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Enhancing Grade 8 Students' Thai Reading Comprehension through SQ4R-Based Active Learning and Reading Skill Exercises

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Abstract

This study examined changes in Thai reading comprehension among Grade 8 students following SQ4R-based active learning with reading exercises. The objectives were to evaluate instructional efficiency against a 75/75 criterion, compare pretest and posttest scores, calculate an effectiveness index, and assess student satisfaction. A one-group pretest–posttest design involved 40 students from one intact classroom selected through cluster random sampling at a public secondary school in northeastern Thailand. The intervention comprised six lesson plans delivered over 12 hours and followed six stages: Survey, Question, Read, Record, Recite, and Reflect. Reading exercises addressed main-idea identification and comprehension of informational, persuasive, and literary texts. Data were collected using formative assessment records, a 30-item multiple-choice reading comprehension test, and a 15-item satisfaction questionnaire. Analyses included descriptive statistics, process and outcome efficiency percentages, an effectiveness index, and a paired-samples t test. Process and outcome efficiency values were 86.17% and 78.33%, respectively, exceeding the specified criterion. Mean reading comprehension scores increased from 13.63 (SD = 5.16) to 23.50 (SD = 2.40), $t(39) = 11.53$, $p < .001$. The mean increase was 9.88 points, with a 95% confidence interval of [8.14, 11.61]. The effectiveness index was .6031, representing 60.31% of the maximum possible gain from the pretest baseline. Overall satisfaction averaged 4.71 out of 5. The findings provide preliminary evidence of improved reading performance and favorable learner perceptions following the intervention. However, the absence of a comparison group and the reuse of test items limit causal interpretation.

Keywords: SQ4R, active learning, reading comprehension, reading exercises, Thai language instruction

1. Introduction

Reading comprehension is fundamental to education at lower-secondary levels when students engage with texts that possess progressively diverse goals and formats. Comprehending complex texts necessitates that readers discern principal concepts, correlate supporting material, and amalgamate textual data with pertinent prior knowledge (Kintsch, 1988; Perfetti & Stafura, 2014; Snow, 2002). In Thailand, the Basic Education Core Curriculum designates the identification of main ideas, summaries, and elucidation of textual details as key objectives for Grade 8 Thai language education (Ministry of Education, 2008). These anticipations necessitate teaching that aids students in developing and articulating understanding through both informational and literary materials.

A primary pedagogical obstacle is facilitating the shift from word recognition and identifying explicit details to formulating a cohesive understanding of a text. Reading comprehension relies on the interplay of linguistic, cognitive, and knowledge resources, and challenges in harmonizing these elements can hinder understanding (Kendeou et al., 2016). Students thus require chances to articulate their judgments, differentiate primary concepts from supplementary

details, and verify their answers with textual proof. Investigations into instructional growth within Thai secondary education underscore the necessity of assessing students' reading requirements while creating instructional assistance (Intasena & Worapun, 2024).

Active learning offers a pertinent educational framework by involving students in significant tasks and contemplating their learning (Prince, 2004). This approach to reading education necessitates activities that actively engage individuals in comprehending texts. The SQ4R methodology employed in this research consists of Survey, Question, Read, Record, Recite, and Reflect. It structures reading into tasks that enable students to preview a text, formulate inquiries, analyze material, document essential concepts, articulate comprehension, and reassess their interpretations. Relevant reading activities offer tangible chances to implement these phases with curriculum-related resources.

Prior research has investigated SQ4R across several educational settings, including its incorporation with visual mind mapping (Alzu'bi, 2020; Jelita, 2018; Khusniyah et al., 2020). In Thailand, Foojai and Ongardwanich (2020) explored the integration of SQ4R with semantic mapping for analytical reading in Grade 7, whereas Panaputto et al. (2024) studied SQ4R and reading comprehension in Grade 10 students. These investigations offer a justification for additional classroom exploration, but variations in educational levels, teaching resources, and evaluated results constrain their direct relevance to a specific Grade 8 instructional framework. The current research tackles this contextual deficiency by investigating SQ4R-oriented active learning using exercises that encompass main-idea reading strategies, articles, advertising, news stories, and literary works. Its significance resides in the documentation and assessment of this curriculum-aligned use, rather than the introduction of a novel reading technique.

The research aimed to achieve four goals: to assess process and outcome efficiency based on a set 75/75 standard; to analyze students' Thai reading comprehension scores pre- and post-instruction; to compute an effectiveness index indicating improvement in relation to the highest attainable gain; and to evaluate student satisfaction. It was postulated that posttest results would exceed pretest results. Employing a one-group pretest–posttest methodology, the research offers preliminary classroom-level insights to guide the development of Thai reading exercises and future comparison studies.

