BAHASTRA
Vol. 46 (2) 2026, pp. 526-534
P-ISSN: 0215-4994 | E-ISSN: 2548-4583
http://journal1.uad.ac.id/index.php/BAHASTRA/index

A comparative analysis of students' text-writing skills in the implementation of the Student Teams Achievement *Division* (STAD) model using module-based and web-based learning

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Received: April 23, 2026 **Revised:** July 27, 2026 **Accepted**: July 31, 2026

KEYWORDS
Module-Based Learning
Kurikulum Merdeka
STAD
Text-Writing Skills
Web-Based Learning

ABSTRACT

Writing instruction in Indonesian language classes faces two related challenges: students' persistent difficulty in organizing ideas, text structures, and linguistic features, and the curricular shift toward Kurikulum Merdeka, which emphasizes logical, critical, creative, and publication-oriented writing in print and digital media. Previous studies on Student Teams Achievement Division (STAD) mostly tested the model as a cooperative strategy, while fewer studies compared how different media shape STAD implementation in genre-based writing. This study addresses that gap by comparing module-based and web-based STAD for tenth-grade students' text-writing skills. A quantitative quasi-experimental comparison was conducted using 70 complete posttest scripts from two Grade X classes at SMA Negeri 3 Padang. The module-based group and the web-based group wrote observation report, exposition, and anecdote texts. The texts were assessed through an analytic rubric covering content development, generic structure, and linguistic features. The data were analyzed using descriptive statistics, Welch's t-test, Mann-Whitney U test, and Cohen's d. The module-based group obtained an overall mean of 76.06 (SD = 6.46), while the web-based group reached 80.85 (SD = 5.61). The difference was significant, t (66.69) = 3.31, p = .001, d = .79. Web-based STAD showed the largest advantage in observation reports and anecdotes, while the difference in exposition texts was smaller. These findings indicate that instructional media are not neutral in cooperative writing instruction. Web-based STAD strengthens interaction, access to examples, and revision feedback, whereas modules provide procedural scaffolding. The study contributes empirical evidence on media-sensitive STAD implementation for text-based Indonesian language learning.

Introduction

Indonesian language learning in senior high school is increasingly shaped by two urgent issues: the need to improve students' literacy performance and the need to prepare students to write in print and digital environments. The PISA 2022 country note reports that only around one quarter of Indonesian students reached at least Level 2 in reading (OECD, 2023). This condition indicates that many students still need systematic support to identify main ideas, evaluate information, and communicate ideas through texts. In classroom practice, these literacy demands appear directly in writing activities because students must transform reading, discussion, and observation into coherent written products.

The curricular context has also changed. Since the national curriculum framework has moved toward Kurikulum Merdeka (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2024), Indonesian language learning no longer focuses only on mastering fixed text types. The current *Capaian Pembelajaran* for Bahasa Indonesia *Fase* E emphasizes the ability to write ideas, thoughts, views, directions, and written messages for various purposes in a logical, critical, and creative manner (Badan Standar, Kurikulum, dan Asesmen Pendidikan, 2024). It also expects students to publish their writing through print and digital media. Although the empirical data in this study were collected during the implementation of Curriculum 2013, the focus on genre-based text writing remains relevant to the current curriculum because both curricula require students to develop ideas, organize text structures, and use language features according to communicative purposes.

Writing is a productive language skill that requires students to coordinate cognitive, linguistic, and social processes. Students need to generate ideas, select relevant information, organize the information into a genre-appropriate structure, and revise the text so that readers can follow the intended meaning. Tarigan (2008) defines writing as the process of expressing ideas in written language so readers can understand them. Writing is further characterized as a language skill acquired through structured stages of planning, drafting, and revising rather than mastered instantaneously (Dalman, 2016). More recent writing research also views writing as a socially situated activity that develops through practice, feedback, and interaction (Graham, 2018; Hyland, 2003). Large-scale reviews of adolescent writing instruction similarly identify structured practice and collaborative writing among the most effective strategies for improving students' writing performance (Graham & Perin, 2007). Therefore, writing instruction needs learning designs that help students plan, discuss, draft, revise, and evaluate texts. This view is consistent with the cognitive process model of writing, which describes composing as a recursive interplay of planning, translating ideas into text, and reviewing rather than a single linear sequence (Flower & Hayes, 1981).

