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Improving Student Engagement and Learning Independence Using Word Square Cooperative Learning with Interactive Video

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Abstract

Student engagement and learning independence are important for student-centered IPAS learning, yet preliminary observations in Grade IV of MI Al-Mukhlisin, Jambi City, showed low levels of both. This classroom action research examined the iterative use of Word Square cooperative learning supported by interactive video to improve classroom participation and learning independence. Twenty fourth-grade students participated in two cycles, with two meetings in each cycle. Data were collected through observation, a learning-independence questionnaire, interviews, and documentation and analyzed descriptively. Student engagement increased from 45.6% at pre-action to 61.3% at the end of Cycle I and 83.5% at the end of Cycle II. Learning independence based on observation increased from 42.4% to 62.8% and 82.9%, respectively. The questionnaire, administered at the end of Cycles I and II, increased from 64.0% to 80.2%. The findings show progressive classroom improvement during an iterative instructional process combining Word Square, interactive video, individual accountability, teacher facilitation, and cycle-based reflection. The study offers a context-specific instructional example for participatory IPAS learning in Madrasah Ibtidaiyah.

Keywords: Cooperative Learning; Interactive Video; IPAS; Learning Independence; Student Engagement; Word Square.

Introduction

Education plays a strategic role in developing students' intellectual capacity, character, and independence. In the learning process, students are not only expected to receive information but also to participate actively in constructing knowledge and developing the ability to regulate their own learning. Student engagement is therefore an essential component of effective learning because active participation in questioning, discussion, expressing ideas, and completing tasks can support deeper understanding and improved learning outcomes (Prijanto & Kock, 2021). Learning independence is equally important because it enables students to take initiative, assume responsibility, and manage their learning without excessive dependence on others (Nugroho & Maulana, 2021; Nurfadilah & Hakim, 2020). These two aspects are particularly relevant in Natural and Social Sciences (IPAS), which emphasizes not only conceptual understanding but also inquiry skills, self-awareness, and environmental awareness (Agustina et al., 2022).

However, the expected level of student engagement and learning independence has not been

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fully achieved in fourth-grade IPAS learning at MI Al-Mukhlisin, Jambi City. Preliminary observations conducted on January 9, 2026, involving 20 students showed that 80% of the students were in the low category of learning engagement, 15% were in the moderate category, and only 5% were in the high category. In terms of learning independence, 85% of the students were categorized as low, 10% as moderate, and only 5% as high. These conditions were reflected in limited classroom participation, low involvement in completing tasks, hesitation to ask questions or express opinions, insufficient initiative in seeking information, and a high level of dependence on teacher guidance. Students also showed limited ability to set learning goals, select appropriate strategies, evaluate their learning outcomes, and independently seek solutions when facing difficulties. These findings indicate the need for a more active, collaborative, engaging, and student-centered instructional approach.

One instructional alternative that may address these problems is the cooperative learning model of the word square type, which combines group collaboration with activities involving the identification of answers within letter arrangements. This model encourages students to think, discuss, analyze information, and actively participate in finding answers, thereby supporting both engagement and learning responsibility (Ilmi et al., 2024). Conceptually, this approach is consistent with constructivist theory, which views students as active constructors of knowledge through learning experiences and social interaction (Danoebroto, 2015). Nevertheless, previous studies have indicated that repeated use of word square activities without variation in learning media may lead to boredom and reduced concentration (Rahmawati et al., 2021). Therefore, integrating interactive video is considered relevant because the combination of visual, audio, text, animation, quizzes, and immediate feedback can create a more concrete and engaging learning experience while encouraging greater student participation and independence (Awaliyah & Ahmad Yani T, 2024; Fatimah, 2023; Khairunnisa et al., 2023; Rachman et al., 2023).

Previous studies provide evidence that cooperative learning, Word Square activities, and video-supported instruction can contribute to student participation or learning outcomes (Hasan, 2023; Ilmi et al., 2024; Rahman et al., 2021). At the same time, research on elementary students' self-regulated learning suggests that instructional support and well-organized classroom interaction are important for developing students' ability to monitor and regulate their learning (de Ruig et al., 2023) However, limited attention has been given to how these mechanisms can be combined within an elementary classroom so that collaborative support increases participation without increasing students' dependence on more capable peers. Therefore, the gap addressed in this study concerns how cooperative Word Square activities, interactive-video prompts, and individual accountability can be integrated and progressively refined to support both student engagement and learning-independence behaviors in a Madrasah Ibtidaiyah classroom.

The Madrasah Ibtidaiyah context is relevant to the present study because MI teachers are required to facilitate general elementary-school subjects, including IPAS, within a classroom environment that simultaneously emphasizes structured teacher guidance, student responsibility, cooperation, and the development of independent learning habits. In this context, the present study does not claim that Word Square or interactive video constitutes a specifically religious instructional model. Rather, it examines how a participatory and responsibility-oriented instructional design can be implemented and iteratively refined within an MI classroom. Accordingly, the contribution of this study to madrasah education lies in documenting a classroom-based approach for increasing participation and independent learning behavior in IPAS while remaining compatible with the instructional routines of Madrasah Ibtidaiyah.