2. Literature Review

2.1 Reading Comprehension as the Creation of Meaning

Reading comprehension is the creation of a unified interpretation of a text by integrating textual information with relevant background knowledge. Kintsch's (1988) construction–integration model clarifies how readers establish connections among concepts to extract meaning that surpasses isolated statements. Perfetti and Stafura (2014) emphasize the significance of language proficiency in the integration of information during comprehension. These perspectives suggest that proficient reading depends on understanding linguistic meaning and the ability to connect information within a text.

Instructional activities should emphasize the relationships among concepts as well as the identification of details. Recognizing a central idea requires readers to distinguish between fundamental information and supplementary details, whereas summarization entails the selection and organization of data into a unified account. Interpretation may also need inferences based on the text and relevant contextual comprehension. Kendeou et al. (2016) identify inferential processes and knowledge resources as essential components in meaning construction, advocating for pedagogical approaches that compel students to express their interpretative reasoning.

These methodologies provide a conceptual basis for the present study's emphasis on fundamental ideas, supporting components, summaries, and textual analysis. They suggest that student feedback can serve an instructional purpose: written responses and summaries offer views that are amenable to scrutiny and correction. However, we should distinguish the results on comprehension assessments from the processes proposed to clarify them. The present study assessed reading proficiency rather than measuring the separate effects of vocabulary, inference-making, or comprehension oversight.

2.2 Dynamic Learning and Interaction with Textual Material

Active learning involves substantial involvement in educational activities and reflection on the content being learned (Prince, 2004). The importance of reading instruction relies on how activities direct students' focus toward the text's meaning. Crafting questions, pinpointing relevant information, summarizing content, and assessing interpretations can provide students the opportunity to interact significantly with a work.

The ICAP paradigm offers a comprehensive categorization of interaction by distinguishing among passive, active,

constructive, and interactive modes (Chi & Wylie, 2014). This distinction is advantageous since visible participation does not necessarily indicate a corresponding level of mental commitment. Highlighting information or reiterating a message differs from generating an explanation that connects ideas. In a like manner, collective involvement transforms into an interactive experience within the structure as learners jointly deepen their understanding, rather than simply engaging in tasks alongside one another.

In the realm of reading instruction, these differentiations suggest that the quality of the response produced has greater importance than the simple presence of an activity. Tasks that necessitate students to identify evidence, clarify relationships, and summarize importance may foster effective cognitive involvement. Dialog may extend this process as students examine and expand upon one another's understandings. The possible results depend on the task requirements and the responses of the learners.

In the present study, active learning functions as the pedagogical framework, while SQ4R and the reading assignments specify the techniques via which learners engage with texts. ICAP serves as a structure for understanding these activities; the study did not specifically classify or measure students' modes of engagement.

2.3 SQ4R and Auxiliary Reading Activities

The SQ4R technique utilized in this study includes Survey, Question, Read, Record, Recite, and Reflect. Thai research on reading instruction (Foojai & Ongardwanich, 2020; Intaaue & Phungphet, 2024) illustrates this progression. Articulating the processes is essential because of the discrepancies in terminology across various SQ4R programs; for example, Jelita (2018) specifies Survey, Question, Read, Recite, Review, and Reflect.

The structure outlined here provides a system for activities before, during, and after reading. The survey establishes an initial structure for the material, whereas the inquiry conveys an objective for the subsequent reading. Reading focuses attention on facts relevant to the questions. The Record technique facilitates the identification and organization of key ideas, while Recite requires students to express their understanding. Reflect provides an opportunity to reassess responses and their relationship to the text. The educational rationale is founded on the connections among these activities: queries guide reading, recorded information supports summaries, and reflection aids in the reevaluation of interpretations.

Reading tasks transform this series into specific assignments. Prompts aimed at identifying core ideas, selecting pertinent information, summarizing content, and clarifying importance offer students concrete strategies for executing the stages of reading. The educational value depends on its alignment with the learning objectives and the characteristics of the text. For example, understanding the message of an advertisement requires attention to its persuasive purpose, whereas the analysis of literary pieces may entail a scrutiny of figurative language and thematic components.

Phachuenjai and Intasena (2026) provided relevant findings through their examination of the amalgamation of 5W1H inquiry and mind mapping with 33 fifth-grade students in Thailand. They reported increased comprehension scores following the test and favorable satisfaction ratings. Although their methodology differs from SQ4R, it retains an emphasis on direct questioning and the organization of textual information. Thus, it clarifies the rationale for combining a reading approach with supplementary activities, but differences across learners and instructional components limit direct comparisons with the present study.

