



Integrating TSTS Model into Digital Flipbooks: A Strategy to Foster Numerical and Scientific Problem-Solving Ability

Annisa Fauzana^{1*}, Suherman¹, Yerizon¹, Edwin Musdi¹

¹Universitas Negeri Padang, Padang, Indonesia.

Received: February 15, 2026

Revised: April 30, 2026

Accepted: May 25, 2026

Published: May 31, 2026

Corresponding Author:

Annisa Fauzana

fauzanaannisa@gmail.com

DOI: [10.29303/jppipa.v12i5.14991](https://doi.org/10.29303/jppipa.v12i5.14991)

 Open Access

© 2026 The Authors. This article is distributed under a (CC-BY License)



Abstract: This study aimed to develop and evaluate a Two Stay Two Stray (TSTS)-integrated digital flipbook electronic worksheet (E-LKPD) designed to enhance mathematical problem-solving abilities among eighth-grade students. Employing the Plomp research and development model, the product underwent systematic expert validation, iterative usability testing, and classroom-based field evaluation. Results indicated that both the teaching module and E-LKPD achieved "Very Valid" status, with mean validity scores of 3.47 and 3.54 respectively across content, instructional design, graphics, and language dimensions. Practicality assessments yielded "Very Practical" ratings: 90% for the teaching module and 84.26% for the E-LKPD during field testing. Effectiveness was demonstrated by 80% of students achieving mastery on a mathematical problem-solving assessment, surpassing the predefined 65% success threshold. These findings confirm that integrating the structured TSTS cooperative learning protocol within an interactive digital flipbook format can effectively support the development of mathematical problem-solving competencies. The developed product offers a scalable, curriculum-aligned instructional resource that bridges cooperative pedagogy with technology-enhanced learning.

Keywords: Digital flipbook; Electronic worksheet; Mathematical problem-solving; Two stay two stray

Introduction

Mathematical problem-solving is widely recognized as a cornerstone of 21st-century education, essential for fostering critical thinking, logical reasoning, and the ability to navigate complex, real-world scenarios (Ng et al., 2026; Osman et al., 2026; Taar & Palojoki, 2022). Despite its centrality in curriculum frameworks worldwide, empirical evidence consistently reveals a significant gap in students' problem-solving competencies (Hambach et al., 2016; Kanamori et al., 2023; Wicaksono & Korom, 2025). In Indonesia, recent international assessments such as PISA 2022 indicate that learners struggle substantially with tasks requiring analytical reasoning, strategic planning, and contextual application of mathematical concepts (Jeong et al., 2025; Joshi & Khanal, 2025; Kastorff et al., 2025). Classroom observations and preliminary diagnostic assessments further corroborate this trend, showing that students

often rely on rote procedures, exhibit difficulty in identifying relevant information, and lack confidence when confronted with non-routine problems. These challenges are frequently exacerbated by traditional, teacher-centered instructional approaches and the limited availability of interactive, context-rich learning materials that actively engage learners in the problem-solving process (Arani, 2025; Haritas & Harini, 2025; Rezai et al., 2025).

Addressing this pedagogical gap requires instructional designs that simultaneously promote collaborative knowledge construction, metacognitive strategy use, and technological accessibility (Fardella et al., 2024; Li et al., 2026; Ofem et al., 2026; Shahab & Barak, 2026; Sun et al., 2026). The Two Stay Two Stray (TSTS) cooperative learning model offers a structured framework that naturally aligns with the stages of mathematical problem-solving (Apriakanti et al., 2020; Firman et al., 2020; Huda et al., 2020). By systematically

How to Cite:

Fauzana, A., Suherman, Yerizon, & Musdi, E. (2026). Integrating TSTS Model into Digital Flipbooks: A Strategy to Foster Numerical and Scientific Problem-Solving Ability. *Jurnal Penelitian Pendidikan IPA*, 12(5), 254-260. <https://doi.org/10.29303/jppipa.v12i5.14991>

