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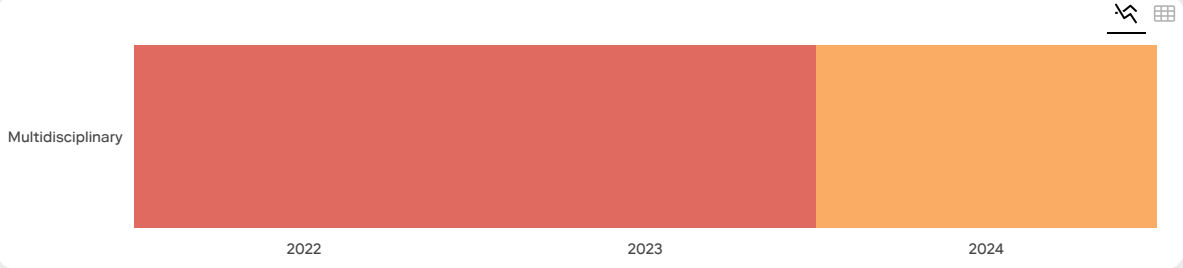

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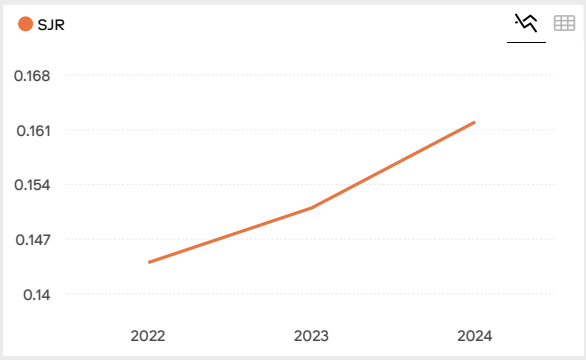