2.4 Data from Thai Reading Education

Thai studies offer beneficial perspectives on systematic reading instruction across many educational levels. Foojai and Ongardwanich (2020) investigated the amalgamation of SQ4R and semantic mapping with 42 seventh-grade pupils over the course of nine instructional hours. The pupils' critical reading skills after instruction exceeded their pretest scores and the predetermined standard. This study focuses on lower-secondary education and suggests that the combination of SQ4R with additional instructional support has been investigated before. Its focus on literary analysis and semantic mapping, meanwhile, diverges from the present variety of reading tasks encompassing multiple text types.

Intaaue and Phungphet (2024) investigated SQ4R instructional methods with a group of 21 fifth-grade students. They reported increased scores in Thai reading comprehension on the posttest compared to the pretest, above a 70% threshold, accompanied by very high student satisfaction. Panaputto et al. (2024) examined the SQ4R technique with 40 tenth-grade students in Thailand and similarly saw improved reading comprehension following the instruction. These findings support further investigation of SQ4R within Thai educational contexts; nevertheless, variations in grade levels, instructional time, resources, and evaluations impede direct comparison of the degree of improvement.

Intasena and Worapun (2024) offer an additional perspective through their examination of HyFlex reading pedagogy,

which included needs assessment, instructional design, and implementation with secondary school students. The importance of this research relates to the alignment of educational support with students' reading needs. The unique pedagogical structure of HyFlex means its outcomes should not be considered direct evidence for SQ4R.

These findings collectively suggest that structured reading activities need continuous investigation within the educational setting. They also highlight a tangible limitation: improvement within an engaged group does not necessarily indicate that one intervention is preferable to another approach. Single-group pretest-posttest designs are vulnerable to multiple alternative interpretations, including testing effects and maturation (Marsden & Torgerson, 2012). The literature consequently supports a rationale for assessments customized to specific situations; however, it leaves questions about comparative efficacy, retention, and transfer unresolved.

2.5 Research Deficiency and Theoretical Foundation of the Current Investigation

The examined study lays a substantial foundation for SQ4R and analogous reading support techniques; yet, it fails to specifically evaluate the distinct collection of six SQ4R-focused lessons paired with activities for Grade 8 Thai reading in both factual and literary settings. The present study addresses this contextual shortcoming by documenting the implementation of the package and evaluating reading performance and student satisfaction.

The conceptual framework connects three components of education. Active learning promotes substantial involvement; SQ4R organizes the reading process; and the exercises offer tasks that allow students to apply that organization. Curious involvement, record-keeping, summarization, and reflection should help students choose, connect, and assess written information. These processes offer the educational rationale instead of the techniques specifically analyzed in the study.

Reading comprehension and satisfaction denote distinct outcomes. Comprehension scores reflect performance on the assessment, whereas satisfaction represents students' perceptions of the learning experience. Examining both proposals provides insight into educational results and student perspectives without assuming that favorable views signify improved comprehension. The study offers a focused evaluation of a cohesive classroom application, with findings intended to inform future pedagogical improvements and comparative analyses.

3. Methodology

3.1 Research Design

This research utilized a one-group pretest-posttest pre-experimental framework to investigate alterations in Grade 8 students' Thai reading comprehension after using SQ4R-based active learning with reading tasks. The principal result was reading comprehension, while student satisfaction served as a secondary outcome. Efficiency percentages for processes and outcomes, along with an effectiveness index, offer more information about instructional performance and learning advancement.

The design adhered to the sequence O_1–X–O_2, with O_1 denoting the reading comprehension pretest, X indicating the 12-hour intervention, and O_2 signifying the reading comprehension posttest. A satisfaction survey was conducted following the instruction. The lack of a control group restricted the analysis to alterations within the participating class and hindered conclusive assignment of those changes to the intervention (Marsden & Torgerson, 2012).

3.2 Research Setting and Participants

The research was carried out at Phadungnaree School, a public secondary institution located in Maha Sarakham Province, Thailand. The study population comprised 630 Grade 8 students enrolled in the second semester of the 2025 academic year. A single complete classroom was chosen via cluster random sampling, resulting in 40 participants.

The classroom served as the sample unit, and every participating student was provided with the identical teaching material. The selection process consequently entailed the random choice of a classroom instead of random allocation to various instructional settings. The sample size represented the registration of the chosen class.

A distinct Grade 8 classroom within the identical institution was utilized for the preliminary execution and instrument creation. The pupils in the classroom were excluded from the primary research. Pretest and posttest scores were accessible for all 40 individuals in the chosen class.

3.3 Instructional Intervention

The intervention comprised six lesson plans and six corresponding reading exercise sets. Every lesson necessitated two hours of instruction, culminating in a total of 12 hours. The material corresponded with the Grade 8 standards for the Thai language curriculum on primary idea recognition, summarization, elucidation of textual specifics, and appropriate

reading practices. Table 1 encapsulates the educational material.

