The Effects of Cooperative Learning Activities on Self-Directed Learning in Early Secondary Education Students

Jakkrit Marnnoi[1*], Piya Marnin[2], Somsak Wongsaman[3], and Mit Darachai[4]

International Islamic College Bangkok, Krirk University, Thailand

Corresponding author. E-mail: mnprint01@gmail.com[1*]

Abstract

The purposes of this study were to 1) investigate the level of self-directed learning (SDL) among junior high school students in the experimental group before and after cooperative learning (CL) interventions, 2) examine the SDL level in the control group before and after conventional instruction, and 3) determine statistically significant differences in SDL levels between experimental and control groups post-intervention. The research employed a quasi-experimental design. The population consisted of 86 students who were members of the "Happy Mind, Healthy Life" club (pseudonym). A total of 42 students were selected as the sample and assigned to two groups: an experimental group and a control group, each comprising 21 students. The research instruments included a set of CL activities and an SDL questionnaire for early secondary education students, both validated by five experts. Data were analyzed using t-tests to compare pre-test and post-test scores within and between groups. The research results indicated that 1. Students in the experimental group showed a statistically significant increase in self-directed learning after participating in the cooperative learning activities at the .05 significance level (2). No significant difference was found in the control group between the pre-test and post-test scores. Moreover, 3. the post-test scores of the experimental group were significantly higher than those of the control group at the .05 level. Findings support implementing cooperative learning as a standard pedagogical approach for early adolescent learners to develop SDL capabilities.

Keywords: cooperative learning activities; secondary education students; self-directed learning

Introduction

In an era of rapid social and technological change, educational paradigms are shifting to prioritize learner autonomy. The cultivation of self-directed learning (SDL) is therefore paramount, as it equips individuals with the capacity to manage their own learning processes throughout life (Sarodom, 2023). This is particularly critical during early adolescence, as junior high school students develop advanced cognitive and metacognitive skills essential for autonomous learning. Establishing robust SDL capabilities at this juncture fosters greater resilience and confidence in navigating future academic and personal challenges (Badu-Nyarko & Zumapkeh, 2014).

Cooperative learning (CL) is widely recognized as an effective pedagogical strategy for fostering these skills. Grounded in the principles of positive interdependence and collaborative engagement, CL involves structured group interactions in which students work together to achieve shared goals (Johnson & Johnson, 1994). Unlike unstructured group work, CL systematically organizes student roles and accountability, enabling learners to practice planning, monitoring, and evaluating their learning, which are core components of SDL (Noklang, 2019). Through peer discourse and feedback, students can refine their understanding of personal strengths and limitations, collectively developing tailored learning strategies (Laal & Ghodsi, 2012; Noklang et al., 2015). Furthermore, CL tasks promote autonomous decision-making within a supportive framework, encouraging reflection through self- and peer-assessment (Slavin, 1995).

Despite strong theoretical support, empirical gaps remain regarding the efficacy of CL in specific developmental and cultural contexts. While studies affirm its role in promoting academic and social outcomes (Yang, 2023), fewer have explicitly examined its impact on multidimensional SDL competencies among early adolescents in non-Western educational settings. Recent research underscores the importance of culturally responsive CL designs that align with local practices and student readiness (Mendo-Lázaro et al., 2022; Nguyen et al., 2020). This study aims to address this gap by investigating how structured CL activities influence SDL within a Thai junior high school context.

Applying Knowles et al.'s (2005) SDL framework, this quasi-experimental study seeks to determine whether a structured CL intervention significantly enhances SDL capabilities compared to conventional instruction. The outcomes are anticipated to offer actionable insights for cultivating essential 21st-century skills in culturally grounded ways.

Research Objectives

1. To investigate the change in the level of self-directed learning (SDL) among junior high school students in the experimental group from pre- to post-intervention (cooperative learning instruction).

2. To examine the change in the self-directed learning (SDL) level among junior high school students in the control group from pre- to post-intervention (conventional instruction).

3. To determine whether statistically significant differences exist in post-intervention in self-directed learning (SDL) levels between the experimental and control groups

Literature Review

Self-directed learning (SDL) is a process in which individuals take primary initiative in diagnosing their learning needs, formulating goals, identifying resources, implementing strategies, and evaluating outcomes (Knowles et al., 2005). For adolescent learners, SDL is not merely an academic skill but a critical component of personal development, fostering independence, metacognitive awareness, and adaptability —essential for lifelong learning (Logan et al., 2021; Woods & Copur-Gencturk, 2024). The framework by Knowles et al. (2005), which includes dimensions such as self-perception as a learner, self-analysis of needs, and self-evaluation of outcomes, provides a comprehensive model for assessing SDL competencies, particularly during the formative secondary school years.