Based on this gap, the present study aims to improve students' learning engagement and

learning independence through the implementation of the word square cooperative learning model supported by interactive video in fourth-grade IPAS learning at MI Al-Mukhlisin, Jambi City. This study is expected to provide classroom-based evidence regarding the integration of cooperative learning activities, Word Square tasks, and interactive digital media within an iterative instructional framework. Theoretically, the study may contribute to a better understanding of how active and cooperative learning strategies can support student engagement and learning independence at the elementary school level. Practically, the findings may serve as a reference for teachers in designing IPAS learning that is more participatory, engaging, student-centered, and supportive of students' initiative and responsibility for their own learning.

Method

This study employed Classroom Action Research (CAR) using the Kemmis and McTaggart model. CAR was selected because it enables systematic improvement of classroom practice through iterative cycles of planning, action, observation, and reflection. The research was designed to improve students' learning engagement and learning independence through the implementation of a cooperative learning model of the Word Square type supported by interactive video. This design allows each cycle to be evaluated and refined based on the findings obtained during the preceding action (Abdillah et al., 2021; Annury, 2019; Parnawi, 2021).

The study was conducted in Grade IV-B of MI Al-Mukhlisin, Jambi City, Jambi Province, during the first semester of the 2026/2027 academic year. The participants consisted of all 20 students in the class, including 13 boys and 7 girls. All students were involved because the classroom action was intended to address the learning problems identified in that particular class. Initial observations indicated that students' engagement and learning independence had not yet developed optimally, as many students were passive during classroom activities, showed limited initiative in asking questions or expressing opinions, and remained dependent on teacher guidance when completing learning tasks.

Prior to the implementation of the study, administrative and institutional permission was obtained through Universitas Jambi and MI Al-Mukhlisin, Jambi City. The study was conducted as part of the researcher's academic research within the Master of Elementary Education Program, Faculty of Teacher Training and Education, Universitas Jambi. Permission to conduct the classroom observations and research activities was subsequently obtained from MI Al-Mukhlisin, Jambi City, in coordination with the school principal and the Grade IV classroom teacher. The school provided permission and support for the implementation of the classroom action research during regular IPAS learning activities.

Throughout the study, student confidentiality was maintained by using abbreviated codes rather than students' full names in observation records, data tables, and research reporting. The observation sheets, learning-independence questionnaire, interviews, and documentation were used solely for research purposes and to evaluate changes in student engagement and learning independence; they were not used as part of students' formal academic grades. Participation in classroom activities was conducted within the regular instructional setting, and the research procedures were coordinated with the classroom teacher to minimize disruption to the students' normal learning activities.

The intervention was implemented in two cycles, with each cycle consisting of two meetings. Each cycle included planning, action, observation, and reflection. During the learning process, students interacted with instructional videos, responded to embedded questions, participated in discussions, worked in heterogeneous groups, completed Word Square activities, presented their

work, and participated in evaluation and reflection. The results of each cycle were reviewed with the classroom observer and used to determine improvements for the subsequent cycle. The four meetings were organized as follows:

Table 1. Instructional Intervention Sequence Across Cycles and Meetings

Cycle/Meeting	Duration	IPAS topic/subtopic	Main instructional activities
Cycle I, Meeting 1	2 × 35 min	Changes in forms of energy – transformation of energy in everyday life	Interactive video, embedded quiz, teacher–student questioning, PPT reinforcement, Word Square activity, group discussion, individual worksheet, presentation, evaluation and reflection
Cycle I, Meeting 2	2 × 35 min	Changes in forms of energy – photosynthesis	Interactive video on photosynthesis, embedded questions, discussion, Word Square activity, individual task within group interaction, presentation and reflection
Cycle II, Meeting 1	2 × 35 min	Changes in forms of energy – the importance of energy transformation	Interactive video, quiz, heterogeneous group discussion, individual Word Square work, presentation, feedback and reflection
Cycle II, Meeting 2	2 × 35 min	Forces around us – effects of forces on objects	Interactive video, interactive questions, group interaction, Word Square activity, presentation, evaluation and reflection

The researcher acted as the practitioner and delivered the instructional activities, whereas the Grade IV classroom teacher acted as the observer. The observer monitored the implementation of the instructional process and student engagement and learning-independence behaviors using the prepared observation sheets. Reflection on each cycle was subsequently discussed by the researcher and classroom teacher

Data Collection

Data were collected through observation, questionnaires, interviews, and documentation. Observation was conducted systematically during each classroom meeting to examine teacher activities, students' learning engagement, students' learning independence, classroom interaction, group-work dynamics, and the implementation of the Word Square cooperative learning model supported by interactive video (Utomo et al., 2024).