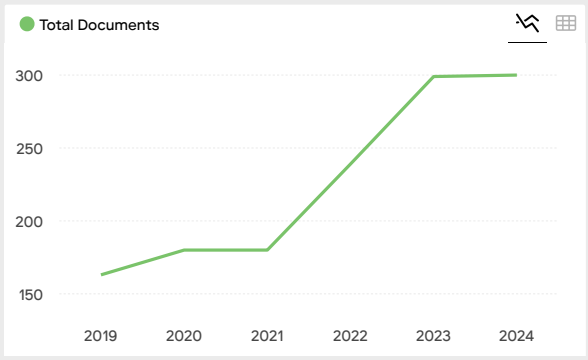

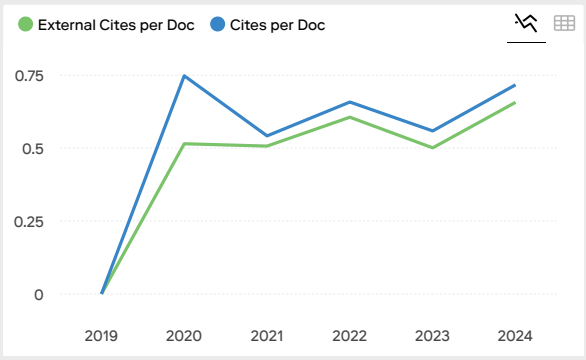

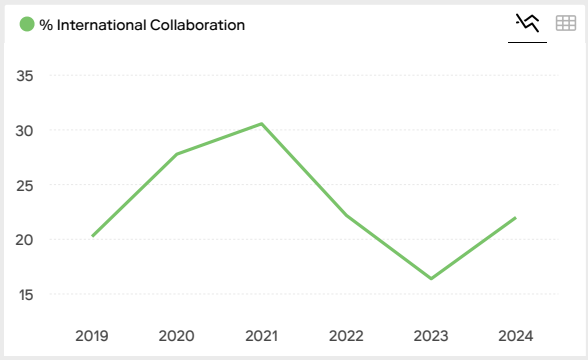

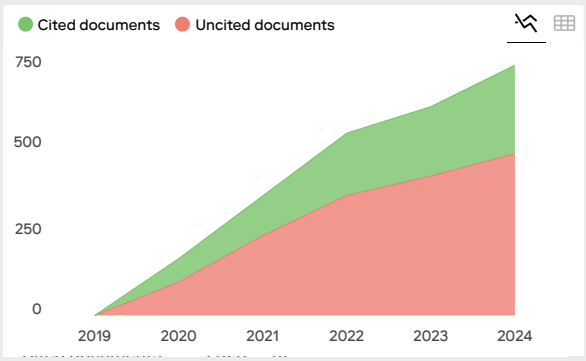

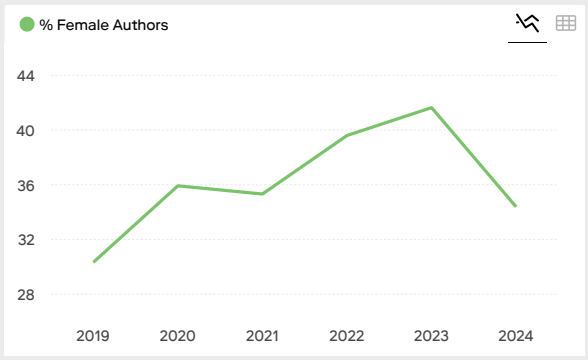

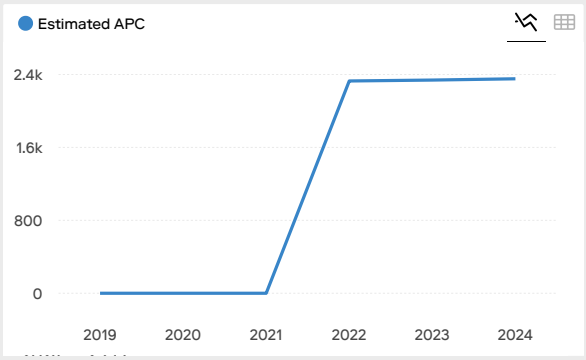

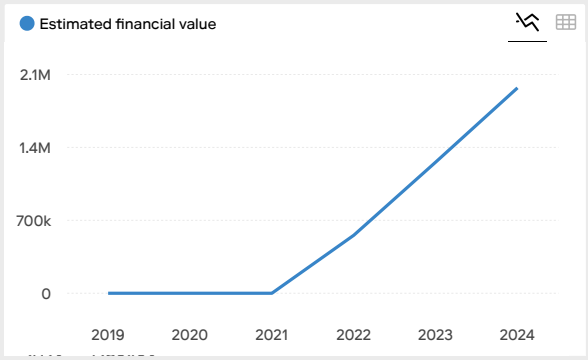

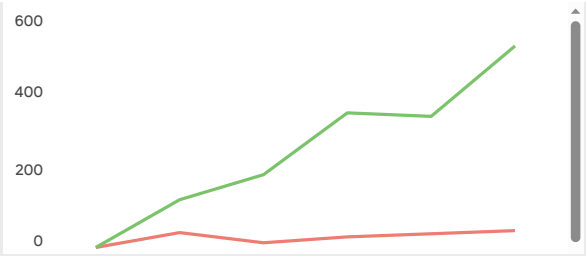

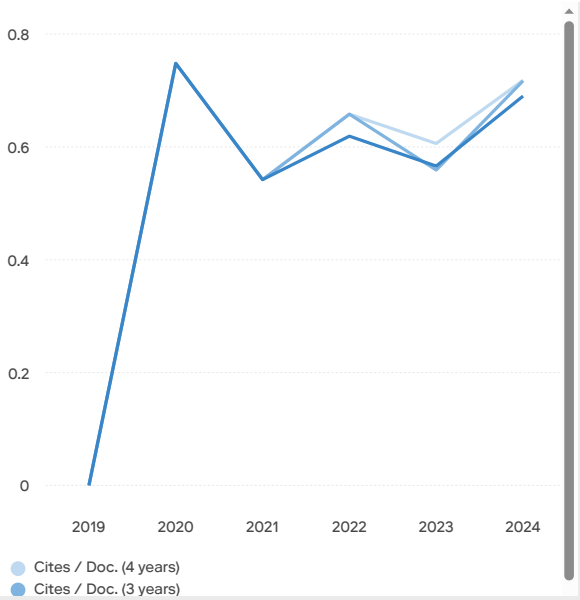

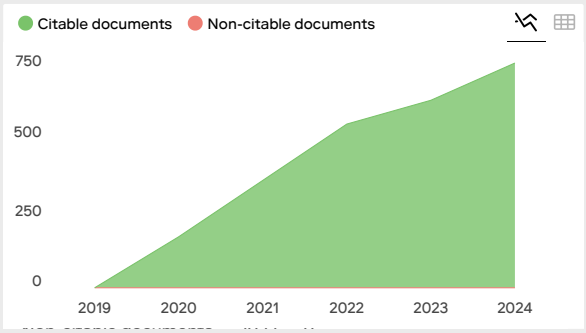

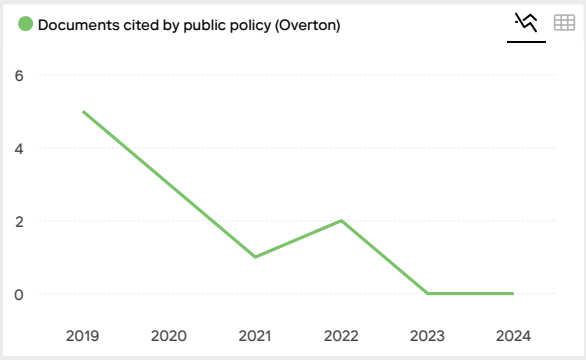

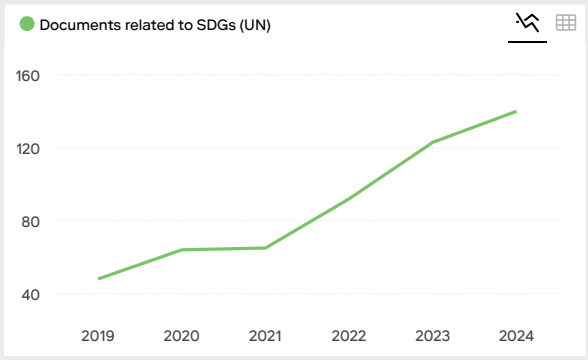

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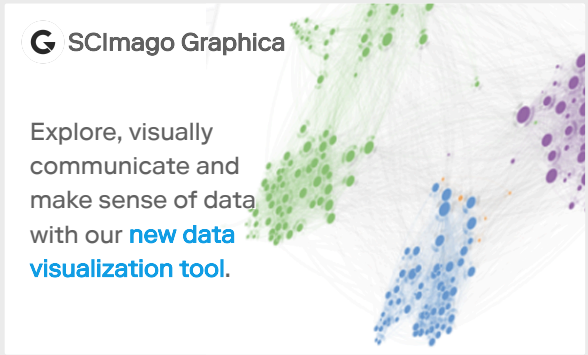