Cooperative learning (CL) is an instructional methodology structured around positive interdependence, individual accountability, promotive interaction, social skills, and group processing (Johnson & Johnson, 1994). It moves beyond simple group work by creating systematic conditions in which students' success is linked to their peers' success. This structured interaction requires learners to engage in explanation, debate, and mutual support, which in turn cultivates cognitive and social skills (Slavin, 1995). The defined roles within CL groups, such as facilitator or recorder, provide a scaffold for students to practice planning and reflective evaluation, activities that are central to developing self-direction (Noklang, 2019).

Theoretically, CL creates an ideal environment for SDL development. The collaborative problem-solving and peer feedback inherent in CL activities encourage learners to articulate their thought processes, confront diverse perspectives, and refine their learning strategies (Laal & Ghodsi, 2012). This process enhances metacognitive skills and a sense of responsibility for one's

own learning, core components of SDL (Zimmerman, 2002). Empirical studies have consistently linked CL with improved academic outcomes and social skills, suggesting its potential to foster the autonomous behaviors characteristic of SDL (Slavin, 1995; Yang, 2023).

While the benefits of CL are well-documented in Western educational systems, its application and effectiveness can vary significantly across cultural contexts. For instance, while Yang (2023) provides a broad historical review affirming CL's general efficacy, Mendo-Lázaro et al. (2022) emphasized that its success depends on culturally responsive designs that align with local pedagogical practices. In Asian settings, research by Nguyen et al. (2020) highlights the importance of adapting CL to align with collectivist cultural norms and students' readiness levels. Studies in Thailand have examined CL's impact on social skills and academic achievement, but investigations into its effect on multidimensional SDL competencies in early adolescence remain limited. Research such as Noklang's (2019) on participatory methods underscores the potential of collaborative approaches in Thai contexts. However, a clear empirical link between structured CL and SDL development in junior high schools is still lacking.

In synthesis, the literature firmly establishes the importance of SDL and the potential of CL as a vehicle for its development. However, a critical gap exists. Many studies affirm CL's role in promoting general academic and social gains. Still, fewer have explicitly traced its impact on the specific, multifaceted competencies of SDL, as defined by frameworks such as those of Knowles et al. (2005). This gap is particularly pronounced in non-Western educational settings, specifically Thai ones. Therefore, this study seeks to address this gap by examining how a structured CL intervention designed with cultural considerations influences the SDL capabilities of junior high school students in Thailand, thereby contributing to a more nuanced, contextually grounded understanding of the field.

Conceptual Framework

This study investigates two primary variables: independent and dependent variables. These variables are further elaborated within the conceptual framework.

The independent variable is a set of cooperative learning (CL) activities, designed under the 'Good Mental Health, Happy Life Club.' This learning program consisted of continuous activities over eight weeks, with one session per week. The design of these activities is grounded in the five core components of the Johnson & Johnson (1994) conceptual framework: Positive

Interdependence, Face-to-Face Interaction, Individual and Group Accountability, the application of Social Skills, and Group Processing.

The dependent variable is self-directed learning (SDL), comprising five constituent elements according to the framework of Knowles et al. (2005). These elements are the learner's Self-Perception, Self-Diagnosis of learning needs, Self-Design of a learning plan, Self-Conduct of the learning process, and Self-Evaluation of learning outcomes.
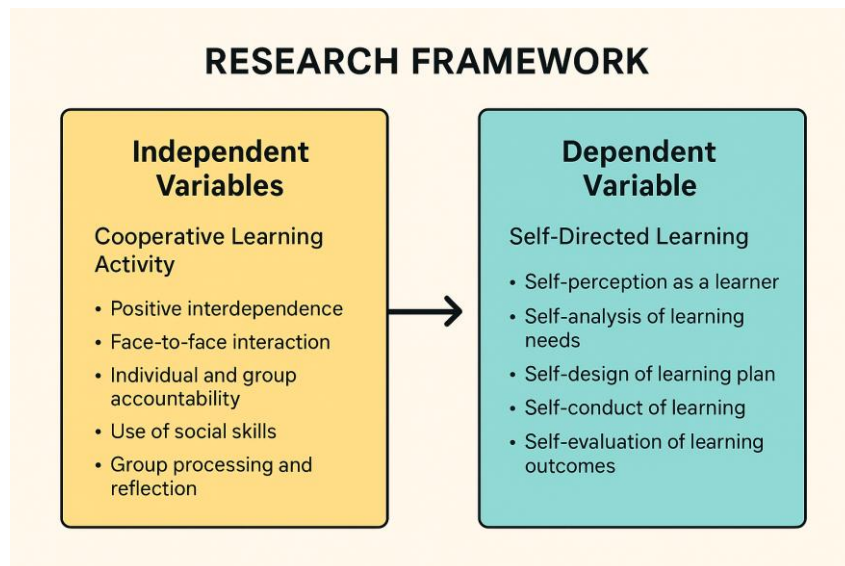
RESEARCH FRAMEWORK