Student engagement was measured using an observation sheet developed from eight indicators: involvement in the learning process, participation in task completion, initiative in problem solving, willingness to ask questions and express opinions, efforts to seek additional information, cooperation in group discussions, self-reflection, and the application of knowledge in practical situations. Each indicator was assessed using a four-point scale ranging from 1 to 4.

Student engagement refers to students' observable involvement in the immediate classroom activity, including participation, interaction, task involvement, questioning, discussion, and use of information during the ongoing lesson. Learning independence, in contrast, refers to students' capacity to initiate, direct, select strategies for, monitor, and evaluate their own learning with decreasing dependence on external assistance

Learning independence was assessed using both observation sheets and a student questionnaire. The observation instrument covered eight indicators: learning initiative, identification of learning needs, setting learning goals and targets, perceiving difficulties as

challenges, seeking and using relevant learning resources, selecting and applying learning strategies, evaluating learning processes and outcomes, and self-efficacy. The questionnaire consisted of 15 statements with four response options: strongly agree, agree, disagree, and strongly disagree.

In this study, learning independence is defined as the learner's ability and willingness to initiate, organize, direct, and evaluate learning activities while reducing unnecessary dependence on teachers or peers. Self-regulated learning is used as an explanatory theoretical perspective because several processes associated with independence, including goal setting, strategy selection, monitoring, and self-evaluation, overlap with self-regulatory processes. However, the terms are not treated as identical constructs.

Teacher performance was recorded using an observation sheet focusing on the implementation of the instructional stages, including introductory activities, presentation of interactive video content, group formation, implementation of the Word Square activity, discussion, presentation, evaluation, and lesson closure. Interviews were also conducted with the teacher and students to obtain supporting information on classroom conditions, student responses, learning difficulties, and perceived changes following the intervention. Documentation, including lesson plans, observation records, student work, photographs, and relevant school documents, was used to strengthen and complement the primary data.

Before implementation, the learning materials, instructional media, and research instruments were subjected to expert validation. The validated components included the teaching module, interactive video, PowerPoint materials, Word Square worksheets, teacher observation sheets, student engagement observation sheets, learning-independence observation sheets, and the learning-independence questionnaire. Validation focused on content suitability, indicator relevance, clarity of items, language use, and appropriateness for Grade IV students. Based on the validators' feedback, revisions were made to improve the clarity of the instructional content, sequencing of learning activities, presentation and use of the interactive media, wording of questionnaire and observation items, and alignment of the engagement and learning-independence indicators with the intended constructs. No statistical reliability coefficient was reported in the original study.

Although the instruments underwent expert content review and revision before implementation, no internal-consistency coefficient was calculated for the learning-independence questionnaire, and no formal inter-rater reliability statistic was obtained for the observation instruments. Consequently, the percentage scores should be interpreted as descriptive classroom-action indicators rather than highly precise psychometric estimates.

Data credibility was further supported through technique and source triangulation. Observation, questionnaire, interview, and documentation data were compared to examine the consistency of the findings, while information obtained from students, the researcher, and the classroom teacher as observer was cross-checked during the reflection process. Qualitative reflection records supported the quantitative findings from Cycle I. Several students remained reluctant to ask questions or express opinions and tended to rely on peers when completing the Word Square activity. Participation within groups was also uneven, with more confident students contributing more frequently. In addition, the interactive video had not yet been consistently linked to the subsequent learning task, which limited students' active use of the information presented.

Data Analysis

The data were analyzed using descriptive quantitative and qualitative techniques. Quantitative data from observation sheets and questionnaires were converted into percentages, while interview

results, observation notes, and documentation were used to provide qualitative explanations of changes occurring throughout the intervention. The purpose of the analysis was to organize and interpret the collected information systematically so that changes in students' engagement, learning independence, and instructional implementation could be identified across the action cycles (Rahmadi, 2011).

The learning-independence questionnaire was analyzed using the formula:

$$\text{Percentage} = \frac{\text{Obtained Score}}{\text{Maximum Score}} \times 100\%$$

(Fitriyani, 2018).

Student learning-independence observation data were analyzed using the percentage correction formula:

$$P = \frac{R}{SM} \times 100$$

where P represents the percentage score, R is the obtained score, and SM is the maximum score (Sugiyono, 2013). The percentages were interpreted into five categories: very good (80–100%), good (70–79%), moderately (60–69%), low (50–59%), and very low (0–49%).

Student engagement data were analyzed using:

$$P = \frac{F}{N} \times 100\%$$

where P is the percentage, F is the frequency obtained, and N is the total number of cases (Anas Sudijono, 2011; Mafrudah & Edy, 2023)). The results were categorized as very good (80–100%), good (70–79%), moderate (60–69%), low (50–59%), and very low (0–49%).