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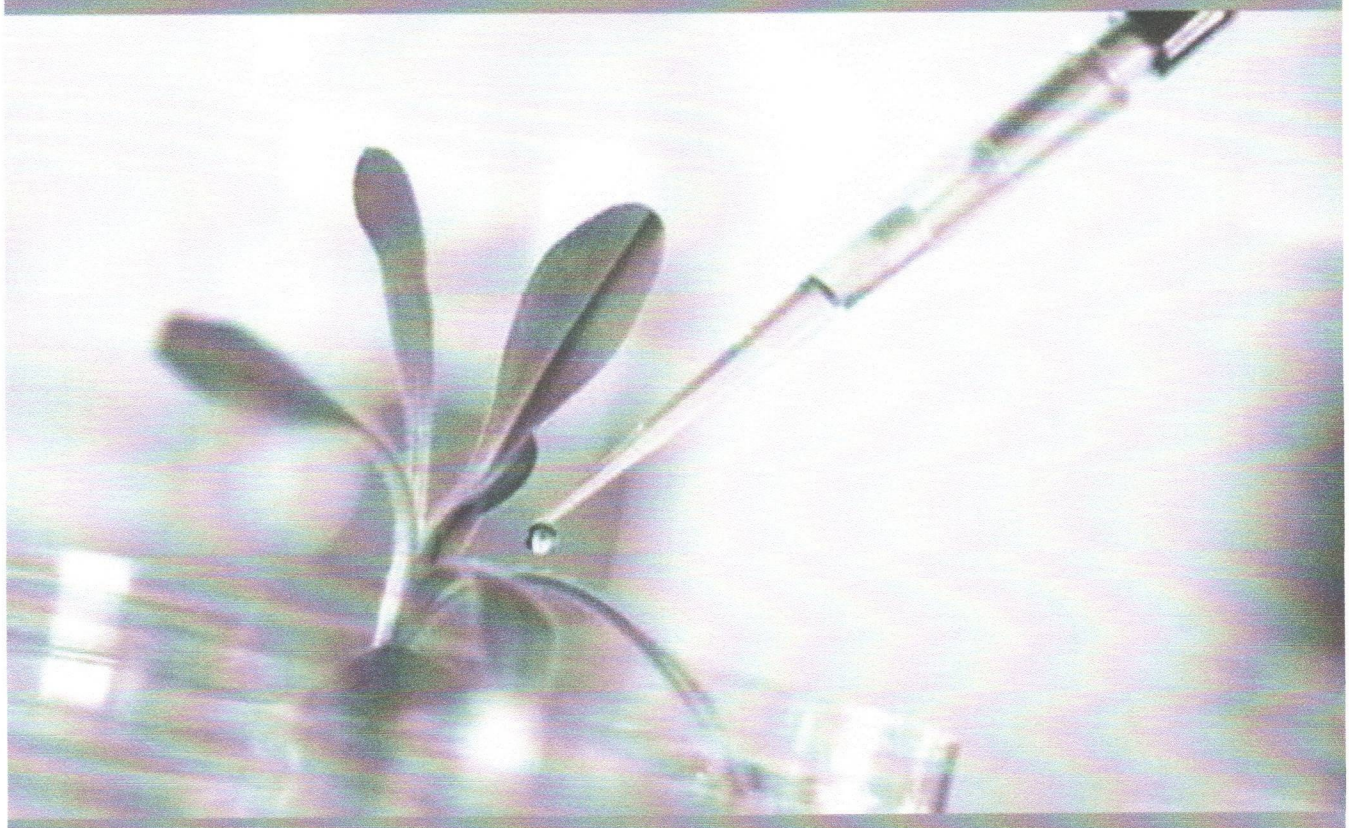

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Active learning management for enhancing 5th graders' reading literacy: A confirmatory factor analysis approach

Onnapa Makaew [1], Autthapon Intasena [1,*], Nattapon Yotha [2]

[1]Department of Curriculum and Instruction, Faculty of Education, Mahasarakham University, Mahasarakham, Thailand
[2]Department of Education Measurement, Evaluation and Research, Faculty of Education, Phetchabun Rajabhat University, Phetchabun 67000, Thailand

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ABSTRACT

This study investigated the impact of active learning management on the reading literacy of Thai 5th-grade students and validated its key components through confirmatory factor analysis (CFA). Using a one-group experimental design, 37 students were purposively selected to participate in an intervention based on structured active learning principles and tailored lesson plans. The instruments included an active learning management plan and a reading literacy proficiency test. Data were analyzed using mean scores, percentages, standard deviations, effectiveness indices (E1/E2 and EI), paired sample t-tests, and CFA. The results indicated that active learning significantly improved students' reading literacy during and after the intervention, as shown by the effectiveness indices and pre- and post-test comparisons. CFA confirmed the model of reading literacy, identifying evaluation and critique, reading for analysis, inference and summarization, and reading for comprehension as key contributing factors, with evaluation and critique being the most influential. These findings highlight the effectiveness of active learning management in enhancing reading literacy among Thai 5th-grade students.

1. Introduction

Reading literacy plays a fundamental role in the academic and personal development of 5th-grade students. Defined as the capacity to comprehend and employ written language structures essential to societal demands or esteemed by the individual (Nel and Adam, 2014), reading literacy encompasses more than just decoding words on a page; it involves comprehension, interpretation, and critical thinking skills essential for navigating various aspects of life (Delgadova, 2015; Frankel et al., 2016). For 5th graders, developing proficiency in reading literacy marks a crucial stage in their educational career. It is during this period that learners transition from simply reading words to delving deeper into the meaning behind the text, exploring societal values, and understanding the broader implications of the content they encounter. As 5th graders engage with increasingly complex texts, they not only expand their vocabulary and linguistic capabilities but also begin to grasp the nuances of their own society and the diverse perspectives within it.