Table 1. Substance and Length of the Educational Intervention

Lesson	Reading focus	Duration
1	Principles of identifying main ideas and organizing information	2 hours
2	Reading comprehension of articles	2 hours
3	Reading comprehension of advertisements	2 hours
4	Reading comprehension of news reports	2 hours
5	Reading comprehension of a Thai elegiac poem	2 hours
6	Reading comprehension of Thai didactic verse based on Aesop's fables	2 hours
Total	Six lessons and six corresponding exercise sets	12 hours

Every lesson adhered to the SQ4R methodology of Survey, Question, Read, Record, Recite, and Reflect. In the survey, students examined the reading material to gain a preliminary understanding of its content. During the inquiry phase, individuals devised or contemplated questions to direct their reading. In the course of reading, they analyzed the text to discern principal concepts, pinpoint corroborative details, and respond to the inquiries. Throughout the Record phase, the exercises documented relevant facts and reactions. During Recite, they articulated their comprehension in their own terminology, also utilizing written synopses. In the Reflect phase, students assessed their replies and reevaluated their judgments of the text.

The activities reinforced the sequence by engaging with primary concepts, ancillary details, summary, and analysis. The reading methodology was uniform throughout the classes; however, the materials and task content differed based on the reading emphasis.

Three specialists in educational assessment, curriculum development, and Thai language content evaluated the lesson plans. They assessed the coherence between curriculum indicators, objectives, content, activities, resources, and evaluation methods. The suitability was evaluated using a five-point scale, with a mean score of no less than 3.51 set as the threshold for acceptance. All six proposals received the highest rating for appropriateness. The materials were amended based on expert recommendations and preliminary trials prior to their use with the primary sample.

3.4 Research Instruments

3.4.1 Thai Reading Comprehension Test

The evaluation of reading comprehension was conducted by a test created by the researcher, comprising 30 multiple-choice questions, each offering four possible answers. Accurate answers garnered one point, while erroneous answers earned zero points, resulting in a cumulative score between 0 and 30.

The initiation of test development involved a requirements table that connected curricular indicators, learning objectives, reading materials, and assessment components. Three specialists evaluated an initial set of 50 items employing the index of item-objective congruence (IOC). Forty-eight items satisfied the acceptance criterion of .50, and 45 were chosen for preliminary testing.

Pilot answers were evaluated through the application of item difficulty and discrimination metrics. The designated selection parameters included difficulty levels ranging from .20 to .80 and discrimination values of no less than .20. The development documentation revealed 32 items that fall within the permissible difficulty spectrum, with values spanning from .21 to .76. A total of 30 items were selected for the final test.

A Lovett reliability coefficient of .95 was documented for the 32-item development set. This coefficient characterizes the set and is not provided as a measure of dependability for the ultimate 30-item assessment.

The identical 30 items were presented prior to and after the instruction. The response choices for each item were reorganized for the posttest; however, the item text itself was preserved. As a result, the method failed to eradicate possible prior knowledge of the examination.

3.4.2 Formative Assessment Records

Formative assessment documentation encompassed engagement and reading habits, student outputs, and performance on lesson-specific quizzes. Every lesson was allocated a total of 82 points: 60 for engagement and conduct, 12 for

student outputs, and 10 for the assessment. Across the six lessons, the maximum possible total score was 492.

The aggregate formative score was utilized to determine process efficiency, E_1. Participation and behavior accounted for 360 of the 492 potential points, leading to the interpretation of E_1 as a composite indicator of classroom performance instead of a reading comprehension score comparable to the pretest or posttest.

3.4.3 Student Satisfaction Questionnaire

Student satisfaction was assessed using a 15-item questionnaire, with responses ranging from 1 (very low satisfaction) to 5 (very high satisfaction). The survey examined views on lesson material, educational activities, reading tasks, possibilities for participation, perceived advantages of learning, and the classroom environment.

The development procedure commenced with the evaluation of 20 potential items by three specialists for content comprehensiveness, clarity, and linguistic suitability. The summary of outcomes comprised 15 elements. The results of satisfaction were understood as students' views on the educational experience instead of as concrete proof of enhanced understanding.

The predefined interpretation categories were 4.51–5.00 for very high satisfaction, 3.51–4.50 for high satisfaction, 2.51–3.50 for moderate satisfaction, 1.51–2.50 for low satisfaction, and 1.00–1.50 for very low satisfaction.

3.5 Data Collection Procedure

Prior to the teaching, the investigators elucidated the educational tasks and the SQ4R methodology to the subjects. The students subsequently finished the pretest consisting of 30 reading comprehension items.

The six sessions were delivered throughout 12 instructional hours utilizing the appropriate reading resources and activities. Formative assessments were documented throughout each class for engagement and reading conduct, student outputs, and quizzes.