Teacher activity was analyzed by comparing the total observed score with the maximum possible score:

$$P = \frac{\Sigma A}{\Sigma N} \times 100\%$$

Where P represents the percentage of teacher activity, ΣA is the total score obtained, and ΣN is the total possible score (Adam Malik & Chusni, 2018). The results were classified as very good (81–100%), good (61–80%), moderate (41–60%), low (21–40%), and very low (0–20%).

For each observation meeting, the maximum possible score was 640, derived from 20 students × 8 indicators × a maximum score of 4. Percentage scores were therefore calculated by dividing the total obtained score by 640 and multiplying by 100

The ≥70% criterion was specified as an operational success criterion for the classroom action before the final interpretation of the intervention outcomes, following the methodological reference used in the original study (Sandi et al., 2022). Within the scoring framework adopted in this study, 70% also marks entry into the 'good' category for engagement and the 'independent' category for learning independence. The threshold should therefore be understood as a study-specific classroom-action benchmark rather than a universal psychometric cut-off.

Results

The classroom action research demonstrated that the implementation of the cooperative learning model of the word square type supported by interactive video progressively improved fourth-grade students' engagement and learning independence in Natural and Social Sciences (IPAS) learning. Improvements were observed from the pre-action stage through Cycle II. In addition to changes in student behavior, teacher activity also increased across meetings, indicating increasingly effective implementation of the instructional intervention. The detailed data on the development of student engagement and learning independence are presented in table 2.

Table 2. Development of Student Engagement and Learning Independence

Stage	Student Engagement	Category	Learning Independence (Observation)	Category
Pre-action	45.6%	Very low	42.4%	Very low
Cycle I, Meeting 1	51.0%	Low	50.9%	Low
Cycle I, Meeting 2	61.3%	Moderate	62.8%	Moderate
Cycle II, Meeting 1	74.4%	Good	75.2%	Good
Cycle II, Meeting 2	83.5%	Very good	82.9%	Very good

At the pre-action stage, student engagement reached only 45.6%. Classroom observations indicated that students were insufficiently involved in learning activities, reluctant to ask or answer questions, hesitant to express opinions, and minimally involved in discussions and task completion. After the intervention was introduced, student engagement increased to 51.0% in the first meeting of Cycle I and 61.3% in the second meeting. Thus, although an improvement of 15.7 percentage points was achieved compared with the initial condition, the result at the end of Cycle I had not yet reached the predetermined success criterion of ≥70%.

Following revisions to the instructional process in Cycle II, student engagement increased more substantially. The percentage reached 74.4% in the first meeting and 83.5% in the second meeting. Overall, student engagement increased by 37.9 percentage points, from 45.6% at the pre-action stage to 83.5% at the end of Cycle II. Behavioral changes were reflected in greater attention to learning materials, increased participation in group discussions, greater willingness to answer questions and express opinions, and more active involvement in completing the word square activities.

A similar pattern was found in students' learning independence. Observation results showed that learning independence increased from 42.4% at the pre-action stage to 50.9% and 62.8% in the first and second meetings of Cycle I, respectively. In Cycle II, the percentage further increased to 75.2% in the first meeting and 82.9% in the second meeting. Thus, learning independence increased by 40.5 percentage points from the initial condition to the end of the intervention.

The observational findings were supported by the learning independence questionnaire. At the end of Cycle I, the questionnaire score was 64.0%, which increased to 80.2% at the end of Cycle II. The 16.2-percentage-point increase suggests that the development of learning independence was not only evident in students' observable classroom behavior but was also reflected in their perceptions of their ability to manage their own learning activities.

Teacher activity also improved progressively throughout the intervention. The percentage increased from 83.3% in the first meeting of Cycle I to 86.6% in the second meeting, followed by 90.0% and 95.0% in the first and second meetings of Cycle II, respectively. These findings indicate that improvements in student outcomes occurred alongside improvements in teachers' ability to provide instructions, manage group activities, use interactive video, provide reinforcement, and facilitate student participation.

Overall, by the end of Cycle II, student engagement reached 83.5%, learning independence based on observation reached 82.9%, and learning independence based on the questionnaire reached 80.2%. All three outcomes exceeded the predetermined 70% success criterion. Therefore, the classroom action research was concluded after Cycle II.

The quantitative trends were further examined through classroom observations, interview records, cycle-reflection notes, and supporting documentation. At the pre-action stage, these qualitative sources were consistent with the low engagement and learning-independence scores. The classroom teacher reported that only a limited number of students actively asked or answered

questions, while some students tended to remain passive and depended on teacher direction when completing learning tasks. Student interview records also indicated similar patterns. Some students reported that they rarely asked questions because they were afraid of giving incorrect answers, tended to ask friends when they experienced difficulty, and sometimes required assistance to complete tasks. These findings were consistent with the pre-action observation scores of 45.6% for student engagement and 42.4% for learning independence.