Considering that the attainment of reading literacy necessitates students to interact with texts through comprehension, critical analysis, and the interpretation of social values inherent in the text (Frankel et al., 2016), this skill is neither easily acquired by students nor effectively imparted by educators. In elementary school environments, when pupils are youthful and generally inexperienced with intricate cognitive processes and cultural education, the endeavor of cultivating reading literacy presents considerable difficulties.

Young learners may find it challenging to comprehend abstract concepts, interpret texts beyond their literal significance, or discern latent societal values due to their restricted life experiences and cognitive maturation. Moreover, the varied backgrounds and experiences of students can complicate the teaching and learning process, as educators must address cultural diversity and differing degrees of prior knowledge. Thus, it is unsurprising that reading literacy frequently presents a significant difficulty in language classrooms across many educational settings.

* Corresponding Author.
Email Address: autthapon.i@msu.ac.th (A. Intasena)
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Corresponding author's ORCID profile:
https://orcid.org/0000-0003-3628-5805

Hence, the thinking process plays a crucial role in acquiring this skill, necessitating instructional methods that align with the learners' needs. Elementary school students often benefit from hands-on and active learning activities to grasp concepts effectively in the classroom. However, within the Thai educational context, there is a notable tendency towards lecture-based instruction, with active learning activities frequently overlooked. This discrepancy has led to criticism of the education system, as evidenced by findings from academic research and assessments at both national and international levels.

To address the difficulty of enhancing reading literacy in Thailand, the use of an active learning strategy presents a feasible answer. Active learning, defined by experiential and participatory techniques, actively involves students in the educational process (Blaz, 2022; Fornari and Poznanski, 2021). Instances of active learning methodologies in reading instruction encompass think-pair-share exercises, literature stations, and interactive read-aloud sessions. These exercises promote collaborative engagement with texts, enhancing understanding and critical analysis. Active learning in reading literacy training is highly effective as it promotes direct engagement with texts, critical analysis, and the extraction of meaning from various sources. Active learning promotes a profound comprehension of reading techniques and improves fundamental literacy abilities by engaging students in interactive conversations, collaborative exercises, and practical assignments. Incorporating active learning into reading instruction offers a dynamic and effective method for enhancing students' reading experiences and proficiency within the Thai educational framework, ultimately providing them with essential skills to adeptly navigate and comprehend diverse written materials.

2. Literature review

2.1. Reading literacy

Reading literacy comprises a dynamic and expanding array of abilities, knowledge, and tactics that individuals develop throughout their lives across diverse contexts, shaped by societal, economic, and cultural transformations (OECD, 2019). The definition of reading literacy has evolved to encompass more than fundamental decoding skills, highlighting the interactive aspects of reading comprehension and the creative processes of meaning-making (Frankel et al., 2016). Cognitively oriented theories of reading literacy emphasize the reader's proactive engagement in deriving meaning from texts, employing prior knowledge and contextual signals to formulate comprehension (Dole et al., 1991). This interactive method underscores the significance of metacognitive skills, including comprehension monitoring and the adaptation of reading techniques, which differ according to various objectives and settings. Moreover, reading literacy beyond basic comprehension to include the utilization of reading abilities for personal goal attainment, information acquisition, and meaningful societal engagement.

Moreover, reading literacy denotes a thorough comprehension of reading capabilities, including fundamental decoding skills as well as advanced cognitive processes and metacognitive skills (Frankel et al., 2016; Westerveld et al., 2020). This expansive definition of reading literacy recognizes the complex nature of reading comprehension, which encompasses not only the grasp of textual content but also the critical engagement with and reflection on written materials. Effective reading literacy training should thus seek to develop both skill and engagement in reading, enhancing students' motivation, interest, and enjoyment of the activity. By underscoring the significance of engagement, instructors can promote varied and regular reading practices that transcend the classroom, enabling students to take an active role in their own reading advancement.

In modern culture, reading literacy is essential for individuals to attain their objectives, realize their potential, and engage comprehensively in diverse facets of life (Delgadova, 2015). Reading literacy is a fundamental ability that supports success and empowerment across academic, professional, personal, and civic domains in a fast-evolving world. Reading literacy empowers individuals to comprehend intricate texts, critically assess information, and make informed choices, facilitating active engagement in economic, political, cultural, and social domains. Consequently, promoting reading literacy is vital for individual advancement and aids in creating a more educated, empowered, and inclusive society.

2.2. Active learning

Active learning is an instructional approach that emphasizes student engagement, participation, and collaboration in the learning process (Fornari and Poznanski, 2021). Unlike traditional passive learning methods, where students primarily receive information from instructors, active learning encourages students to actively construct knowledge through hands-on activities, discussions, and problem-solving tasks. In active learning environments, students take on a more active role in their own learning, promoting deeper understanding, critical thinking skills, and long-term retention of information (Konopka et al., 2015).

Principles of active learning revolve around creating opportunities for students to actively engage with course material, interact with their peers, and apply their learning in meaningful contexts (Fornari and Poznanski, 2021). These principles include promoting student-centered learning, fostering collaboration and communication, providing opportunities for reflection and metacognition, and encouraging experimentation and exploration (Aji and Khan, 2019). By

incorporating these principles into instructional design, educators can create dynamic learning environments that cater to diverse learning styles and promote higher levels of student engagement and achievement.