rotating group members to share, compare, and refine solution strategies, TSTS encourages active discourse, peer scaffolding, and the explicit articulation of reasoning—key processes in developing robust problem-solving skills (Rahayu et al., 2020; Sabrina et al., 2020; Silalahi & Sary, 2020). Concurrently, the integration of digital technologies into learning resources has emerged as a viable pathway to enhance student engagement and support self-regulated learning (Kumar Karanam & Hartman, 2025; Yordanova & Shotarov, 2026; Zoubir et al., 2026). Digital flipbook-based electronic student worksheets (E-LKPD) provide dynamic, multimedia-rich environments that can be accessed across devices, feature interactive prompts, and deliver immediate feedback (Lufri et al., 2021; Sujinah & Yanah, 2024; Sumarmi et al., 2021). However, the synergistic potential of embedding a structured cooperative model like TSTS within a purpose-built digital flipbook remains underexplored, particularly within the flexible, student-centered demands of contemporary curriculum reforms such as Indonesia's Kurikulum Merdeka (Harahap & Sulasmi, 2026; Indrayadi & Alta, 2025; Kumayas et al., 2025).

To bridge this gap, the present study focuses on the design, development, and preliminary evaluation of a TSTS-integrated digital flipbook E-LKPD tailored to support mathematical problem-solving instruction. The primary objective is to develop a learning resource that meets established criteria for content validity, instructional practicality, and pedagogical effectiveness. Specifically, this research aims to: (1) design a digital flipbook worksheet that systematically scaffolds the TSTS cooperative learning phases; (2) evaluate its validity through expert review in terms of content alignment, instructional design, and linguistic clarity; (3) assess its practicality based on teacher and student usability feedback; and (4) examine its effectiveness in fostering students' mathematical problem-solving competencies. By aligning cooperative pedagogy with interactive digital media, this work seeks to provide an empirically grounded, scalable instructional tool that addresses persistent challenges in mathematics education while offering actionable insights for educators navigating technology-enhanced, student-active learning environments.

Method

Research Design

This study employs a Research and Development (R&D) design aimed at producing and validating a digital instructional product. The development follows the Plomp model, which comprises three iterative phases: preliminary research, development/prototyping, and assessment. The design

integrates the Two Stay Two Stray (TSTS) cooperative learning model into a flipbook-type Electronic Student Worksheet (E-LKPD), supported by a teacher-aligned Teaching Module, to systematically scaffold mathematical problem-solving instruction.

Development Procedure

The procedural workflow adheres to the Plomp framework, augmented by Tessmer's formative evaluation layers to ensure continuous refinement: Preliminary Research: Needs analysis, curriculum mapping (Kurikulum Merdeka, Phase D), student characteristic profiling, concept analysis, and literature review were conducted to establish design specifications and learning objectives; Development/Prototyping Phase: Initial prototypes of the Teaching Module and E-LKPD were designed using Canva and deployed via the Heyzine platform to enable interactive navigation, image upload, and automated feedback. Formative evaluation proceeded through: (a) self-evaluation, (b) expert review (mathematics education, language, and technology specialists), (c) one-to-one evaluation (3 students of varying ability levels + 1 teacher), and (d) small-group evaluation (6 heterogeneous students). Iterative revisions were implemented after each evaluation stage; and Assessment Phase: A field test was conducted with a full classroom cohort to evaluate the product's practicality in authentic instructional settings and its effectiveness in improving mathematical problem-solving performance.

Participants

Participants were purposively selected Grade VIII students from a public junior high school in West Sumatra, Indonesia. Subgroups included: 3 students (one-to-one phase), 6 students (small-group phase, stratified by academic ability), and 20 students (field-test phase). One certified mathematics teacher participated in practicality assessments. Informed consent was obtained from the school administration, the teacher, and students' guardians; all data were anonymized for analysis.

Instruments and Data Collection

Data were collected using three primary instruments: Validity Instruments: Expert judgment sheets assessing four dimensions: content alignment, didactic design, graphic/layout quality, and language clarity (4-point Likert scale); Practicality Instruments: Structured questionnaires for teachers and students measuring ease of use, time efficiency, engagement, navigation clarity, and pedagogical usefulness; Effectiveness Instrument: A validated essay-based test measuring mathematical problem-solving across four indicators: (1) identifying relevant information, (2)

selecting an appropriate strategy, (3) implementing the strategy, and (4) interpreting results. Scoring followed a 0–4 analytic rubric aligned with Polya’s problem-solving framework and national competency indicators.