Upon finishing the instructional sequence, pupils undertook the reading comprehension posttest and then filled out the satisfaction questionnaire. The sequence of data collection included the pretest, the intervention accompanied by formative assessment, the posttest, and the satisfaction evaluation. The evaluations presented in this study utilized quantitative data derived from these tools.

3.6 Data Analysis

Descriptive statistics were used to summarize classroom performance, reading comprehension scores, and satisfaction responses. Analyses were organized according to the four research objectives.

First, instructional efficiency was evaluated against the predetermined 75/75 criterion. Process efficiency was calculated as:

$$E_1 = [\Sigma P_i / (N \times 492)] \times 100$$

where P_i represents each student's cumulative formative score and N represents the number of participants. Outcome efficiency was calculated as:

$$E_2 = [\Sigma T_{2i} / (N \times 30)] \times 100$$

where T_{2i} represents each student's posttest score. The criterion was satisfied when both percentages reached at least 75. The notation E_1/E_2 denotes the pair of process and outcome percentages, rather than the numerical quotient of the two values.

Second, a paired-samples t test compared pretest and posttest reading comprehension scores at a significance level of .05. Difference scores were defined as posttest minus pretest scores. Cohen's d_z was calculated by dividing the mean difference by the standard deviation of the difference scores to describe the magnitude of within-participant change (Lakens, 2013). This estimate was not interpreted as an effect relative to an untreated comparison group.

Third, the effectiveness index was calculated as:

$$EI = (\Sigma T_{2i} - \Sigma T_{1i}) / [(N \times 30) - \Sigma T_{1i}]$$

where T_{1i} and T_{2i} represent pretest and posttest scores, respectively. The numerator represents the observed total score gain, and the denominator represents the maximum possible gain from the group's pretest baseline. The index was interpreted as a descriptive measure of attained improvement relative to the available gain.

Fourth, satisfaction was summarized using item-level means and standard deviations. The overall satisfaction mean was calculated as the average of the 15 item means and interpreted using the predefined categories.

E_2, the paired comparison, and EI draw on overlapping reading comprehension data. They were therefore treated as

complementary summaries of performance rather than independent confirmations of instructional effectiveness. Satisfaction findings were considered separately as evidence of students' perceptions.

3.7 Ethical Considerations

The research protocol underwent an expedited assessment and received approval from the Ethics Committee for Research Involving Human Subjects at Mahasarakham University, Thailand (Approval No. 258-154/2025, dated April 9, 2025). The endorsement encompassed the study initiative about Grade 8 students' reading comprehension through active learning and reading activities at Phadungnaree School, Maha Sarakham Province.

4. Results

4.1 Participants Included in the Analysis

Paired reading comprehension scores were available for all 40 students in the selected classroom. The formative assessment records also contained scores for all 40 students across the six lessons. These records were included in the analyses of instructional efficiency, pretest–posttest differences, and the effectiveness index. Student satisfaction was summarized from the reported responses to the 15-item questionnaire.

4.2 Instructional Efficiency

The instructional package achieved process and outcome efficiency values of 86.17% and 78.33%, respectively. As presented in Table 2, the mean cumulative formative score was 423.95 out of 492 points (SD = 22.82), while the mean posttest score was 23.50 out of 30 points (SD = 2.40). Both efficiency percentages exceeded their respective thresholds under the predetermined 75/75 criterion.

Table 2. Process and Outcome Efficiency of the Instructional Package

Efficiency component	Maximum score	M	SD	Percentage
Process performance (E_1)	492	423.95	22.82	86.17
Posttest performance (E_2)	30	23.50	2.40	78.33

Note. N = 40. E_1 summarizes participation and reading behavior, student products, and lesson-level quizzes across six lessons. E_2 summarizes reading comprehension posttest performance. The predetermined criterion was 75/75.

Mean process percentages across individual lessons ranged from 84.66 to 88.81. The lowest percentage occurred in Lesson 1, which addressed principles of identifying main ideas, and the highest occurred in Lesson 5, which addressed a Thai elegiac poem. These percentages represent composite formative performance within each lesson rather than separate measures of reading comprehension by text type.

4.3 Pretest–Posttest Reading Comprehension Comparison

The mean reading comprehension score increased from 13.63 before instruction (SD = 5.16) to 23.50 after instruction (SD = 2.40). These means corresponded to 45.42% and 78.33% of the maximum possible score, respectively. The mean increase was 9.88 points, equivalent to 32.92 percentage points on the test scale.

A paired-samples t test indicated that posttest scores were significantly higher than pretest scores, $t(39) = 11.53$, $p < .001$. The 95% confidence interval for the mean increase was 8.14–11.61 points. The standardized within-participant change was Cohen's $d_z = 1.82$.