In the context of teaching reading literacy, active learning activities can be designed to enhance students' comprehension, critical thinking, and metacognitive skills. Examples of active learning activities in reading instruction may include literature circles, where students engage in small-group discussions about assigned texts, think-pair-share exercises, where students reflect on reading passages and share their insights with a partner, and interactive read-aloud sessions, where teachers pause to ask comprehension questions and facilitate discussions about literary elements. These activities encourage students to actively process and analyze written texts, fostering deeper understanding and engagement with the material (Lin, 2017).

Implementing active learning strategies in grade 5 classrooms can significantly enhance students' development of reading literacy skills. At this stage of their education, students are transitioning from basic reading comprehension to more complex analysis and interpretation of texts. Active learning provides opportunities for students to practice critical reading skills, such as making inferences, evaluating arguments, and synthesizing information from multiple sources. By actively engaging with texts through discussions, collaborative activities, and hands-on tasks, grade 5 students can develop a deeper understanding of literary concepts, expand their vocabulary, and strengthen their reading comprehension abilities. Moreover, active learning fosters a positive attitude towards reading, encouraging students to view reading as an enjoyable and meaningful activity rather than a passive chore. Overall, incorporating active learning into grade 5 reading instruction can empower students to become proficient, confident readers who are equipped to succeed academically and participate fully in society.

2.3. Previous studies

Scholars have extensively investigated the efficacy of active learning activities, such as think-pair-share (Dwigustini and Widiya, 2020; Liunokas, 2019; Ugwu, 2019), literature circles (Anggrarini and Nurhadi, 2022), and interactive read-aloud sessions (Ceyhan and Yıldız, 2021), in enhancing reading skills. Previous studies have indicated that these active learning approaches are effective in fostering reading skills such as reading comprehension and analytical reading. However, there is a noticeable gap in the literature concerning the specific focus on reading literacy. Moreover, while some studies have explored related reading skills like analytical reading, the participants have predominantly been adults or high school students. Conversely, late elementary school students, who are at a critical developmental stage where they begin grappling with more complex concepts, remain relatively underexplored.

Additionally, while existing research has provided valuable insights into the benefits of active learning strategies, no confirmatory factor analysis has been conducted in previous studies to validate the underlying constructs influencing reading literacy development through these methods. This absence of empirical validation leaves a critical gap in understanding the structural relationships among the key components of active learning and their impact on reading literacy outcomes.

Consequently, the present study aims to address these gaps by employing active learning activities within a structured learning management framework to enhance reading literacy among late elementary school students. Therefore, the sole purpose of the study was to investigate the effects of active learning management on Thai 5th graders' reading literacy.

3. Methodology

3.1. Research design

The study utilized a one-group experimental design to investigate the effectiveness of employing active learning in designing a structured learning management system, along with accompanying lesson plans, aimed at enhancing various aspects of reading literacy among 5th-grade students in Thailand. To assess the impact of the active learning management approach, participants' performance was evaluated through pre-tests, engagement in learning activities, and post-tests.

3.2. Participants

The study involved 37 5th-grade students from Thailand, selected through purposive sampling. Thailand, being an English as a Foreign Language (EFL) country with its native language, is categorized as having very low English proficiency based on the English Proficiency Index. None of the participants had prior experience abroad or attended international program schools. Ethical considerations regarding human research were carefully observed in the treatment of the participants.

3.3. Instruments

This study employed a comprehensive active learning management plan designed to improve reading literacy among fifth-grade students in Thailand. Crafted in accordance with active learning principles, this plan outlined the rationale, objectives, timeline, activities, and assessment methods. It consisted of six distinct lesson plans, each targeting specific aspects of reading literacy such as identifying main ideas, interpreting texts, recognizing signs, and engaging in analytical reading.

The texts used in the plan were chosen to reflect real-life situations relevant to the students, including news articles, manuals, and medical descriptions. The active learning approach embedded in the plan aimed to create a dynamic learning environment conducive to problem-solving, collaboration, and critical thinking. Four key abilities are the core components and expected outcomes that contribute to reading. Each is presented in Table 1.

Table 1: Reading literacy skills and Indicators

Reading literacy skills	Indicators
Reading for comprehension	Identifying the main idea Understanding details Recognizing relationships Understanding vocabulary Summarizing content
Reading for analysis	Analyzing text structure Examining cause and effect Comparing and contrasting Distinguishing facts from opinions Evaluating evidence and supporting details Formulating critical questions
Inference and summarization	Making inferences Summarizing Reviewing and refining understanding Developing practical application skills
Literary criticism skills	Analyzing coherence Evaluating and critiquing supporting arguments Assessing logical reasoning

Various instructional activities were incorporated, including gamified learning, think-pair-share exercises, and Cooperative Integrated Reading and Composition (CIRC) techniques. Prior to formal implementation, the plan underwent evaluation by a panel of three experts comprising scholars and experienced educators. Additionally, a trial study involving participants with similar characteristics to the target group was conducted, with results indicating the suitability of the plan for implementation (mean = 4.33). Insights from expert feedback and the trial study findings were used to refine the plan further.

The reading literacy assessment consisted of 30 multiple-choice questions designed to assess critical thinking and various levels of reading proficiency. These questions ranged in complexity (Index of Item Objective Congruence [IOC]: 0.67-1.0) and difficulty (0.22-0.68), effectively discerning different levels of reading literacy (0.25-0.63). The reliability of the test, assessed using Lovett's (1977) method, yielded a robust coefficient of 0.95, confirming its consistency and reliability.