Preliminary classroom evidence in the research setting showed that students' writing problems were concentrated in three areas. First, students often had difficulty developing a clear main idea into sufficient supporting details. Second, they did not consistently follow the generic structures of observation report, exposition, and anecdote texts. Third, their texts showed weaknesses in cohesion, diction, sentence effectiveness, and mechanics. These problems are consistent with previous findings that students often face difficulty in idea development, organization, and linguistic accuracy when writing school-based genres (Yoandita, 2019). A teacher-centered learning pattern can intensify the problem because students receive limited opportunities to exchange ideas and revise their drafts through peer interaction.

Cooperative learning offers a relevant response to these problems because it positions students as active participants in a structured social learning process. The Student Teams Achievement Division (STAD) model is one of the most widely used cooperative learning models. STAD organizes students into heterogeneous teams, combines teacher presentation with team study, and maintains individual accountability through assessment and group recognition (Slavin, 2014, 2015). STAD is often categorized among structured, innovative cooperative learning models that combine teamwork with periodic quizzes and team recognition (Shoimin, 2016). This structure resonates with sociocultural accounts of learning, which hold that higher mental functions such as reasoning and self-regulation first develop through social interaction before they are internalized by the individual (Vygotsky, 1978). Broadly defined, collaborative learning refers to situations in which two or more people learn or attempt to learn something together, providing the social context in which such internalization can occur (Dillenbourg, 1999). Social interdependence theory further explains why structured group goals combined with individual accountability, both central to STAD, tend to produce stronger achievement than individualistic learning structures (Johnson & Johnson, 2009). Peer support within STAD teams can therefore function as a form of scaffolding, in which more capable peers temporarily assist a learner with tasks that are still beyond his or her independent capability (Wood et al., 1976). In writing instruction, this structure can support idea generation, peer explanation, and revision because students must help one another understand the task while still producing individual writing products.

The effectiveness of STAD, however, does not depend only on the cooperative model. It is also shaped by the media that guide group interaction. Module-based learning provides printed scaffolding through objectives, materials, examples, exercises, and assessment criteria. This format can help students follow writing stages in an orderly manner. Web-based learning provides different affordances. As a complementary instructional medium, it can extend learning beyond the classroom and give students more control over the pace and location of study (Lawanto, 2001). It offers flexible access to examples, opportunities for online discussion, faster feedback, and space for revising writing in a digital environment. Prior research on collaborative writing shows that face-to-face, online, and blended modes create different interaction patterns and different learning opportunities (Lu & Kim, 2021). Online feedback has also been shown to support writing development when it is timely and specific (Lv et al., 2021). Studies on

technology-mediated collaborative writing similarly report that tools enabling shared, real-time text production help learners negotiate content and refine linguistic accuracy together (Elola & Oskoz, 2010). Classroom-based studies of collaborative writing further indicate that jointly composing texts can lead learners to produce more accurate and complex language than writing individually (Storch, 2013). More broadly, blended and web-supported instruction is characterized by the combination of face-to-face guidance with online access to resources and interaction, which can extend the time and modes available for idea development (Graham, 2006).

Many studies have examined STAD and cooperative learning for improving student achievement and writing skills (Resmi et al., 2020; Yusuf et al., 2019). Broader reviews of cooperative learning research likewise report consistent positive effects on achievement and peer relationships across subject areas (Gillies, 2016). Recent studies also report that STAD and cooperative learning can increase writing performance, learning participation, and group responsibility (Karnedi, 2025; Mantra et al., 2025; Tafonao et al., 2025). Nevertheless, most of these studies position STAD as a single treatment and do not explicitly compare the role of instructional media within the same cooperative model. This limitation leaves an important research gap: whether module-based and web-based media produce different writing outcomes when both are integrated into STAD.

The novelty of this study lies in its comparative focus. Rather than asking only whether STAD improves writing skills, this study examines how two media environments shape the effectiveness of STAD in text-based Indonesian language learning. The study compares module-based STAD and web-based STAD using the same text genres: observation report, exposition, and anecdote. The research question is: How do students' text-writing skills differ between module-based STAD and web-based STAD, both overall and across observation report, exposition, and anecdote texts? By answering this question, the study contributes to media-sensitive cooperative learning research and provides practical evidence for Indonesian language teachers who need to design writing instruction in the transition from Curriculum 2013 to Kurikulum Merdeka.

Method

This study used a quantitative quasi-experimental comparison design, following standard procedures for quantitative educational research (Sugiyono, 2015). The design was chosen because the learning treatments were implemented in intact classroom groups and random assignment of individual students was not possible. The study compared two implementations of the same cooperative learning model. The first group learned through module-based STAD, while the second group learned through web-based STAD. The main dependent variable was students' text-writing skill after the treatment.

