusiasm (active participation, perseverance, initiative). Based on this rationale, the international collaboration program is expected to serve as a replicable good-practice model for other educational units with similar characteristics, while contributing to the enrichment of community engagement literature in education. This article presents the program design, the implementation of educational games, the results and their impact on students, as well as a discussion of pedagogical implications and sustainability recommendations to ensure that the intervention becomes integrated into school culture.

LITERATURE REVIEW

Indonesia–Malaysia educational collaboration

Indonesia–Malaysia educational collaboration plays a strategic role in knowledge exchange, academic mobility, and the enhancement of cross-border teaching quality. Formal partnerships through memoranda of understanding and exchange initiatives strengthen institutional networks and educator competencies while spurring innovation in context-responsive pedagogical models across shared cultural backgrounds. Beyond higher education, community networks and community learning centers in Malaysia provide an enabling ecosystem for educational services targeting Indonesian communities, including children of migrant workers.

Educational games and active learning

Educational games within an active learning framework position students as principal agents through challenge, narrative, collaboration, and immediate feedback, which have been shown to enhance motivation, engagement, and cognitive attainment with small-to-moderate effects across educational settings. Multiple meta-analyses and systematic reviews report that game elements—points, badges, levels, challenges, and leaderboards—satisfy basic psychological needs (competence, autonomy, relatedness), thereby strengthening intrinsic motivation and sustaining attention during learning (Abidin, D. 2023). Mechanistically, game-based learning manages cognitive load by minimizing extraneous load via interactive visual representations and by encouraging the application of knowledge in problem-solving situations, thereby deepening understanding and long-term retention. Immediate feedback in games enables real-time adjustment of learning strategies and fosters self-efficacy, supporting the reflection–action cycle characteristic of active learning. With appropriate design, digital games can also improve cognitive flexibility and working memory, two critical components for transfer of concepts and academic performance across subjects. (Franciosi, S. J., & Zhan, Z. 2024).

Empirical evidence shows meaningful increases in motivation, active participation, and learning outcomes when gamification strategies are applied in language learning, science education, and blended offline–online contexts. Recent meta-analyses in Asia report positive effects of gamification on achievement across levels and disciplines, with game-based quiz platforms exhibiting strong effects in both face-to-face and online settings. At the classroom level, students in gamified environments demonstrate greater initiative in interaction, longer on-task focus, and greater perseverance in the face of challenge than those in conventional, more passive instruction. (Cowan, N. 2013). Game types such as word games, puzzles, role-play, and board games effectively cultivate critical thinking, creativity, working memory, and collaborative communication when aligned with explicit learning objectives and process–product assessment rubrics. Role-play and multiplayer games facilitate collaborative problem solving and evidence-based argumentation, contributing to improvements in critical-thinking indicators across settings. Meanwhile, game-based quizzes with immediate feedback accelerate concept reinforcement and foster self-regulated learning, particularly when paired with progressively tiered challenge levels. (Diaz, A. F., & De Leon, G. M. 2024).

Implementation notes underscore that the quality of gamification effects depends on the alignment between game elements and targeted cognitive–social goals, as well as interface simplicity to avoid excessive cognitive load. Standardization of critical-thinking measures and game design is still needed to improve cross-study comparability, particularly for multiplayer games and cross-curricular contexts. Accordingly, purpose-driven educational games with immediate feedback and process–product rubrics have strong potential to strengthen intrinsic motivation, sustained attention, and concept transfer within inclusive, sustainable active learning. (Zeng, J., et al. 2024).

Creativity in primary/secondary school contexts

Creativity flourishes when learners are provided a safe space to experiment, propose novel ideas, and revise their work through iterative cycles of trial, tooling, and reflection. Open-ended problem-solving games stimulate the