3.4. Data collection and analysis

This study employed a one-group pre- and post-test design during the first semester of the 2023 academic year. The effectiveness of the active learning management plan was evaluated based on two indicators: process effectiveness (E1), determined by participants' average scores during activities, and product effectiveness (E2), assessed through posttest scores, both compared against a criterion of 75. To explore the relationship between posttest performance and initial proficiency, an Effectiveness Index (EI) was calculated. A paired samples t-test was conducted to ascertain significant differences between participants' pretest and posttest scores, providing insights into the impact of the active learning management plan on their reading literacy. Furthermore, confirmatory factor analysis (CFA) was conducted to validate the structure of the reading literacy model and assess the relationships among its key components.

4. Results

The study's findings revealed that students achieved an average score of 613.7 out of a maximum of 708 points during the learning management activities, corresponding to 88.23% proficiency (Table 2). Additionally, the average score on the posttest was 23.13, representing 77.11% of the maximum possible score of 30. The effectiveness of the active learning management approach in improving participants' reading literacy was calculated as 89.1/77.11 (E_1/E_2= 89.1/77.11), surpassing the predetermined criterion of 75/75. These results indicate that active learning management significantly contributes to the development of critical reading abilities among learners, both during the learning process and upon its completion.

The findings reveal that when aggregating the initial assessment scores of the participants, they amount to 481, whereas their collective scores in the follow-up evaluation total 856 (Table 3). In relation to the test's maximum achievable score of 1080, the computed EI for the active learning management plan stands at 0.6. This indicates a significant enhancement, with students demonstrating a notable improvement of 60% in their comprehension.

Table 2: The effectiveness of active learning management

Effectiveness	Maximum point	Sum	$\bar{x}$	%
The effectiveness of the process (E_1)	708	23331	613.7	89.1
The effectiveness of the product (E_2)	30	613.97	23.13	77.11

The effectiveness of active learning management (E_1/E_2) = 88.23/80.50

Table 3: The effectiveness index of active learning management

n	Sum		EI
	Pre-test	Post-test	
37	481	856	0.6

Moreover, upon comparing the students' performance in the initial and final assessments, notable improvements in their reading proficiency were noted. The study's results revealed a significant contrast between the participants' scores in the pre-test ($\bar{x}$ = 13.00, SD = 1.51) and post-test ($\bar{x}$ = 23.13, SD = 3.50), with a t-value of 18.48 and a p-value below 0.00 (Table 4). The substantial rise in scores observed in the post-test strongly suggests that the

active learning management plan, integrating an active learning approach, positively influenced the reading proficiency of the participants.

Table 4: The comparison between participants' pre- and post-tests

Score	n	Mean	SD	t	Sig.
Post-test	37	13.00	1.51	18.48	.00**
Pre-test	37	23.13	3.50		

**: p<0.05

A second-order CFA was constructed to validate the reading literacy measurement model (Table 5). The first-order analysis examined the relationships among four key reading literacy components and their respective 18 behavioral indicators. All factor loadings were positive, ranging from 0.35 to 0.92, with Reading for Comprehension being the most influential component, followed by Inference and Summarization, and Reading for Analysis.

The Reading for Comprehension (RC) component had factor loadings ranging from 0.64 to 0.95, explaining 35% to 92% of the variance. The most significant indicators were understanding details (RC2), recognizing relationships (RC3), and summarizing content (RC5).

These findings suggest that comprehension skills are critical for literacy development, with a strong emphasis on grasping details and making connections within texts.

Table 5: Confirmatory factor analysis on the learning management plan

Behavioral indicators	Factor loading		SE	Z	p-value	R-squared	Factor score coefficient
	b	β					
First-order confirmatory factor analysis							
Reading for comprehension							
Identifying the main idea	1.00	0.64	0.02	27.48	0.000	0.58	0.57
Understanding details	1.63	0.95	0.01	90.41	0.000	0.81	0.29
Recognizing relationships	1.49	0.93	0.01	46.77	0.000	0.35	0.72
Understanding vocabulary	1.66	0.84	0.01	71.79	0.000	0.92	0.59
Summarizing content	1.36	0.86	0.01	82.63	0.000	0.58	0.84
Reading for analysis							
Analyzing text structure	1.00	0.68	0.03	2.02	0.000	0.95	0.28
Examining cause and effect	1.85	0.72	0.03	9.87	0.000	0.85	0.42
Comparing and contrasting	1.10	0.75	0.03	12.26	0.000	0.80	0.32
Distinguishing facts from opinions	1.42	0.81	0.03	25.66	0.000	0.34	0.47
Evaluating evidence and supporting details	1.59	0.80	0.03	18.63	0.000	0.62	0.58
Formulating critical questions	1.38	0.78	0.03	11.90	0.000	0.78	0.22
3. Inference and summarization							
Making inferences	1.00	0.67	0.02	27.57	0.000	0.54	0.41
Summarizing	1.39	0.74	0.02	35.24	0.000	0.45	0.89
Reviewing and refining understanding	1.45	0.90	0.01	49.74	0.000	0.79	0.39
Developing practical application skills	1.35	0.65	0.02	27.56	0.000	0.57	0.32
4. Literary criticism skills							
Assessing logical reasoning	1.00	0.75	0.04	9.80	0.000	0.82	0.41
Evaluating and supporting arguments	1.14	0.55	0.08	13.24	0.000	0.54	0.39
Assessing logical reasoning	1.07	0.68	0.04	10.23	0.000	0.81	0.27
Second-order confirmatory factor analysis							
Reading comprehension	1.00	0.93	0.02	7.46	0.000	0.52	-
Reading for analysis	1.05	0.84	0.01	5.87	0.000	0.90	-
Interference and summarization	1.70	0.86	0.02	6.77	0.000	0.78	-
Assessing logical reasoning	1.05	0.78	0.02	1.90	0.000	0.98	-

χ^2= 4.58; df = 3; χ^2/df = 1.52; p-value = 0.628; CFI = 1.00; TLI = 1.00; RMSEA = 0.00; SRMR = 0.01

For Reading for Analysis (RA), factor loadings ranged from 0.68 to 0.81, accounting for 34% to 95% of the variance. The most influential indicators were distinguishing facts from opinions (RA4), evaluating evidence and supporting details (RA5), and formulating critical questions (RA6). This suggests that analytical reading skills, particularly the ability to differentiate information from opinion and assess supporting evidence, play a significant role in reading literacy.