Data Analysis Techniques

Quantitative and qualitative analyses were triangulated to ensure methodological rigor: Validity: Mean validity scores were calculated as $V = \frac{\sum x}{n}$, where x represents expert ratings and n the number of items. Products were classified as *Very Valid* if $V \geq 3.40$; Practicality: Percentage scores were computed using $P = \frac{R}{SM} \times 100\%$, where R is the total obtained score and SM is the maximum possible score. Thresholds categorized responses as *Practical* (75–79.9%) or *Very Practical* ($\geq 80\%$); Effectiveness: Student test scores were converted to percentages and compared against the school’s Minimum Mastery Criterion (KKM = 75). The product was deemed effective if $\geq 65\%$ of students achieved mastery. Indicator-level performance was analyzed descriptively to identify strengths and residual gaps; and Qualitative Data: Interview transcripts and observational field notes were thematically coded to contextualize quantitative findings, validate usability perceptions, and guide final product adjustments.

Quality Assurance

All instruments underwent prior validation by independent experts to ensure content and construct

validity. Pilot testing confirmed internal consistency before full deployment. The developmental cycle adhered to ethical research standards, with voluntary participation, data confidentiality, and institutional approval documented prior to field implementation.

Result and Discussion

Results should be clear and concise. The discussion should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

The development of the TSTS-integrated digital flipbook E-LKPD followed the Plomp model through three iterative phases. The final product was evaluated against three quality criteria: validity, practicality, and effectiveness. Results are summarized below.

Validity

Expert validation involved five specialists (three mathematics education experts, one language expert, one educational technology expert). Ratings were collected using a 4-point Likert scale across four dimensions: content appropriateness, instructional design, graphics, and language.

Both products exceeded the threshold for "Very Valid," indicating strong alignment with curricular standards, pedagogical principles, visual design guidelines, and linguistic clarity.

Table 1. Validity Scores for Teaching Module and E-LKPD

Product	Content	Instructional Design	Graphics	Language	Overall Mean	Category
Teaching Module	3.53	3.33	3.55	3.47	3.47	Very Valid
E-LKPD	3.43	3.59	3.58	3.54	3.54	Very Valid

Note: Scale: 1–4; Category threshold: ≥ 3.40 = Very Valid

Practicality

Practicality was assessed through teacher and student questionnaires during small-group evaluation

($n = 6$) and field testing ($n = 20$). Responses used a 4-point Likert scale; percentages were calculated as $P = (R/SM) \times 100\%$.

Table 2. Practicality Scores for Teaching Module and E-LKPD

Product / Phase	Ease of Use	Attractiveness	Comprehensibility	Usefulness	Overall %	Category
Teaching Module (Teacher, Field Test)	100	100	91.67	-	90.00	Very Practical
E-LKPD (Students, Small Group)	85.42	90.28	81.25	87.50	86.11	Very Practical
E-LKPD (Students, Field Test)	85.94	85.42	84.50	81.17	84.26	Very Practical

Note: Category threshold: $\geq 80\%$ = Very Practical

All scores met or exceeded the "Very Practical" criterion, confirming that the product is user-friendly, engaging, and supportive of independent and collaborative learning.

Effectiveness

Effectiveness was measured via a post-test assessing mathematical problem-solving ability across four indicators aligned with Polya’s framework. The product was deemed effective if $\geq 65\%$ of students

achieved the school's Minimum Mastery Criterion (KKM = 75).

Sixteen of twenty students (80%) achieved mastery, surpassing the 65% effectiveness threshold. Indicator-level analysis reveals strongest performance in problem

identification and strategy selection, with relatively lower—but still adequate—performance in result interpretation, suggesting an area for instructional refinement.