Table 3. Pretest and Posttest Thai Reading Comprehension Scores

Assessment	N	M	SD	Percentage of maximum score
Pretest	40	13.63	5.16	45.42
Posttest	40	23.50	2.40	78.33

Note. Maximum score = 30. Mean difference = 9.88 points; 95% CI [8.14, 11.61]; $t(39) = 11.53$, $p < .001$; Cohen's $d_z = 1.82$. Differences and percentages were calculated from unrounded values.

The results supported the hypothesis that students would obtain higher reading comprehension scores after the intervention. The estimated change describes performance within the participating class and does not represent a comparison with students receiving another instructional approach.

4.4 Effectiveness Index

The total pretest score was 545, and the total posttest score was 940, producing an observed gain of 395 points. With 40 participants and a maximum individual test score of 30, the maximum possible total score was 1,200. The available gain from the pretest baseline was therefore 655 points.

The effectiveness index was calculated as:

EI = (940 − 545) / (1,200 − 545) = 395 / 655 = .6031

Table 4. Effectiveness Index of the Instructional Package

Indicator	Value
Number of participants	40
Maximum possible total score	1,200
Total pretest score	545
Total posttest score	940
Observed total gain	395
Maximum possible gain from baseline	655
Effectiveness index	.6031

The index indicates that the observed gain represented 60.31% of the maximum possible improvement from the group's pretest baseline. This percentage differs from the 32.92-percentage-point increase on the test scale because the two calculations use different denominators.

4.5 Student Satisfaction

Table 5. Student Satisfaction with the Instructional Experience

Item	Aspect assessed	M	SD	Satisfaction level
1	Satisfaction with lesson content	4.73	0.59	Highest
2	Perceived usefulness of lesson content	4.88	0.33	Highest
3	Preference for activities and worksheets	4.63	0.66	Highest
4	Satisfaction with perceived improvement in understanding	4.70	0.56	Highest
5	Enjoyment supported by learning materials	4.75	0.58	Highest
6	Satisfaction with the ability to follow activity stages	4.43	0.89	High
7	Preference for the sequence of learning activities	4.93	0.26	Highest
8	Preference for the reading exercises	4.80	0.56	Highest
9	Enjoyment of participation in learning activities	4.60	0.58	Highest
10	Perceived suitability of learning activities	4.65	0.61	Highest
11	Enjoyment of the classroom activity atmosphere	4.85	0.36	Highest
12	Opportunities to express opinions and be heard by the teacher	4.65	0.65	Highest
13	Positive experience of working with classmates	4.45	0.80	High
14	Classroom atmosphere encouraging participation	4.90	0.30	Highest
15	Classroom atmosphere supporting confidence in self-expression	4.73	0.55	Highest
Overall	Mean across the 15 items	4.71	—	Highest

Note. Item descriptions are English summaries of the questionnaire statements. Responses ranged from 1 to 5. Means of 4.51–5.00 indicate the highest satisfaction category, and means of 3.51–4.50 indicate the high category. Standard deviations are reported at the item level; an overall composite-score standard deviation is not reported.

The overall satisfaction mean was 4.71 on the five-point scale, corresponding to the highest satisfaction category. Item means ranged from 4.43 to 4.93. Thirteen items fell within the highest satisfaction category, while two fell within the high category.

The highest-rated item concerned the sequence of learning activities (M = 4.93, SD = 0.26), followed by the classroom atmosphere encouraging participation (M = 4.90, SD = 0.30). The comparatively lowest-rated items concerned students' perceived ability to follow the activity stages (M = 4.43, SD = 0.89) and their experience of working with classmates (M = 4.45, SD = 0.80). Both remained within the high satisfaction category.

The questionnaire responses indicated favorable perceptions of the instructional experience. Items concerning improved understanding and usefulness represent students' self-reported perceptions and are distinct from the reading comprehension test results.

5. Discussion

5.1 Principal Findings

This study examined Thai reading comprehension following an SQ4R-based active learning intervention with reading exercises among 40 Grade 8 students. Posttest scores were significantly higher than pretest scores, with a mean increase of 9.88 points and a standardized within-participant change of $d_z = 1.82$. The instructional package also exceeded the predetermined 75/75 efficiency criterion, achieved an effectiveness index of .6031, and received an overall satisfaction mean of 4.71. These findings provide preliminary evidence of improved test performance and favorable learner perceptions following the intervention.

The findings require interpretation in relation to the research design and the measures used. The pretest–posttest comparison establishes that scores changed within the participating class, but it does not establish how much of that change would have occurred without the intervention. Furthermore, outcome efficiency, the paired comparison, and the effectiveness index draw on overlapping test data. Their consistency describes the observed improvement from different perspectives rather than providing independent demonstrations of effectiveness.