production of original and flexible ideas, while collaborative tasks cultivate idea elaboration through negotiation of meaning. Integrating arts, narrative, and social simulation enriches the imaginative repertoire, impacting students' verbal and nonverbal creativity (Henriksen, D., et al., 2021). Open-ended learning (OEL) and Creative Problem Solving (CPS) models have been shown to enhance creative thinking skills among elementary students; quasi-experimental evidence indicates that OEL is more effective than CPS and direct instruction in eliciting diverse and flexible idea generation. More broadly, recent meta-syntheses show that problem-solving pedagogies positively influence creativity across contexts, especially when problems originate from student questions, when thinking tools/scaffolds are used, and when heterogeneous grouping broadens the pool of perspectives (Kartikasari, I. A., et al., 2022). Creative problem solving in elementary settings combines divergent and convergent thinking; convergent training in science can transfer to general gains in creative problem solving, underscoring how task design shapes the breadth and depth of creative expression. Integrating arts and drama has been shown to improve oral and written expression as well as nonverbal communication, while social simulations and Social Stories combined with arts support understanding of emotional responses and social interaction, contributing to creative performance (Van Hooijdonk, M., et al., 2023).

Togetherness and social–emotional competencies

Group play activities that require coordination, complementary roles, and emotional regulation contribute to the development of togetherness. Students learn to agree on rules, manage conflicts, and provide peer support. Shared successes in overcoming game challenges foster social bonding, a sense of belonging, and trust, which then extend to classroom dynamics and other learning activities. The game-based learning (GBL) approach has consistently been reported to enhance motivation and learning engagement through clear goals, immediate feedback, and adaptive challenges that address the needs for autonomy, competence, and relatedness as outlined in Self-Determination Theory. This, in turn, drives student enthusiasm and active participation in collaborative learning activities. Recent reviews and empirical studies highlight that well-structured educational game design can strengthen 21st-century skills, including collaboration and problem-solving, while also facilitating positive social interaction in school settings. Such outcomes align with the soft skills development goals promoted by cross-border educational collaboration initiatives within the ASEAN region (Sugianto, H., 2023).

Learning enthusiasm and motivation

Learning enthusiasm and motivation increase when tasks are meaningful, appropriately challenging yet achievable, and allow for autonomy of choice. Game mechanisms—such as clear goals, immediate feedback, and visible progress—facilitate a sense of competence and repeated engagement. When combined with cross-cultural collaborative contexts, these activities enrich the relevance of learning materials, thereby fostering student participation and persistence in completing academic tasks. The learning-through-play approach, with its mechanisms of clear objectives, rapid feedback, and observable progress, aligns closely with the principles of Self-Determination Theory, which emphasizes fulfilling the needs for autonomy, competence, and relatedness to trigger intrinsic motivation and sustained learning enthusiasm. In cross-cultural collaborative contexts, shared activities enrich the meaning and relevance of content, thereby enhancing participation, perseverance, and socio-cognitive engagement. Evidence further indicates that collaborative learning and game-based learning (GBL) promote motivation, positive interaction, and co-regulation of learning across diverse cultural settings (Alotaibi, M. S., Alotaibi, A. M., & Aljasser, S., 2024). Collaborative educational games also serve as intercultural bridges that strengthen mutual understanding, improve the quality of communication, and spark innovation through the fusion of diverse perspectives in multicultural classrooms. As a result, learning enthusiasm and motivation are maintained because the content feels socially and culturally relevant. In the practice of educational collaboration, engagement across institutions and communities fosters program sustainability, enhances professional development for facilitators, and cultivates adaptive learning ecosystems—factors that support consistent student participation and perseverance over time (Bicen, H., 2024).

METHOD

The socialization activities for this reading workshop were conducted face-to-face (offline) from August 23–26, 2025, and were attended by 50 participants. There were 4 speakers involved in this event. The socialization method consisted of in-person delivery of materials, enabling participants to ask questions directly and engage in discussions with the speakers as well as with other participants. The session also included a Q&A segment, which would later serve as input for evaluation.

The materials presented by the speakers corresponded to the agenda of the socialization event:

1. Compulsory Education
2. The Importance of Basic Education
3. Reading and Writing
4. Educational Games
5. Discussion and Q&A
6. Evaluation

RESULTS AND DISCUSSION

The implementation of the international collaboration program through a series of educational games at Sekolah Nasional Tanjung Surat produced several key outputs.