Table 3. Student Performance on Mathematical Problem-Solving Indicators (N = 20)

Indicator	Description	Mean Score (%)	Category
1	Identifying relevant information	89.38	Very Good
2	Selecting appropriate strategy	88.13	Very Good
3	Implementing the strategy	76.25	Good
4	Interpreting results	65.63	Good
Overall Mastery	Students scoring ≥ 75	80%	Effective

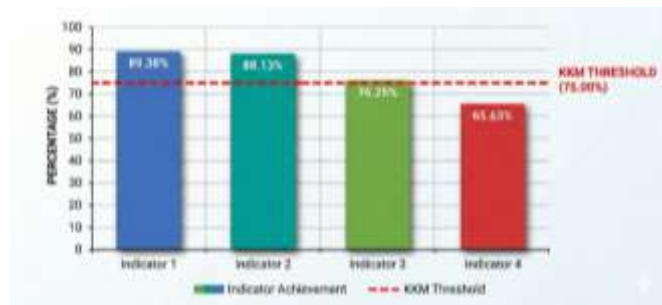


Figure 1. Distribution of student scores by problem-solving indicator

The development and evaluation of the TSTS-integrated digital flipbook E-LKPD yielded outcomes that extend beyond mere product validation, offering meaningful insights into how structured cooperative pedagogy and interactive digital media can jointly address persistent challenges in mathematics education. The high validity scores across content, instructional design, graphics, and language dimensions indicate that the product successfully operationalized theoretical principles of problem-based cooperative learning within a technologically accessible format. More significantly, the strong practicality ratings from both teachers and students suggest that the resource aligns with real-world classroom constraints—such as limited instructional time, diverse learner abilities, and the growing expectation for mobile-compatible learning tools—without compromising pedagogical rigor.

The effectiveness outcome, wherein 80% of students achieved mastery in mathematical problem-solving after using the product, warrants particular attention. This improvement is not merely a function of exposure to digital content; rather, it reflects the synergistic effect of embedding the Two Stay Two Stray protocol within a scaffolded, interactive worksheet. The TSTS structure—requiring students to first construct understanding in small groups, then articulate and compare strategies with peers from other groups, and finally synthesize insights before individual application—appears to have activated metacognitive

monitoring and strategic flexibility. Students were not passively receiving solution methods; they were compelled to evaluate, justify, and adapt approaches in response to peer feedback. This process mirrors the cognitive demands of authentic problem-solving, where identifying relevant information, selecting viable strategies, and interpreting results are iterative and socially mediated acts.

These findings carry implications for curriculum implementation under Indonesia's Kurikulum Merdeka, which emphasizes student agency, contextual relevance, and differentiated learning pathways. The modular design of the flipbook E-LKPD, with its clear navigation, embedded formative prompts, and opportunities for visual documentation of reasoning, supports teachers in facilitating inquiry-oriented lessons without requiring extensive additional preparation (Hamidah et al., 2023; Meydi et al., 2024; Ndruru et al., 2026). For students, the combination of collaborative structure and digital interactivity appears to have lowered affective barriers to engaging with non-routine problems—a critical factor given prior evidence of anxiety and avoidance behaviors when facing unfamiliar mathematical tasks (Fratta et al., 2026; Gustafsson et al., 2025; Ma & Zhang, 2026).

It is important to acknowledge contextual boundaries. The study was conducted with a single class in one school setting, and the content focus was limited to statistics. While the developmental process followed iterative validation cycles, broader generalizability requires replication across diverse school contexts, grade levels, and mathematical domains. Additionally, the reliance on post-test mastery as the primary effectiveness indicator, while aligned with local assessment policies, could be complemented in future work by longitudinal measures of transfer, retention, or disposition toward mathematical reasoning.

Ultimately, this work suggests that the integration of cooperative learning models with purpose-built digital media can serve as a viable lever for enhancing problem-solving competence. The significance lies not in the product itself, but in the demonstrable pathway it

offers for translating pedagogical theory into scalable, classroom-ready resources that honor both cognitive complexity and learner diversity. Future efforts might explore adaptive features within such flipbooks—such as differentiated problem sets or automated feedback loops—to further personalize the problem-solving experience while preserving the collaborative discourse that appears central to its efficacy.

Conclusion

This study successfully developed and evaluated a Two Stay Two Stray (TSTS)-integrated digital flipbook E-LKPD designed to enhance mathematical problem-solving competencies among Grade VIII junior high school students. Guided by the Plomp research and development model, the product underwent systematic expert validation, iterative usability refinement, and classroom-based field testing. Findings confirm that the developed teaching module and E-LKPD meet established quality benchmarks: both attained "Very Valid" status across content, instructional design, graphics, and language dimensions (mean scores: 3.47 and 3.54, respectively); were rated "Very Practical" by teachers and students in both small-group and full-class trials (84.26–90.00%); and demonstrated clear pedagogical effectiveness, with 80% of learners achieving mastery on a structured problem-solving assessment—surpassing the predefined success threshold. These outcomes illustrate how embedding a structured cooperative learning protocol within an interactive digital medium can activate the cognitive and social processes essential for mathematical reasoning, offering a scalable, curriculum-aligned instructional resource that bridges pedagogical theory and technology-enhanced classroom practice.