5.2 Interpreting the Improvement in Reading Comprehension

The observed improvement is compatible with the instructional rationale underlying the SQ4R sequence. The construction–integration model describes comprehension as the development of a coherent representation through connections among textual information and relevant knowledge (Kintsch, 1988). Similarly, Perfetti and Stafura (2014) emphasize the contribution of word knowledge and its integration with the developing understanding of a text. Instruction that prompts students to identify important information, connect ideas, and reconsider interpretations may therefore support processes relevant to comprehension.

The intervention translated these demands into a sequence of reading activities. Survey and Question provided an initial orientation and a purpose for reading. Read and Record directed attention toward identifying and organizing relevant information. Recite encouraged students to express their understanding in their own words, while Reflect provided opportunities to reconsider responses in relation to the text. The accompanying exercises made these activities concrete through tasks involving main ideas, supporting details, summaries, and interpretations.

These activities can also be considered through the distinction between participation and cognitive engagement. Prince (2004) identifies meaningful activity and reflection on learning as central features of active learning. The ICAP framework further suggests that generating explanations or interpretations involves different engagement demands from simply manipulating or reproducing information (Chi & Wylie, 2014). Accordingly, the potential value of the intervention lies partly in what students were prompted to do with textual information. Completing an exercise alone does not establish deep processing; the relevance of the tasks depends on whether they elicit selection, explanation, and reconsideration of meaning.

These mechanisms remain theoretical interpretations. The study did not directly measure strategy use, metacognitive monitoring, or engagement categories, and it did not test whether changes in these processes explained the score increase.

The findings are consistent with relevant Thai studies. Panaputto et al. (2024) reported improved reading comprehension following SQ4R instruction among Grade 10 students. Foojai and Ongardwanich (2020) reported higher analytical reading performance after SQ4R instruction combined with semantic mapping among Grade 7 students. Intaaue and Phungphet (2024) likewise reported higher postinstruction Thai reading comprehension scores among Grade 5 students. Together, these studies support continued investigation of structured reading instruction

across educational levels. Differences in learners, materials, assessments, and instructional combinations nevertheless prevent direct comparisons of effectiveness.

Related evidence also comes from Phachuenjai and Intasena (2026), whose study combined 5W1H questioning with mind mapping for Thai primary students. Although that intervention differs from SQ4R, both approaches organize learners' engagement through explicit questions and the representation of textual information. Intasena and Worapun (2024), working with HyFlex reading instruction, provide a complementary perspective on aligning instructional development with secondary learners' reading needs. These connections concern shared instructional principles; they do not establish that the approaches are interchangeable or equally effective.

5.3 Instructional Efficiency and Attainable Learning Gain

The E_1/E_2 values of 86.17/78.33 indicate that both composite formative performance and posttest performance exceeded the specified thresholds. However, the two percentages represent different kinds of performance. E_1 incorporated participation and reading behavior, student products, and quizzes, whereas E_2 represented performance on the reading comprehension posttest.

This distinction is particularly important because participation and behavior accounted for 360 of the 492 possible formative points. The high E_1 value therefore reflects substantial weighting of classroom participation and behavior. It should not be interpreted as evidence that students demonstrated 86.17% mastery of reading comprehension. Similarly, the higher process percentage relative to the posttest percentage cannot be interpreted as a decline in learning because the underlying tasks, scoring systems, and assessment conditions differed.

The effectiveness index of .6031 indicates that students achieved 60.31% of the maximum possible score gain from their pretest baseline. This provides a useful description of improvement relative to the available gain. It is distinct from the 32.92-percentage-point increase on the test scale and does not represent the proportion of improvement caused by the intervention.

The standardized change of $d_z = 1.82$ provides another summary of the pretest–posttest difference. As Lakens (2013) explains, interpretation of an effect size depends on its design and standardizing denominator. Here, the denominator was the standard deviation of individual difference scores. The estimate therefore describes change within this class and should not be treated as equivalent to an effect derived from a comparison between instructional conditions.

5.4 Student Satisfaction and Instructional Experience

The overall satisfaction mean of 4.71 suggests that students evaluated the instructional experience favorably. Ratings were particularly favorable for the sequence of learning activities and the classroom atmosphere encouraging participation. These responses suggest that students valued the organization of the activities and the opportunities to participate.

The comparatively lower ratings for following the activity stages and working with classmates deserve attention, even though both remained within the high satisfaction category. They identify areas for further examination rather than demonstrating that students experienced a specific difficulty. Without interviews or other explanatory evidence, the study cannot determine why these items received lower ratings. Future implementation could investigate whether additional modeling, clearer task instructions, or more structured peer interaction would address learners' needs.

The favorable satisfaction findings are broadly consistent with those reported by Intaaue and Phungphet (2024) for SQ4R and by Phachuenjai and Intasena (2026) for questioning integrated with mind mapping. Nevertheless, satisfaction reflects students' perceptions. It does not independently establish comprehension improvement, and the present analyses did not examine whether more satisfied students obtained larger test-score gains.