The population consisted of Grade X students at SMA Negeri 3 Padang in the 2017/2018 academic year. The school was selected because Indonesian language learning at the site still showed students' difficulty in constructing school-based texts. Purposive sampling was used to select two classes with relatively similar academic characteristics and no prior implementation of STAD for writing instruction. The final analyzed sample consisted of 70 complete writing scripts, with 35 students in the module-based STAD group and 35 students in the web-based STAD group.

Both treatments followed the main STAD stages: teacher presentation, team study, individual writing task, assessment, and group recognition. In the module-based group, students used printed learning modules containing learning objectives, concept explanations, text examples, writing steps, exercises, and assessment criteria, developed following established principles of instructional module design that emphasize clear objectives, systematic content sequencing, and embedded practice and assessment (Santyasa, 2009). In the web-based group, students used web-based materials, online examples, and digital discussion spaces to access resources, exchange ideas, and revise drafts. The two groups studied the same genres: observation report text, exposition text, and anecdote text.

The operational definitions of the variables were specified to clarify the measurement focus. Students' text-writing skill was defined as the score obtained from writing three genre-based texts. The score represented students' ability to develop content, organize generic structure, and use appropriate language features. The treatment variable was defined as the type of instructional media used to support STAD implementation. The operational indicators are presented in Table 1.

Table 1. Operational Definitions and Writing Assessment Indicators

Variable	*Operational Definition*	*Indicators Observed*
Text-writing skill	Students' ability to produce observation report, exposition, and anecdote texts after the STAD treatment, converted into scores on a 0-100 scale.	Content development; generic structure; linguistic features; cohesion and mechanics.
Module-based STAD	STAD implementation supported by printed modules as the main learning medium.	Use of module objectives, text examples, writing steps, exercises, peer discussion, and individual writing task.
Web-based STAD	STAD implementation supported by web materials and digital interaction as the main learning medium.	Access to web materials, online examples, digital discussion, peer feedback, revision, and individual writing task.

The writing instrument was a performance-based writing test. Students wrote one text for each genre. The analytic rubric covered three core components. Content development assessed the relevance, clarity, sufficiency, and elaboration of ideas. Generic structure assessed the completeness and sequence of genre elements, such as general statement and description in observation reports, thesis-argument-reiteration in exposition, and orientation-crisis-reaction-coda in anecdotes. Linguistic features assessed diction, cohesion, sentence effectiveness, spelling, and punctuation according to the conventions of each genre. This assessment focus is grounded in genre-based writing pedagogy, which treats texts as staged, goal-oriented social processes whose structures vary systematically according to cultural and communicative purposes (Martin & Rose, 2008). Combining explicit attention to process and genre in this way helps teachers connect what a text is for with how it is produced (Badger & White, 2000), an approach that has also proved effective for developing tenth-grade students' writing ability in the Indonesian senior high school context (Lukmawardani & Badriyah, 2022).

All students' writing products were assessed by the researcher using the same analytic scoring rubric. To ensure consistency throughout the assessment process, the rubric was applied systematically using explicit performance descriptors for each scoring criterion. All writing scripts were evaluated according to the same scoring procedures and assessment criteria to minimize scoring subjectivity, in line with established research procedures for ensuring the validity and reliability of practice-based assessment instruments (Arikunto, 2014). Rubric-based assessment of this kind is consistent with evidence that analytic, criterion-referenced rubrics improve the reliability and validity of judgments about complex performances such as writing (Jonsson & Svingby, 2007), particularly when the criteria are made explicit enough for students to understand and internalize what quality work looks like (Sadler, 1989).

Data analysis was conducted in several stages. First, individual scores for each genre were converted into a 0-100 scale and averaged to obtain each student's overall writing score. Second, descriptive statistics were calculated to show the mean, standard deviation, minimum, and maximum scores for each group and genre. Third, inferential analysis was conducted to compare module-based and web-based STAD. Shapiro-Wilk and Levene tests were used to inspect normality and variance homogeneity. Since the module group's overall score distribution was not fully normal, Welch's t-test was reported together with the Mann-Whitney U test as a robustness check. Cohen's d was used to estimate the magnitude of the difference. Interpreting effect sizes in this way follows conventional benchmarks for small, medium, and large standardized mean differences (Cohen, 1988), while the overall quasi-experimental comparison of intact classes follows established guidance for strengthening causal inference when random assignment is not feasible (Shadish et al., 2002).