Acknowledgments

Thank you to all parties who have helped in this research so that this article can be published.

Author Contributions

All authors contributed to writing this article.

Funding

No external funding.

Conflicts of Interest

No conflict interest.

References

- Apriakanti, D., Kusuma, M., & Nurhayati, M. (2020). The Effectiveness of Two Stay Two Stray (TSTS) Cooperative Learning Model in Improving Students' Critical Thinking Skills. *Journal of Science Education Research*, 4(1), 40–43. <https://doi.org/10.21831/jser.v4i1.34240>
- Arani, S. M. N. (2025). Enhancing communication and reducing anxiety: The role of problem-based learning in EFL learners. *Psychological Development. Ampersand*, 15. <https://doi.org/10.1016/j.amper.2025.100245>
- Fardella, C., Pérez-Arredondo, C., Broitman, C., & Roth-Eichin, N. (2024). The carnival as a transformative pedagogical practice for social change: A case study from Chile. *Acta Psychologica*, 250. <https://doi.org/10.1016/j.actpsy.2024.104539>
- Firman, F., Aswar, N., Sukmawaty, S., Mirnawati, M., & Sukirman, S. (2020). Application of the Two Stay Two Stray Learning Model in Improving Indonesian Language Learning Outcomes in Elementary Schools. *Jurnal Studi Guru Dan Pembelajaran*, 3(3), 551–558. <https://doi.org/10.30605/jsgp.3.3.2020.621>
- Fratta, M., Floris, A., Porcu, S., & Atzori, L. (2026). The human digital twin for service management: Architecture and user modeling. *Computer Communications*, 253, 108526. <https://doi.org/10.1016/j.comcom.2026.108526>
- Gustafsson, M., Matveieva, O., Wihlborg, E., Borodin, Y., Mamatova, T., & Kvitka, S. (2025). Adaptive governance amidst the war: Overcoming challenges and strengthening collaborative digital service provision in Ukraine. *Government Information Quarterly*, 42(3). <https://doi.org/10.1016/j.giq.2025.102056>
- Hambach, J., Diezemann, C., Tisch, M., & Metternich, J. (2016). Assessment of Students' Lean Competencies with the Help of Behavior Video Analysis-Are Good Students Better Problem Solvers? *Procedia CIRP*, 55, 230–235. <https://doi.org/10.1016/j.procir.2016.08.012>
- Hamidah, A., Ayunasari, D. S., & Sanjaya, E. (2023). Development of E-LKPD in Motion System Materials for High School Class Using PageFlip 3D Software. *Jurnal Penelitian Pendidikan IPA*, 9(3), 1233–1241. <https://doi.org/10.29303/jppipa.v9i3.3396>
- Harahap, Y. N., & Sulasmi, E. (2026). Student-Centered Curriculum Innovation in the Digital Age. *OMEGA: Jurnal Keilmuan Pendidikan Matematika*, 5(1), 78–83. <https://doi.org/10.47662/jkpm.v5i1.1180>
- Haritas, I., & Harini, K. N. (2025). Solving' as a key course learning outcome (CLO) in postgraduate (PG) management education. *International Journal of Management Education*, 23(3). <https://doi.org/10.1016/j.ijme.2025.101225>
- Huda, S., Yasin, M., Fitri, A., Syazali, M., Supriadi, N., Umam, R., & Jermisittiparsert, K. (2020). Numerical