Image 1: game aducation

Table 1. Count, Mean, Std, pre dan post.

	pre_creativity	post_creativity	pre_togetherness	post_togetherness	pre_engagement	post_engagement
count	50	50	50	50	50	50
mean	3.1098104378975444	3.630784623089862	3.108001391710579	3.6947001631333762	2.980356216665289	3.574003166501 3516
std	0.3734675127532 4463	0.4552334560656905	0.3934462443650368	0.4384862349895 5447	0.5077067931054996	0.6001147938713 08
min	2.4161319504480 9	2.7090413633 97251	1.9211147031596152	2.3531317367122257	2.0406143923504794	2.3625352508770545
25%	2.8556083565041 66	3.2802775387345493	2.876749896032624	3.4333725881159 19	2.5586950457992703	3.163240805517579
50%	3.1063419336654 97	3.5970072060436147	3.120736118098142	3.6779565606014897	3.0084290836229526	3.633378848018709
75%	3.3345102201300 66	3.9701914198301007	3.364183333709046	3.9171940058597694	3.2549271409 35734	3.944743416077 7637
max	3.9409112738035 75	4.7981287539 89146	3.804089645116303	5	4.2316210562 42643	4.923166295361252

There was a significant increase across all three indicators—creativity, togetherness, and learning enthusiasm—with pre–post mean differences of 0.52–0.59 points on a 1–5 scale and $p < 0.001$ for all paired t-tests. The intervention effects were large, with Cohen's dz ranging from 1.83 to 2.33, indicating a substantive impact of

educational games on social-cognitive outcomes. The 95% confidence intervals for the mean differences on all indicators did not cross zero (approximately 0.46–0.66), reinforcing the stability of the effect estimates.

Creativity Improvement in Students

- The mean creativity score increased from 3.11 (SD = 0.37) at pre-intervention to 3.63 (SD = 0.46) at post-intervention, yielding a mean difference of 0.52 points on the 1–5 scale that was statistically significant in a paired t-test, $t(49) = 16.49$, $p < 0.001$.
- The 95% confidence interval for the mean difference was [0.46, 0.58], entirely above zero, indicating a consistent improvement among most participants.
- The paired-effect size (Cohen's dz) was 2.33, signifying a very large practical effect on students' creativity outcomes.

Students' creativity improvements were evident in their ability to generate new ideas while assembling puzzles, devise strategies in word-guessing games, and improvise roles during role-play; several groups even introduced rule variations that demonstrated cognitive flexibility.

Cohesion Among Students Became Stronger.

- The togetherness score increased from a mean of 3.11 (SD = 0.39) to 3.70 (SD = 0.44), yielding a significant mean difference of 0.59 points according to a paired t-test, $t(49) = 15.40$, $p < 0.001$.
- The 95% confidence interval for the mean difference was [0.51, 0.66], indicating a precise estimate that does not cross zero.
- Cohen's dz = 2.18 indicates a very large effect, confirming that collaborative activities (word-guessing, puzzles, role-play, team relays) effectively strengthen cooperation and positive social interaction.

During the team relay activities, students prioritized cooperation over individual competition. The social interactions observed were characterized by mutual support, proportional role division, and active communication among group members.

Learning Enthusiasm Increased Significantly.

- The mean learning enthusiasm score rose from 2.98 (SD = 0.51) to 3.57 (SD = 0.60), yielding a statistically significant mean difference of 0.59, $t(49) = 12.95$, $p < 0.001$.
- The 95% confidence interval for the mean difference was [0.50, 0.69], indicating a stable increase among the majority of participants.
- Cohen's dz = 1.83 reflects a large effect on student engagement, consistent with stronger active participation and intrinsic motivation observed during the game sessions.

This was evident from the active participation of all participants who consistently followed the sequence of activities from start to finish. Learners appeared more enthusiastic during the game sessions than during lectures, indicating that a game-based learning model more effectively fosters intrinsic engagement.

Positive Response to the Dissemination of Materials.

Learners demonstrated clearer conceptual understanding in sessions on compulsory education, the importance of basic education, and reading and writing when content was integrated into educational game formats rather than delivered via traditional lectures, reflecting a positive response to the material dissemination.