Results and Discussion

The individual raw scores were first processed into descriptive statistics so that the findings could be interpreted more directly. Table 2 presents the post-treatment writing performance of the module-based and web-based STAD groups by text genre. The table shows that both groups reached the good category, but the web-based group obtained higher mean scores across all genres.

Tabel 2. Descriptive Statistics of Students' Writing Scores by Learning Media and Text Genre

Learning Media	*Text Genre*	*Mean*	*SD*	*Min.*	*Max.*
Module-based STAD	Observation report text	72.62	12.05	50.00	100.00
Module-based STAD	Exposition text	74.29	11.85	50.00	100.00
Module-based STAD	Anecdote text	81.27	8.42	66.67	100.00
Module-based STAD	Overall mean	76.06	6.46	61.11	85.18
Web-based STAD	Observation report text	79.53	11.67	66.67	100.00
Web-based STAD	Exposition text	77.14	10.17	58.33	100.00

Web-based STAD	Anecdote text	85.87	9.27	72.22	100.00
Web-based STAD	Overall mean	80.85	5.61	70.37	94.45

In the module-based STAD group, the overall mean was 76.06 (SD = 6.46). The highest mean score appeared in anecdote texts (M = 81.27), followed by exposition texts (M = 74.29) and observation report texts (M = 72.62). This pattern suggests that the module helped students follow the writing stages and produce acceptable text structures, especially when the genre allowed narrative and creative elements. The printed module served as procedural scaffolding because students could repeatedly consult the objectives, examples, and writing steps during group work. However, the lower scores for observation reports and exposition texts indicate that structured modules alone did not fully solve students' difficulty in developing factual details and logical arguments.

The web-based STAD group achieved a higher overall mean of 80.85 (SD = 5.61). This group also obtained higher scores in all three text genres: observation report texts (M = 79.53), exposition texts (M = 77.14), and anecdote texts (M = 85.87). The largest descriptive advantage appeared in observation report texts. This result is pedagogically reasonable because web-based learning can provide richer reference materials, examples, and visual information that help students describe objects or phenomena more concretely. The web environment also allowed students to exchange ideas and revise drafts more flexibly, which supported the development of content and cohesion.

The findings may be explained by the wider access to online learning resources available to students in the web-based STAD group. During the implementation of web-based STAD, students accessed multiple online sources to compare factual information before composing their observation reports. This process encouraged them to expand and verify ideas rather than relying solely on the examples provided by the teacher. In contrast, students in the module-based class tended to depend on the information presented in the printed module, resulting in less varied content development. These classroom learning patterns help explain why the web-based group achieved better performance, particularly in the content development component can be seen in Figure 1.

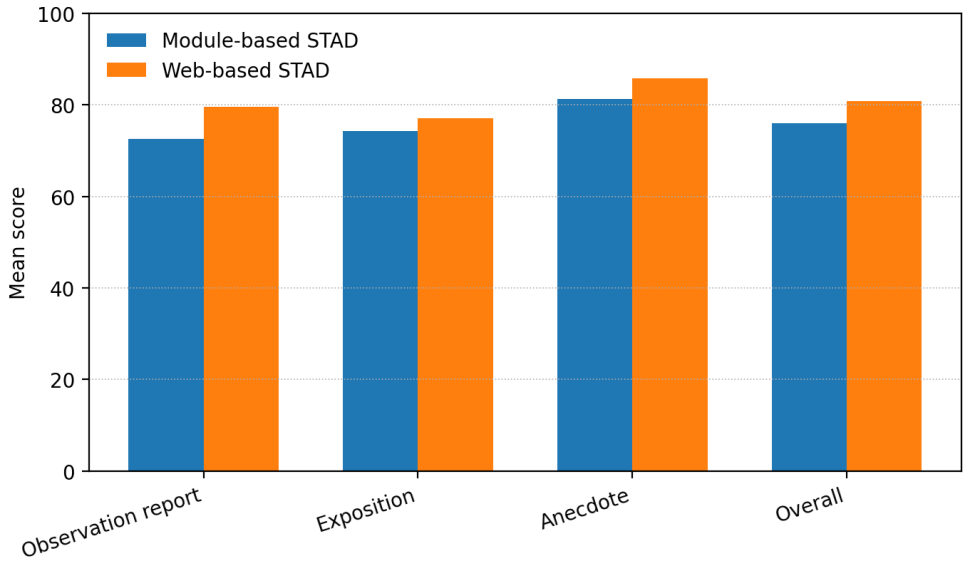

Fig. 1. Mean writing scores in module-based and web-based STAD groups

To determine whether the descriptive differences were statistically meaningful, the group means were compared using inferential statistics. Table 3 shows that the web-based group outperformed the module-based group on the overall writing score. The overall difference was 4.79 points, and the effect size was medium to large (d = 0.79). The Mann-Whitney U test also confirmed the robustness of the overall difference, U = 849.00, p = .006.