- Ability Analysis: The Impact of the Two Stay-Two Stray Learning Model on the Sequence and Series Topic in Islamic Boarding School. *Journal of Physics: Conference Series*, 1467(1), 12002. <https://doi.org/10.1088/1742-6596/1467/1/012002>
- Indrayadi, S., & Alta, A. (2025). *Harnessing student-centered learning for effective learning recovery*. Retrieved from <https://www.econstor.eu/handle/10419/324486>
- Jeong, D., Kim, S. G., & Bong, M. (2025). Gender, mindset, and teacher support predict students' math motivation profiles: Evidence from five countries in PISA 2022. *Contemporary Educational Psychology*, 83. <https://doi.org/10.1016/j.cedpsych.2025.102428>
- Joshi, D. R., & Khanal, J. (2025). Digital resource engagement, health challenges, and mathematical achievement in school children: An in-depth analysis of PISA data 2022. *Computers in Human Behavior Reports*, 19. <https://doi.org/10.1016/j.chbr.2025.100782>
- Kanamori, Y., Seki, N., Foxton, R., Moross, J., Komagamine, Y., Mizutani, K., Hosaka, K., Kanazawa, M., Hatayama, T., Komada, W., Yonemitsu, I., Akiyama, M., Kaewmanee, P. C., Kaewsutha, N., Nitta, H., Wakabayashi, N., & Morio, I. (2023). Fostering globally competent dental students through virtual team-working, problem-solving and person-centred multi-disciplinary care planning. *Journal of Dental Sciences*, 18(1), 95–104. <https://doi.org/10.1016/j.jds.2022.07.004>
- Kastorff, T., Müller, M., & Greiff, S. (2025). Digital media use and availability can mitigate the digital divide: Meta-analytic insights from PISA 2022. *Computers and Education*, 238. <https://doi.org/10.1016/j.compedu.2025.105409>
- Kumar Karanam, S. A., & Hartman, N. W. (2025). A systematic review of Digital Twin (DT) and virtual learning environments (VLE) for smart manufacturing education. *Manufacturing Letters*, 44, 1597–1608. <https://doi.org/10.1016/j.mfglet.2025.06.179>
- Kumayas, T., Luntungan, G. S., Arsai, A. N., & Tatipang, D. P. (2025). Curriculum Reform Meets Classroom Realities: Selected Indonesian Teachers' Perspectives on the Merdeka Curriculum. *REiLA: Journal of Research and Innovation in Language*, 7(1), 97–110. Retrieved from <https://journal.unilak.ac.id/index.php/REILA/article/view/25828>
- Li, H., Lee, J. C.-K., Wu, D., & Ding, K. (2026). The Neural Correlates of Pedagogy: An fNIRS Hyperscanning Study of Constructivist and Instructivist Approaches in Teacher-Child Dyads. *NeuroImage*, 121719. <https://doi.org/10.1016/j.neuroimage.2026.121719>
- Lufri, L., Laili, F., Anhar, A., Ladamay, I., Kumala, F. N., Susanti, R. H., Ulfatin, N., & Rahayu, S. (2021). Designing and analysing electronic student worksheet based on Kvisoft Flip Book Maker for elementary school student. *IOP Conference Series: Materials Science and Engineering*, 1098(3), 32028. <https://doi.org/10.1088/1757-899X/1098/3/032028>
- Ma, S., & Zhang, L. (2026). Generation and evaluation mechanism of digital media art pattern design scheme based on interactive genetic algorithm. *Systems and Soft Computing*, 8. <https://doi.org/10.1016/j.sasc.2026.200474>
- Meydi, R., Hamidah, A., & Mataniari, R. (2024). Development of e-LKPD Using Flip PDF Professional on Coordination System Material for F Phase Students. *Jurnal Penelitian Pendidikan IPA*, 10(8), 5900–5908. <https://doi.org/10.29303/jppipa.v10i8.7437>
- Ndruru, H. M. P., Sormin, E., Purba, L. S. L., & Simanjuntak, F. N. (2026). Development of Environmentally Based E-Student Worksheet for Chemistry Practices. *Journal of Science and Education (JSE)*, 6(2), 1381–1393. <https://doi.org/10.58905/jse.v6i2.637>
- Ng, S. H. S., Choo, C. M., Yap, C. L. S., Sam, L., & Chen, S. H. A. (2026). Defining and measuring inventive thinking: A scoping review. *Thinking Skills and Creativity*, 61. <https://doi.org/10.1016/j.tsc.2026.102176>
- Ofem, U. J., Asuquo, E., Nwanunu, B., Madukwe, E., Nsan, N., Adie, J., Ukatu, J., Asukwo, P., Ebye, A. S., & Igwe, R. (2026). From hybrid pedagogies to learner-centered outcomes: How teacher adaptability, digital literacy, and student feedback bridge the gap. *Social Sciences and Humanities Open*, 13. <https://doi.org/10.1016/j.ssaho.2026.102547>
- Osman, E., Hamdan, H., Hassan, F., & Alameddine, F. (2026). Unveiling secondary student perceptions of the application of 21st century skills in classroom instruction. *Social Sciences and Humanities Open*, 13. <https://doi.org/10.1016/j.ssaho.2025.101967>
- Rahayu, M., Sudarma, I. K., & Dibia, I. K. (2020). Enhancement of Science Learning Outcomes through Two Stay Two Stray Learning Model Assisted with Mind Mapping Media. *Journal of Education Technology*, 4(3), 218–227. <https://doi.org/10.23887/JET.V4I3.25688>
- Rezai, A., Ahmadi, R., Ashkani, P., & Hosseini, G. H. (2025). Implementing active learning approach to promote motivation, reduce anxiety, and shape