5.5 Instructional Contribution and Practical Implications

The contribution of this study is the examination of a curriculum-aligned instructional package for Grade 8 Thai reading across informational and literary materials. Its value lies in specifying how an active learning orientation, a six-stage reading sequence, and supporting exercises were brought together in classroom practice. Previous work has already combined SQ4R with additional instructional supports, including semantic mapping (Foojai & Ongardwanich, 2020). The present contribution should therefore be understood as a contextual application rather than the invention of a new reading method.

For classroom practice, the package illustrates how teachers can connect reading stages to observable student responses. Questions can establish a reading purpose, records can reveal which information students select, and summaries can make their interpretations available for review. Teachers should align these tasks with the comprehension demands of each text and avoid treating completion of the sequence as sufficient evidence of

understanding.

Assessment also warrants careful alignment. Participation, student products, and comprehension tests provide different information and are most useful when interpreted separately. Reporting their contributions transparently can help teachers distinguish active participation from demonstrated comprehension. Although the use of several text types provides varied practice, this study did not assess transfer to unfamiliar genres or sustained independent strategy use.

5.6 Strengths, Limitations, and Future Research

Strengths of the study include a clearly specified instructional sequence, curriculum-aligned materials, expert review, pilot implementation, and complete paired reading scores for the 40 participants. Reporting formative performance, comprehension scores, and satisfaction also provides a broader account of the classroom experience than relying on a single outcome.

Several limitations constrain interpretation. First, the one-group design cannot separate intervention-related change from testing effects, maturation, or concurrent learning experiences (Marsden & Torgerson, 2012). Second, the sample consisted of one classroom at one school, limiting generalizability. Third, the same test items were administered before and after instruction. Rearranging response options did not eliminate familiarity with the item content.

Measurement evidence also requires qualification. The reported reliability coefficient of .95 concerned the 32-item development set rather than the final 30-item test. It therefore cannot be assumed to describe the reliability of the administered scores. Satisfaction was assessed through self-report and may have been influenced by response tendencies or the classroom context. The reported analyses did not establish the relationship between satisfaction and comprehension gains.

Finally, the study evaluated an integrated package over 12 instructional hours. It did not isolate the contributions of SQ4R, the exercises, or other features of instruction, and it included no delayed assessment of retention.

Future research should use comparison conditions across multiple classrooms or schools, strengthen reliability evidence for the final instruments, and include delayed and transfer assessments. Classroom observations or student interviews could help explain how learners use the reading stages and experience the activities. Such evidence would clarify both the outcomes and the processes associated with the instructional package.

6. Conclusion

This study found a significant increase in Thai reading comprehension scores among 40 Grade 8 students following a 12-hour SQ4R-based active learning intervention with reading exercises. Mean scores increased from 13.63 to 23.50 out of 30. The instructional package met the predetermined 75/75 efficiency criterion, with E_1/E_2 values of 86.17/78.33, and achieved an effectiveness index of .6031. Students' overall satisfaction mean was 4.71 out of 5, corresponding to the highest satisfaction category.

The study contributes a curriculum-aligned application of the six-stage SQ4R sequence supported by exercises across informational and literary texts. This integration offers teachers a practical structure for guiding students to question, organize, summarize, and reconsider textual information. The contribution concerns the implementation of an instructional package for Grade 8 Thai reading rather than the development of a new reading method.

The findings provide preliminary, context-specific evidence of improved performance following instruction. The single-class design, absence of a comparison group, and repeated use of the same test items prevent definitive attribution of the gains to the intervention. Future studies should include comparison conditions, multiple classrooms, and delayed assessments to examine the durability of learning and its transfer to unfamiliar texts.

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Author Statements

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Consent for Publication

All authors have read and approved the final version of the manuscript and have agreed to its publication.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed Consent

Written informed consent was obtained from the parents or legal guardians of all participating students, and assent was obtained from the students prior to their participation in the study, in accordance with the approved research ethics protocol.

Ethics Approval

The research protocol was reviewed and approved by the Ethics Committee for Research Involving Human Subjects at Mahasarakham University, Thailand (Approval No. 258-154/2025, dated April 9, 2025).

Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to ethical and privacy considerations concerning student participants. However, de-identified data may be made available from the corresponding author upon reasonable request, subject to applicable ethical requirements and institutional approval, where necessary.

Use of Artificial Intelligence

The authors used generative artificial intelligence (AI) tools solely to assist with English language editing and grammatical correction. All AI-assisted revisions were carefully reviewed and verified by the authors, who take full responsibility for the accuracy, originality, and integrity of the final manuscript.

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