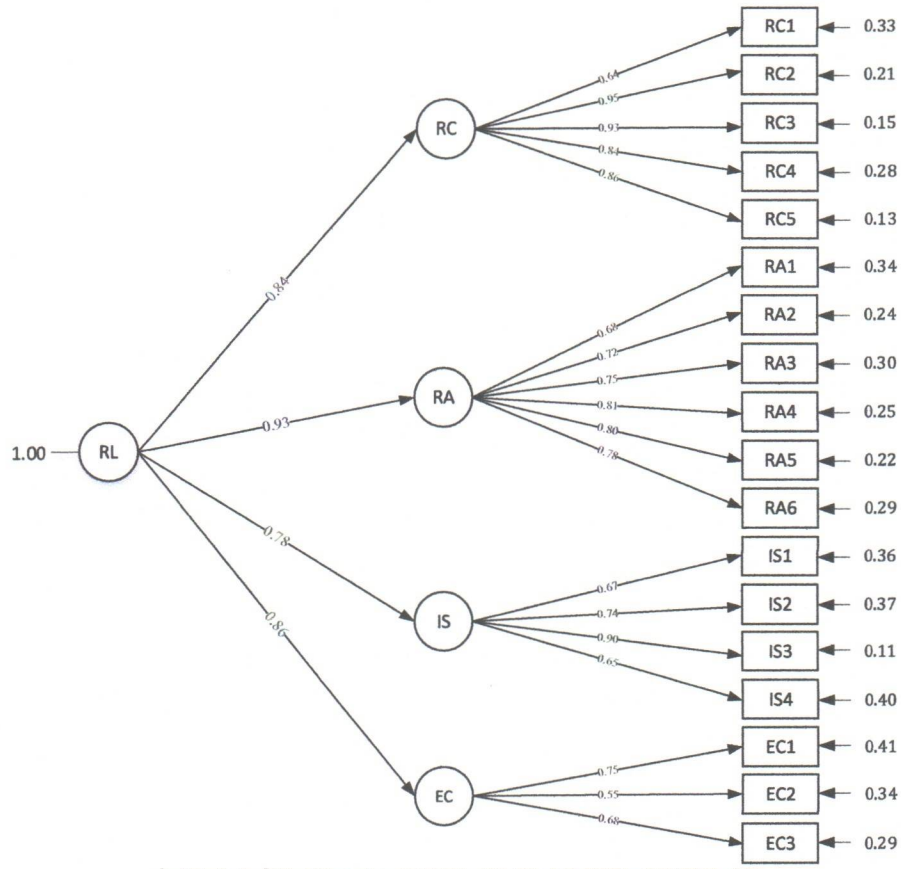
The Inference and Summarization (IS) component had factor loadings between 0.65 and 0.90, explaining 45% to 79% of the variance. The most important indicators were reviewing and refining understanding (IS3), summarizing (IS2), and making inferences (IS1). These findings highlight the role of inferential thinking and summarization in reading literacy, as these skills enable readers to construct meaning beyond the surface level of texts.

For Evaluation and Critique (EC), factor loadings ranged from 0.55 to 0.75, explaining 54% to 82% of the variance. The most significant indicators were analyzing coherence (EC1), assessing logical reasoning (EC3), and evaluating and critiquing supporting arguments (EC4). This suggests that critical reading skills, particularly the ability to assess logical consistency and argumentation, contribute significantly to literacy development.

The second-order CFA examined the relationship between Reading Literacy (RL) as an overarching construct and its four components (RC, RA, IS, EC). All factor loadings were positive, with EC (0.93) being the most influential component, followed by RA (0.84), IS (0.86), and RC (0.78). The shared variance between RL and its components ranged from 52% to 98%, reinforcing the significance of higher-order cognitive processes in literacy.

In conclusion, the findings confirm that the reading literacy model is well-structured, with Evaluation and Critique emerging as the most critical factor in overall literacy development. The analysis underscores the importance of critical evaluation skills, alongside comprehension and inference, in shaping a well-rounded literacy framework. These

results highlight the need for instructional approaches that emphasize not only reading comprehension but also analytical thinking and evaluative skills to foster deeper literacy proficiency. The confirmatory factor analysis can be seen in Fig. 1.



$\chi^2 = 4.58$; df = 3; $\chi^2/df = 1.52$; p-value = 0.628; CFI = 1.00; TLI = 1.00; RMSEA = 0.00; SRMR = 0.01

Fig. 1: A model of reading literacy learning management

5. Discussion

Considering the study's findings, it is evident that active learning management is highly effective in enhancing the reading literacy of 5th graders. These results align with previous research conducted by Anggrarini and Nurhadi (2022), Ceyhan and Yıldız (2021), Dwigustini and Widiya (2020), Liunokas (2019), and Ugwu (2019), who also observed the benefits of active learning in reading classrooms. Moreover, this underscores that active learning not only improves reading comprehension and analytical reading skills, as demonstrated in prior studies, but also proves beneficial for young learners in elementary school as they embark on acquiring more advanced reading abilities.