Table 3. Inferential comparison between web-based and module-based STAD

Comparison	*Mean Difference*	*t*	*df*	*p*	*Cohen's d*
Observation report text	+6.91	2.43	68	.018	0.58
Exposition text	+2.86	1.08	68	.283	0.26
Anecdote text	+4.60	2.17	68	.033	0.52
Overall mean	+4.79	3.31	66.69	.001	0.79

These results provide a direct answer to the research questions. Regarding RQ1, students taught through web-based STAD demonstrated significantly higher overall writing performance than those taught through module-based STAD. The difference of 4.79 points, accompanied by a medium-to-large effect size (d = 0.79), suggests that the instructional medium may play a meaningful role even when the same cooperative learning model is employed. However, the findings for RQ2 show that this advantage was not uniform across text genres. Significant differences were found for observation report and anecdote texts, whereas the difference in exposition writing was not statistically significant. Thus, the effect of instructional media within STAD appears to be genre-sensitive rather than universal.

The genre-based comparison offers a more nuanced interpretation. Web-based STAD showed significant advantages in observation report texts and anecdote texts. In observation reports, digital access likely helped students gather concrete information and organize descriptions based on richer examples. In anecdote texts, online discussion and peer feedback may have encouraged students to develop more engaging situations, reactions, and language choices. These results support the idea that digital learning environments can increase interaction and provide faster feedback when the learning task requires idea elaboration and revision (Means et al., 2013; Warschauer, 2007). These findings are consistent with broader evidence that well-timed, specific feedback is among the most powerful influences on learning and achievement (Hattie & Timperley, 2007), and that structured peer feedback in particular can support both linguistic accuracy and learner autonomy in second-language and school-based writing (Yu & Lee, 2016).

The better performance of students in the web-based STAD group may be associated with their access to a wider range of online anecdotal texts. Exposure to diverse examples likely enriched students' understanding of humorous situations, social criticism, and the generic structure of anecdotal writing, enabling them to develop more varied narrative ideas.

The difference in exposition texts was positive but not statistically significant. This finding is important because it prevents an overgeneralized claim that web-based STAD automatically improves every writing genre. Exposition writing requires students to formulate a thesis, build arguments, connect reasons with evidence, and close with a clear reaffirmation. Digital resources may help students access information, but they do not automatically teach argument quality. Therefore, exposition writing needs explicit scaffolding for claim-evidence-reasoning, logical connectors, and source evaluation. Teachers who use web-based STAD should combine digital interaction with clear argumentative writing prompts and guided revision criteria. This recommendation aligns with research showing that novice writers benefit more from strong instructional guidance than from open-ended, minimally guided tasks, because argumentative reasoning imposes a cognitive load that unguided digital access alone cannot resolve (Kirschner et al., 2006). Combining explicit process steps with genre-specific models, as proposed in process-genre pedagogy, may therefore be particularly useful for strengthening exposition writing (Badger & White, 2000).

Although the statistical difference was not significant, the findings suggest that students in both groups experienced similar challenges in organizing arguments and providing sufficient evidence to support their opinions. This indicates that the instructional media alone may not be sufficient to improve argumentative writing, as developing logical reasoning and argumentation skills requires intensive guidance, sustained practice, and continuous feedback.

Taken together, the genre-specific findings indicate that the effectiveness of instructional media should be understood in relation to the demands of the writing task. Web-based resources appear to provide greater advantages when students need access to varied information, examples, and opportunities for idea elaboration, as reflected in the observation report and anecdote tasks. In contrast, exposition writing requires more than access to information. Students must evaluate evidence, construct logical relationships among claims, and organize arguments coherently. These higher-level reasoning demands may explain why access to web-based resources alone did not produce a significant advantage over the structured module. Therefore, the contribution of digital media to writing instruction may depend on how well its affordances correspond to the cognitive and rhetorical demands of a particular genre.