- positive attitudes: A case study of EFL learners. *Acta Psychologica*, 253. <https://doi.org/10.1016/j.actpsy.2025.104704>
- Sabrina, G., Rizka, B., & Sariakin, S. (2020). The Implementation Of Two Stay Two Stray Technique To Improve The Students' Competence Of SMP Negeri 9 Banda Aceh in Mastering Reading Comprehension. *JETLi: Journal of English Teaching and Linguistics*, 1(2), 74–91. <https://doi.org/10.55616/jetli.v1i2.18>
- Shahab, C., & Barak, M. (2026). Critical thinking in higher education: Identifying the pedagogical practices and modes of engagement. *Thinking Skills and Creativity*, 59. <https://doi.org/10.1016/j.tsc.2025.102041>
- Silalahi, M., & Sary, Y. W. (2020). The Using Of Two Stay Two Stray (Tsts) Strategy On Students' Reading Comprehension. *Bilingual : Jurnal Pendidikan Bahasa Inggris*, 2(2), 27–34. <https://doi.org/10.36985/DDXZ9W97>
- Sujinah, & Yanah, R. B. T. (2024). Development of Electronic Student Worksheets (E-LKPD) Based on Flipbook. *International Journal of Pedagogical Language, Literature, and Cultural Studies (i-Plural)*, 1(3), 36–43. <https://doi.org/10.63011/IP.V1I3.24>
- Sumarmi, A., M., & Mutia, T. (2021). The Effect of Digital Eco-Learning in Student Worksheet Flipbook to Environmental Project Literacy and Pedagogic Competency. *Journal of Technology and Science Education*, 11(2), 357–370. <https://doi.org/10.3926/jotse.1175>
- Sun, Y., Bhadaniya, P., Eiris, R., & Gheisari, M. (2026). Online construction site visit: Studying construction students' collaborative problem-solving behaviors. *Computers & Education: X Reality*, 8, 100148. <https://doi.org/10.1016/j.cexr.2026.100148>
- Taar, J., & Palojoki, P. (2022). Applying interthinking for learning 21st-century skills in home economics education. *Learning, Culture and Social Interaction*, 33, 100615. <https://doi.org/10.1016/j.lcsi.2022.100615>
- Wicaksono, A. G. C., & Korom, E. (2025). Mediation effect of scientific competency on relationship between inductive reasoning and domain-general and domain-specific problem solving. *Thinking Skills and Creativity*, 57. <https://doi.org/10.1016/j.tsc.2025.101830>
- Yordanova, Z., & Shotarov, A. (2026). From resource scarcity to digital leverage: A framework for sustainable technology and circular-economy-oriented social entrepreneurship. *Sustainable Technology and Entrepreneurship*, 5(1). <https://doi.org/10.1016/j.stae.2025.100127>
- Zoubir, H., Ben Rherbal, A., Sefri, Y., & Chakli, A. (2026). Pedagogical integration of information communication and technologies in rural mathematics education: Enhancing motivation and equity in low-resource contexts. *Scientific African*, 31. <https://doi.org/10.1016/j.sciaf.2025.e03171>