At the end of Cycle I, qualitative reflection records indicated that improvement had begun, although several problems remained. Some students were still reluctant to ask questions or express their opinions and continued to depend on peers when completing the Word Square tasks. Participation within groups was uneven, as more confident students tended to contribute more actively than less-confident students. The reflection process also showed that the interactive video had not yet been fully integrated with subsequent learning activities because some students focused primarily on watching the content without consistently using the information to complete the learning tasks. These qualitative findings were consistent with the quantitative results at the end of Cycle I, when student engagement reached 61.3% and learning independence reached 62.8%, both of which remained below the predetermined 70% success criterion.

Based on these findings, the instructional process was revised in Cycle II by providing clearer task instructions, distributing teacher attention more evenly across groups, providing greater opportunities for students to ask and answer questions, encouraging less-confident students to express their opinions, and linking information from the interactive video more explicitly to discussion and Word Square activities. At the end of Cycle II, observation and reflection records indicated that students participated more actively in discussions and task completion, showed greater confidence in asking and answering questions, and completed the Word Square tasks with less dependence on peers. The teacher's post-intervention interview similarly indicated that students had become more active during learning activities, more willing to communicate their answers, and more independent in completing tasks. The teacher also reported that students responded positively to the interactive video because the audiovisual presentation and interactive questions made the learning activities more engaging.

The convergence of these qualitative findings with the quantitative results strengthened the interpretation of the classroom changes. Student engagement increased to 83.5%, learning independence based on observation reached 82.9%, and the learning-independence questionnaire reached 80.2% by the end of Cycle II. Thus, the evidence from observation, questionnaires, interviews, reflection records, and classroom documentation showed a generally consistent pattern of increased classroom participation and learning independence across the action cycles.

Discussion

Improvement in Student Engagement through Active and Cooperative Learning

The increase in student engagement from 45.6% at the pre-action stage to 83.5% at the end of Cycle II indicates a substantial shift from relatively passive learning toward more active student participation. Initially, students tended to wait for teacher instructions, showed limited confidence in expressing ideas, and participated minimally in discussions and task completion. After the implementation of the word square model, students were required not merely to receive information but also to understand questions, identify key concepts, locate answers within the letter grid, discuss possible answers with peers, and communicate their findings.

This result is consistent with Rinjani et al., (2021) , who state that the word square model can encourage students to participate more actively in learning while positioning the teacher as a

mediator and facilitator. The process of locating answers within the word square provided a concrete reason for students to become involved in the learning activity. Therefore, the increase in engagement was not merely associated with the game-like characteristics of the activity, but also with the shift in students' roles from passive recipients of information to active participants in solving learning tasks.

The findings can also be interpreted through the perspective of cooperative learning. Slavin, (2009) and Vioreza et al., (2020) emphasizes that cooperative learning involves students working in small groups where they can support one another in understanding learning materials and completing tasks. In the present study, this interaction was visible when students discussed possible answers, compared findings, assisted group members who experienced difficulties, and collectively determined appropriate responses. Learning therefore occurred not only through teacher–student interaction but also through peer interaction.

This interpretation is strengthened by Johnson & Johnson, (2009) and Suci, (2018), who identify positive interdependence, face-to-face interaction, individual accountability, social skills, and group evaluation as important elements of cooperative learning. These elements were reflected in the implementation of the intervention. Although students worked collaboratively, they were still expected to take individual responsibility for their own tasks and learning outcomes. This arrangement is particularly important because cooperative learning without individual accountability may lead less active students to depend excessively on more dominant group members.

The improvement from Cycle I to Cycle II further demonstrates that the effectiveness of the word square model was not automatic. At the end of Cycle I, student engagement had reached only 61.3%. Reflection on Cycle I revealed that some students were still reluctant to express their opinions, depended on peers when searching for answers, and were not fully involved in discussions. The interactive video also required better instructional direction so that students would not simply watch the content but actively identify relevant information.

Consequently, improvements were introduced in Cycle II by providing clearer instructions, increasing opportunities for discussion, allowing more students to express their opinions, and optimizing the use of interactive video as a source of information for completing the word square. Following these revisions, student engagement increased to 74.4% in the first meeting and 83.5% in the second meeting of Cycle II.

The transition from Cycle I to Cycle II was guided by a systematic reflection on the instructional problems identified during the first cycle. Reflection on Cycle I indicated that several students remained passive, were hesitant to ask or answer questions, and still depended on peers when completing the Word Square tasks. Participation within groups was also uneven because some students were more dominant, whereas others lacked confidence in contributing to discussions. In addition, the use of interactive video had not yet been fully optimized, as some students tended to focus on watching the content without consistently connecting the information presented to the subsequent learning tasks. These findings became the basis for revising the instructional procedures in Cycle II. The revisions included providing clearer instructions before the Word Square activity, distributing teacher attention more evenly across groups, expanding opportunities for students to ask questions, respond, discuss, and present their work, and providing more consistent reinforcement for active participation and independent effort. The interactive video was also more explicitly connected to the questions, group discussion, and Word Square activities. To make the iterative logic of the Classroom Action Research more transparent, the relationship between the problems identified in Cycle I, the reflective evidence, the revisions implemented in

Cycle II, and the subsequent changes observed is summarized in table 3.