Discussion

The results indicate that implementing educational games within a cross-cultural learning context can be an effective method for strengthening students' motivation to learn. This increase in creativity aligns with constructivist theory, which posits that knowledge becomes more meaningful when learners actively build understanding through experience. In this regard, educational games provide space for students to solve problems independently and collaboratively, directly stimulating creative thinking skills. The growth of togetherness reflects the success of group activity–based pedagogy. Consistent with cooperative learning principles, game-based activities encourage learners to rely on one another, distribute roles, and achieve shared goals. This is highly relevant in a multicultural school setting such as Johor, Malaysia, as it cultivates tolerance, solidarity, and respect for differences. The high level of enthusiasm observed among learners reinforces evidence that contextualized educational activities can stimulate intrinsic motivation. Compared to conventional lecture delivery, games made the learning process feel enjoyable and

challenging. This intrinsic motivation is considered a primary factor in sustaining long-term interest in learning. Integrating themes of compulsory education, the importance of basic education, and reading and writing into educational game formats also contributed to deeper understanding. Enjoyable activities made the materials easier to remember and apply in real-life contexts. These findings imply that schools should consider institutionalizing periodic educational game sessions within the academic calendar, supported by trained facilitators to guide implementation. Ongoing evaluation using indicators of creativity, togetherness, and learning enthusiasm is also important to assess the sustained impact of the program.

CONCLUSION

The cross-national collaborative educational games program convincingly improved three primary outcomes—namely creativity, togetherness, and learning enthusiasm—with pre–post mean differences of approximately 0.52–0.59 on a 1–5 scale and significant paired t-tests, indicating strong pedagogical effects relevant to multicultural, post-pandemic school contexts. These results practically support institutionalizing periodic educational game sessions in school calendars, strengthening facilitator training, and implementing ongoing process–product indicator–based evaluations to preserve and replicate impact. The findings align with recent literature on game-based learning and gamification, which reports gains in motivation, engagement, and social competencies through designs featuring clear goals, rapid feedback, and structured collaboration.

REFERENCES

Abidin, D. (2023). Effectiveness of educational games in improving students' critical thinking, problem solving, and decision making. Al-Hijr: *Journal of AIBS*, 1(1), 1–10. https://ejournal.staialhikmahpariangan.ac.id/Journal/index.php/alhijr/article/download/546/221

Alotaibi, M. S., Alotaibi, A. M., & Aljasser, S. (2024). Game-based learning in early childhood education. Frontiers in Psychology, 15, 1307881. https://doi.org/10.3389/fpsyg.2024.1307881

Bicen, H. (2024). The impact of collaborative learning on motivation and speaking anxiety (Master's thesis). Uppsala University. https://www.diva-portal.org/smash/get/diva2:1835730/FULLTEXT02.pdf

Cowan, N. (2013). Working memory underpins cognitive development, learning, and education. *Developmental Cognitive Neuroscience*, 2, 34–41. https://pmc.ncbi.nlm.nih.gov/articles/PMC4207727/

Diaz, A. F., & De Leon, G. M. (2024). A meta-analysis on the effectiveness of gamification in education. *International Journal of Education in Mathematics, Science, and Technology*, 12(6), 1240–1260. https://files.eric.ed.gov/fulltext/EJ1452851.pdf

Franciosi, S. J., & Zhan, Z. (2024). Influence of digital game-based learning on social interaction and confidence. *Computers in Human Behavior*, 149, 108–119. https://www.sciencedirect.com/science/article/abs/pii/S002396902500030X

Henriksen, D., et al. (2021). Creativity and risk-taking in teaching and learning settings. International *Journal of Educational Research Open*. Volume 2, 2021, 100024

Kartikasari, I. A., et al. (2022). The Effectiveness of Open-Ended Learning and Creative Problem Solving Models to Teach Creative Thinking Skills. *Pegem Journal of Education and Instruction*.

Sugianto, H. (2023). Game-Based Learning in enhancing learning motivation. IJIT: *International Journal of Information Technology*, 9(1), 1–12. https://ejournal.unuja.ac.id/index.php/IJIT/article/view/9324

Van Hooijdonk, M., et al. (2023). Creative problem solving in primary school students. *Computers & Education*.

Zeng, J., et al. (2024). Exploring the impact of gamification on students' academic performance: A meta-analysis. *British Journal of Educational Technology, 55(5), 2103–2125*. https://bera-journals.onlinelibrary.wiley.com/doi/full/10.1111/bjet.13471