In this study, Active learning represented a dynamic approach to education, distinguished by its emphasis on student engagement and participation. By incorporating strategies such as think-pair-share, CIRC, and gamified learning, active learning encourages learners to actively process information, collaborate with peers, and apply knowledge in practical contexts. These activities not only stimulate critical thinking but also cater to diverse learning styles, ensuring that every student has an opportunity to contribute and learn. Importantly, active learning goes beyond mere passive absorption of information; it fosters a deeper understanding of the material by encouraging students to grapple with concepts, make connections, and construct meaning through active involvement.

Moreover, the versatility of active learning makes it suitable for learners of all ages and across various educational settings. While it has demonstrated efficacy in engaging young learners like 5th graders, its benefits extend beyond specific age groups. From kindergarten classrooms to university lecture halls, active learning has been shown to enhance student motivation, retention, and overall academic performance. Its adaptability allows educators to tailor activities to suit the needs and interests of their students, making learning more relevant and meaningful.

In essence, active learning represents a paradigm shift in education, moving away from traditional, teacher-centered approaches towards more student-centered, interactive learning environments (Fornari and Poznanski, 2021). By empowering learners to take an active role in their own education, active learning not only cultivates essential skills such as critical thinking and collaboration but also instills a

lifelong love for learning. As educators continue to explore innovative teaching methodologies, active learning remains a powerful tool for promoting academic excellence and fostering a generation of curious, self-directed learners.

The results of the study highlight that 5th graders can acquire advanced skills such as reading literacy, which necessitates both text decoding and schema knowledge. Given the developmental stage of young learners in the late period of elementary school, where they are on the cusp of developing higher-order thinking skills, a teaching method like active learning proves particularly effective. By leveraging active learning strategies, educators can effectively facilitate the acquisition of reading literacy skills among 5th graders, setting a strong foundation for their continued academic growth and development.

The CFA results further substantiate the validity and reliability of the reading literacy model by demonstrating strong interrelationships among its key components. The high factor loadings and shared variance values indicate that EC, RA, IS, and RC collectively contribute to a cohesive construct of reading literacy. The prominence of Evaluation and Critique as the most influential component highlights the growing importance of critical thinking and reasoning skills in literacy development, aligning with contemporary educational perspectives that emphasize analytical engagement with texts. Moreover, the CFA findings reinforce the effectiveness of active learning management by confirming that structured, interactive learning experiences can enhance multiple dimensions of reading literacy, including comprehension, analysis, and inference. These results underscore the necessity of integrating evidence-based instructional strategies that not only improve students' reading proficiency but also equip them with the cognitive tools necessary for lifelong learning and critical engagement with information.

6. Conclusion

In conclusion, this study was undertaken with the objective of implementing active learning as a foundational principle of learning management to enhance the reading literacy of 5th-grade students within the Thai educational context. Through a one-group experimental design study, the efficacy of active learning activities in fostering students' literacy skills was demonstrated, both during the learning process and upon its completion, as evidenced by the effectiveness (E1/E2) and EI of the learning management. Furthermore, the comparison between pre and post-treatment performances revealed significant improvements in the participants' abilities. Additionally, the CFA provided robust statistical validation of the reading literacy model, confirming that EC, RA, IS, and RC are key components that collectively define reading literacy. The CFA results emphasized that Evaluation and Critique plays the most influential role, indicating the necessity of fostering higher-order thinking skills in literacy instruction. These findings not only reinforce the effectiveness of active learning but also contribute to the field by extending its application beyond general literacy development to include a deeper, more structured understanding of the cognitive processes underlying reading literacy. This study highlights the importance of integrating active learning strategies alongside empirically validated literacy models to cultivate essential reading skills among elementary school students.

The implications of this study are manifold. From a pedagogical standpoint, the incorporation of active learning strategies into educational practices can revolutionize teaching methodologies, offering a more engaging and effective learning experience for students. By prioritizing student engagement and participation, educators can create learning environments that foster critical thinking, collaboration, and a deeper understanding of subject matter. Additionally, from an academic perspective, this study adds to the growing body of research on the efficacy of active learning in improving literacy skills, particularly in younger learners.

However, it is important to acknowledge the limitations of this study. One notable limitation is the relatively small sample size of 37 students, which may affect the generalizability of the findings. Additionally, the study did not include a control group, making it challenging to compare the effects of active learning management against traditional teaching methods. Furthermore, the absence of qualitative data limits our ability to gain deeper insights into the students' experiences, engagement levels, and perceptions of the learning activities. Future research endeavors could address these limitations by employing larger sample sizes, incorporating a control group for comparative analysis, and integrating qualitative methods, such as interviews or classroom observations, to provide a more comprehensive understanding of the effects of active learning on reading literacy in elementary school students.

List of abbreviations

CFA	Confirmatory factor analysis
CFI	Comparative fit index
CIRC	Cooperative integrated reading and composition
df	Degrees of freedom
EI	Effectiveness index
E1	Effectiveness of the process
E2	Effectiveness of the product
EC	Evaluation and critique
EFL	English as a foreign language
IOC	Index of item objective congruence
IS	Inference and summarization
RA	Reading for analysis
RC	Reading for comprehension
RL	Reading literacy
RMSEA	Root mean square error of approximation
SD	Standard deviation
SE	Standard error
SRMR	Standardized root mean square residual
TLI	Tucker–Lewis index

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Compliance with ethical standards

Ethical considerations

Written informed consent was obtained from the parents/guardians of all participating students, and assent was obtained from the students themselves. Participation was voluntary, and students could withdraw at any time without penalty. All data were kept confidential and used solely for research purposes.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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