Table 3. Cycle I Reflection, Cycle II Revision, and Subsequent Evidence

Problem identified after Cycle I	Reflective evidence	Revision introduced in Cycle II	Subsequent evidence
Some students remained passive and hesitant to ask or answer questions	Observation and reflection showed that several students lacked confidence and participated minimally	Teacher provided more opportunities to ask, answer, discuss, and present	Engagement increased from 61.3% at the end of Cycle I to 74.4% and 83.5% across Cycle II
Some students relied excessively on peers when completing Word Square tasks	Several students waited for assistance rather than attempting answers independently	Individual Word Square responsibility was emphasized within group discussion	Observed learning independence increased from 62.8% at the end of Cycle I to 75.2% and 82.9% across Cycle II
Group participation was uneven, with some students dominating	Reflection records showed unequal participation and hesitation among less confident students	Teacher distributed attention more evenly and increased participation opportunities across groups	Classroom participation became more evenly distributed during Cycle II
Interactive-video use remained relatively passive	Students did not consistently connect information from the video with subsequent tasks	Video content and interactive questions were explicitly linked to discussion and Word Square tasks	Students increasingly used information from the video to answer questions and complete learning tasks
Instructions required greater clarity	Some students continued to depend on teacher or peer direction	Teacher provided clearer instructions before Word Square activities and stronger monitoring	Teacher implementation rose from 86.6% at the end of Cycle I to 90.0% and 95.0% in Cycle II
Reinforcement of independent effort was inconsistent	Reflection indicated a need for stronger encouragement of less-confident students	Teacher provided more consistent reinforcement and appreciation for active and independent effort	Student willingness to participate and complete tasks independently increased during Cycle II

Despite the overall increase in student engagement to 83.5% and learning independence to 82.9% at the end of Cycle II, the improvement was not uniform across all students. Some students continued to require teacher or peer support and did not consistently demonstrate the same level of confidence, initiative, and participation as their more active classmates. The final observation records suggest that improvement across aspects of engagement was not uniform, suggesting that active participation in discussion and task completion developed more readily than some aspects requiring stronger initiative and independent decision-making. These findings show that the intervention improved the overall classroom pattern but did not completely eliminate differences in students' engagement and dependence on external assistance. In addition, the two-cycle duration may have limited the opportunity for less-confident students to develop more stable independent learning behaviors. Therefore, the findings should be interpreted as evidence of substantial classroom improvement rather than complete resolution of all engagement and learning-independence difficulties. Longer implementation, more individualized scaffolding, and repeated opportunities for less-active students to express ideas and complete tasks independently may be

needed to address the remaining variation.

The findings are also consistent with Syahid & Bachri, (2020), who explain that cooperative word square activities provide opportunities for students to work together in small groups, assist one another, and identify answers related to the learning material. In the classroom context of the present study, the search process became an important mechanism for stimulating communication, attention, decision-making, and participation simultaneously.

From a constructivist perspective, the findings can be interpreted as evidence that learning becomes more active when students are given opportunities to construct understanding through experience rather than merely receive explanations from the teacher. Students observed the video, responded to questions, participated in discussions, identified words in the word square, completed individual tasks, and presented their work. These activities required students to process information, communicate their understanding, and relate information to learning tasks. Thus, the increase in student engagement reflected a transition from receptive learning toward a more participatory and constructive learning process.

Development of Learning Independence and Its Relation to Self-Regulated Learning

Student learning independence also demonstrated a substantial increase, from 42.4% at the pre-action stage to 82.9% at the end of Cycle II. The questionnaire data supported this pattern, increasing from 64.0% at the end of Cycle I to 80.2% at the end of Cycle II. The consistency between observational and questionnaire findings strengthens the indication that meaningful changes occurred in students' learning independence.

At the beginning of the study, students frequently waited for assistance from the teacher or their peers when experiencing difficulties. As the intervention progressed, students increasingly attempted to identify answers independently, use information obtained from the video and other learning materials, complete assigned tasks, examine their answers, and seek assistance only after making their own initial attempts. These behavioral changes indicate that learning independence should not necessarily be interpreted as learning in isolation. In a cooperative setting, independence can develop through social interaction when students continue to hold individual responsibility for their learning.

This finding is consistent with Mudjiman, (2008) and Purwaningsih & Herwin, (2020), who describes independent learning as learning driven by students' internal willingness to achieve specific objectives. Independent learners are also expected to direct their own learning activities rather than continuously depend on others. In this study, therefore, assigning students individual responsibility within group-based word square activities was particularly important because each learner remained accountable for his or her learning process and outcomes.