These findings extend previous studies on STAD and cooperative learning. Prior research has generally shown that STAD increases participation and achievement because students learn through team support and individual accountability (Slavin, 2014; Yusuf et al., 2019). The present study adds that the media environment matters. When STAD is supported by printed modules, students benefit from order, clarity, and step-by-step guidance. When STAD is supported by web-based media, students benefit from wider access to examples, more flexible interaction, and quicker revision opportunities. Thus, the instructional medium influences how cooperative learning produces writing outcomes. From a motivational perspective, the individual accountability and group recognition built into STAD may support the psychological needs for competence and relatedness that sustain engaged, self-determined learning (Deci & Ryan, 2000), while successful collaborative writing experiences can also strengthen students' belief in their own writing capability (Bandura, 1997). This pattern is consistent with findings that collaborative learning strategies

can simultaneously improve students' writing performance and their writing self-efficacy (Helaluddin et al., 2023).

Importantly, the present findings should not be interpreted as evidence that STAD itself caused the observed differences, because STAD was implemented in both groups. Instead, the findings suggest that the instructional medium through which STAD was supported influenced students' opportunities to access information, exchange ideas, and revise their writing. This distinction strengthens the contribution of the study: the effectiveness of a cooperative learning model may depend partly on the instructional environment in which its collaborative processes take place. Accordingly, decisions about cooperative learning should consider not only the learning model but also the type of media and the nature of the writing task.

The findings also suggest that the effectiveness of web-based STAD was influenced not only by the availability of digital learning resources but also by the cooperative learning process itself. Group discussions, peer interaction, and collaborative problem-solving enabled students to exchange ideas before composing their texts. Such collaborative activities encouraged students to clarify concepts, revise drafts, and improve the overall quality of their writing, consistent with the principles of cooperative learning proposed by Slavin (2015).

The results also connect to current Indonesian language learning needs under Kurikulum Merdeka. The *Capaian Pembelajaran Fase* E expects students to write logically, critically, and creatively, and to publish texts in print or digital media. Web-based STAD is aligned with this direction because it integrates collaboration, digital resources, and revision practice. At the same time, module-based STAD remains relevant for classes that need stronger procedural control or have limited internet access. A balanced instructional design can combine the strengths of both media: modules for structured writing stages and web-based platforms for interaction, reference exploration, and feedback.

This study has several limitations. First, the data came from one school and two intact classes, so the findings should not be generalized without caution. Second, the analysis focused on three text genres that were taught in the research setting. Third, the data were collected during the Curriculum 2013 period, although the interpretation was updated to connect the findings to Kurikulum Merdeka, an alignment issue that has also been documented in evaluations of Indonesian language textbooks developed under Curriculum 2013 (Nisja, 2018). In addition, all writing products were assessed by a single rater using an analytic scoring rubric. Although the rubric was applied consistently throughout the assessment process, the absence of inter-rater reliability testing may have limited the consistency of the scoring. Therefore, future research should involve multiple raters, report inter-rater reliability, replicate the comparison under the current curriculum, include larger samples, and examine how students interact during online peer feedback.

Conclusion

This study compared students' text-writing skills in module-based and web-based STAD implementation. The findings show that both media supported cooperative writing instruction, but the web-based STAD group achieved higher overall writing performance. The web-based group reached an overall mean of 80.85, while the module-based group reached 76.06. The difference was statistically significant and showed a medium to large effect size.

The comparison across genres indicates that web-based STAD was especially beneficial for observation report and anecdote texts. The advantage was smaller and not significant for exposition texts, which suggests that argumentative writing needs more explicit scaffolding than digital access alone can provide. These findings demonstrate that the effectiveness of STAD depends not only on group work but also on the instructional media that shape access, interaction, feedback, and revision.

The study contributes to cooperative learning research by making the novelty explicit: it isolates the role of instructional media within the same STAD model in genre-based Indonesian language writing instruction. For classroom practice, teachers can use web-based STAD to strengthen collaborative idea development and revision, while maintaining module-like scaffolding for text structure and language features. Future studies should test this design under Kurikulum Merdeka with broader samples and more detailed process data.

Declarations

Author contribution : All authors contributed equally to the research and manuscript preparation.
Funding statement : This research did not receive any funding.
Conflict of interest : Both authors declare that they have no competing interests.

Ethics Approval : The study was conducted as part of regular classroom learning. Permission and consent procedures should be reported according to the journal ethics requirements.

Additional information : No additional information is available for this paper.

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