The findings are also consistent with Desmita, (2006) and Majid et al., (2022), who associates independence with decision-making, initiative in addressing problems, responsibility for actions, self-evaluation, and confidence in completing tasks. These characteristics became increasingly visible during the intervention. Students who initially waited for teacher assistance began attempting to solve problems independently before asking for help, while also becoming more willing to present and justify their answers.

Learning independence in this study should not be treated as synonymous with self-regulated learning. Rather, self-regulated learning provides a broader theoretical lens for interpreting several behaviors captured by the learning-independence indicators. SRL (Self-Regulated Learning) typically includes goal setting, strategy selection, monitoring, motivational regulation, and self-evaluation, whereas the present study operationalized learning independence primarily through observable initiative, responsibility, resource use, strategy selection, self-evaluation, and reduced

dependence on external assistance. Some classroom activities, such as identifying strategies for completing the Word Square, using information from the video, attempting tasks before seeking assistance, and reviewing answers, are therefore compatible with self-regulatory processes. However, the present instruments were not designed to measure the full SRL construct. The findings should consequently be interpreted as evidence of improved learning-independence behaviors with partial conceptual overlap with SRL.

Importantly, the improvement in independence occurred within a cooperative rather than an individualistic learning environment. This finding indicates that cooperation and independence are not necessarily contradictory. Peer interaction can function as a form of instructional support, while individual accountability maintains responsibility for personal learning. In this context, cooperation provides scaffolding, whereas individual tasks encourage students gradually to reduce their dependence on direct teacher intervention.

The Role of Interactive Video in Supporting Engagement and Learning Independence

Interactive video served as a supporting component that provided students with information before they completed the word square activities. According to Anggraeni et al., (2021), video-based multimedia can make learning materials more attractive and contribute to increased student interest in learning. In the present study, audiovisual presentations enabled students to observe information more concretely and provided an initial stimulus before they processed the information through discussion and problem-solving activities.

For example, in learning about energy transformation, students were able to observe examples of changes in energy occurring in everyday life through the interactive video. They then used the information obtained from the video to respond to interactive questions and identify relevant keywords in the word square. Thus, video viewing did not function as an isolated learning activity but was connected directly to subsequent cognitive and collaborative tasks.

This finding corresponds with Arsyad, (2015) and Gunawan, (2020), who argues that instructional media can clarify the communication of messages and information, increase students' attention, and provide more concrete learning experiences. However, the reflection conducted after Cycle I suggested that audiovisual media alone were insufficient. When students were primarily directed to watch the video, their participation remained limited. Greater improvements occurred after the video was more explicitly linked to questions, discussion, and word square tasks during Cycle II.

This finding has an important instructional implication: the pedagogical value of interactive video depends not only on its visual attractiveness but also on how it is integrated into learning activities. Video functions most effectively when students are required to identify, interpret, and apply information from the content. In this study, the interactive video provided an initial representation of the material, while the word square required students to retrieve, select, discuss, and apply the information they had obtained.

Therefore, the interactive video and word square served complementary functions. The video provided audiovisual representations and contextual information, whereas the word square encouraged students to process that information through searching, recalling, discussing, and identifying answers. This integration reduced the possibility of technology being used merely as a presentation tool and instead positioned it as an integral component of active learning.

The Relationship between Teacher Facilitation and Changes in Student Learning Behavior

Teacher activity increased from 83.3% in the first meeting of Cycle I to 95.0% in the second meeting of Cycle II. This pattern is important because improvements in student engagement and learning

independence occurred simultaneously with improvements in instructional implementation.

Following reflection on Cycle I, the teacher provided clearer instructions, increased opportunities for participation, optimized questioning and discussion activities, and provided stronger reinforcement for independent student efforts. The teacher's role gradually shifted from primarily delivering information toward facilitating, monitoring, questioning, and guiding the learning process.

These findings suggest that the effectiveness of cooperative word square learning supported by interactive video cannot be attributed solely to the instructional model or media. Its effectiveness also depends on the quality of teacher facilitation. The teacher must organize groups effectively, clarify learning tasks, ensure individual accountability, connect video content to subsequent activities, monitor less active students, and provide equitable opportunities for participation.

The improvement in teacher activity across the cycles also illustrates the reflective nature of classroom action research. The relatively lower achievement in Cycle I provided information that was used to refine the teaching process in Cycle II. Thus, the final improvement in student outcomes should be understood as the result of an iterative process involving instructional intervention, observation, reflection, and refinement rather than the direct effect of a single classroom activity.

Integration of the Instructional Components

Taken together, the findings suggest that improvements in student engagement and learning independence did not result from one instructional component operating independently. Instead, they emerged through the integration of cooperative learning, word square activities, interactive video, individual responsibility, and teacher facilitation.

The word square provided structured searching and simple problem-solving activities. Cooperative learning created opportunities for communication and peer support. Interactive video provided contextual and audiovisual information. Individual assignments maintained student accountability, while teacher facilitation ensured that the instructional components operated coherently.

This combination appears particularly relevant to IPAS learning because IPAS requires students not only to understand concepts but also to observe phenomena, communicate ideas, solve problems, and relate knowledge to everyday contexts. The instructional design therefore created opportunities for students to see, search, discuss, identify, complete, present, and evaluate learning outcomes rather than simply listen to explanations.

Theoretical and Practical Contributions

Theoretically, this study provides classroom-based evidence that cooperative learning and learning independence can develop simultaneously rather than functioning as opposing learning processes. Cooperative interaction can support independence when group learning incorporates individual accountability, decision-making opportunities, and responsibility for completing tasks. This finding reinforces the cooperative learning principles described by Slavin;, (2009) and Johnson & Johnson, (2009) while also corresponding with Zimmerman, (2002) perspective on self-regulated learning.

The findings showed a parallel classroom pattern in which student engagement and learning independence increased across the same action cycles. Because the present study did not test correlations, temporal prediction, or causal relationships between the two variables, this co-occurrence should not be interpreted as evidence that increased engagement caused greater learning independence. Rather, the pattern generates a plausible classroom hypothesis, instructional activities that provide opportunities to search for information, discuss alternatives, make decisions, communicate answers, and evaluate work may simultaneously create conditions in

which students can practice both active participation and independent learning behaviors. This proposed relationship requires direct testing in future correlational, longitudinal, or experimental research.

Another theoretical contribution concerns the integration of cooperative learning, word square, and interactive video. The findings suggest that the instructional benefits were associated with the complementary functions of these components rather than with one component alone. The video provided information and concrete representations, the word square required information processing and retrieval, group activities facilitated social interaction, and individual responsibilities encouraged self-regulation.

Practically, the findings provide an alternative instructional approach for elementary school IPAS teachers seeking to promote both engagement and independence. Interactive video can be used as an initial stimulus and information source, followed by word square activities, group discussion, individual responsibility, presentation, and reflection. Teachers should ensure that group learning does not allow certain students to dominate, that each student has a meaningful role, and that the information presented in the video is directly connected to subsequent learning tasks.

The findings also emphasize that technology should not be treated merely as an attractive addition to classroom instruction. Its effectiveness is greater when students are required to respond to, interpret, and use information obtained from the media. Accordingly, teachers need to design a coherent relationship between instructional media, learning activities, and expected student behaviors.

Conclusion

This study showed progressive improvements in fourth-grade students' learning engagement and learning independence during the iterative implementation of the Word Square cooperative learning model supported by interactive video in IPAS learning at MI Al-Mukhlisin, Jambi City. Students' learning engagement increased from 45.6% in the initial condition to 83.5% at the end of Cycle II. This improvement was reflected in greater participation in learning activities, task completion, confidence in asking questions and expressing opinions, and collaboration during group discussions. Learning independence based on observation also increased from 42.4% to 82.9%, while questionnaire results improved from 64.0% at the end of Cycle I to 80.2% at the end of Cycle II. These changes were indicated by stronger learning initiative, responsibility, willingness to attempt tasks independently, ability to complete assignments, and reduced dependence on teachers and peers.

Theoretically, these findings reinforce the principles of student-centered and cooperative learning, which emphasize interaction, active participation, and individual responsibility as essential components of the learning process. The integration of Word Square activities with interactive video provides opportunities for students to observe, search for information, discuss, collaborate, and complete tasks independently. Practically, this approach can serve as an alternative instructional strategy for teachers to create more interactive and participatory IPAS learning through the combination of video presentation, group discussion, Word Square activities, and individual assignments.

The contribution of this classroom action research is primarily context-specific rather than generalizable. The study documents how a Word Square cooperative learning approach supported by interactive video was iteratively refined across two action cycles in one Grade IV Madrasah Ibtidaiyah classroom. In particular, the findings illustrate how clearer instructions, stronger individual accountability, more equitable participation opportunities, closer integration of video

content with subsequent tasks, and improved teacher facilitation were associated with progressively better classroom engagement and learning-independence indicators. The study therefore contributes a documented example of reflection-based instructional refinement in an MI context rather than evidence that the individual instructional components have separable or universally generalizable effects.

Because this classroom action study did not isolate the contribution of each instructional component and teacher implementation improved across cycles, the observed student changes cannot be attributed exclusively to Word Square or interactive video. Teacher facilitation, repeated practice, familiarity with the task format, and possible observation reactivity may also have contributed.

Future research should examine the implementation of the Word Square model supported by interactive video across different topics, grade levels, subjects, and school contexts to determine the consistency and broader applicability of the findings. Further studies may also employ more varied research instruments and investigate additional variables, such as conceptual understanding, critical thinking, learning motivation, learning outcomes, and retention. This direction is consistent with the study's recommendation to expand the application of the model to different contexts while incorporating additional instruments and research aspects.

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