Independent Variables

Cooperative Learning Activity

- Positive interdependence
- Face-to-face interaction
- Individual and group accountability
- Use of social skills
- Group processing and reflection

Dependent Variable

Self-Directed Learning

- Self-perception as a learner
- Self-analysis of learning needs
- Self-design of learning plan
- Self-conduct of learning
- Self-evaluation of learning outcomes

Figure 1 Research Framework

Research Methodology

This study employed a Quasi-Experimental Design, specifically a Nonequivalent Control Group Design (Campbell & Riecken, 1968). This design was selected because intact, pre-existing groups were used, preventing complete random assignment of participants. The design included pre- and post-test assessments for both an experimental group that received the cooperative learning (CL) intervention and a control group that continued with conventional instruction.

Participants and Sampling

The population consisted of 86 junior high school students who were members of the school's 'Happy Mind, Healthy Life' club (pseudonym). A purposive sampling technique was used to select participants based on pre-test scores using the Knowles et al. (2005) SDL Scale. A total of 42 students who scored below the threshold of 2.51 (on a 5-point scale) were selected for the study, indicating a need for SDL development. These 42 participants were non-randomly allocated into two groups: an experimental group (n=21) and a control group (n=21). Allocation was based

on maintaining the integrity of pre-existing sub-groups within the club to avoid disruption, a common practice in quasi-experimental research conducted in natural educational settings.

Instruments

The research instruments included a set of cooperative learning activities and a self-directed learning questionnaire.

1. Cooperative Learning (CL) Activities: The intervention consisted of a series of CL activities designed under the theme "Good Mental Health, Happy Life," delivered over eight weeks with one 60-minute session per week. The 8-week duration was chosen to allow for sufficient exposure to and practice of CL principles, as recommended by foundational CL research (Johnson & Johnson, 1994; Slavin, 1995). The activities were structured around the five core components of CL: Positive Interdependence, Face-to-Face Interaction, Individual and Group Accountability, Social Skills, and Group Processing.

2. Self-Directed Learning (SDL) Questionnaire: The SDL questionnaire (the dependent variable) was measured using a 5-point Likert scale, based on the framework of Knowles et al. (2005). It covered five SDL competencies: Self-Perception, Self-Diagnosis of Needs, Self-Design of a Learning Plan, Self-Conduct of the Learning Process, and Self-Evaluation of Learning Outcomes. The instrument was validated by five experts in educational psychology, yielding Item-Objective Congruence (IOC) indices ranging from 0.80 to 1.00. A pilot test with 30 non-participating students demonstrated high internal consistency (Cronbach's alpha = 0.81).

Procedures

The research was conducted in three phases:

Preparation: Literature synthesis and instrument validation.

Implementation: The experimental group underwent the 8-week CL intervention during regular club sessions, while the control group participated in standard, teacher-facilitated club activities. To address ethical considerations, the control group was offered a compensatory workshop on CL after the study concluded.

Post-testing: One week after the intervention, both groups completed the post-test SDL questionnaire under the same conditions as the pre-test.

Data Analysis

Data were analyzed using SPSS software. Paired-samples t-tests were used to assess the intervention's effect by comparing pre-test and post-test scores within each group.

Independent-samples t-tests (with a significance level of α = 0.05) were used to compare post-test scores between the experimental and control groups, assessing the relative efficacy of CL versus conventional instruction. Effect sizes (Cohen's d) were calculated to gauge the practical significance of the findings.

Ethical Considerations and Limitations

Informed consent was obtained from the school administration, parents, and students, and anonymity and confidentiality were ensured. As ethical compensation for not receiving the intervention, the control group was provided with a post-study workshop on cooperative learning strategies.

This study has several limitations that should be considered when interpreting the results. The sample size was relatively small (N=42), and participants were non-randomly allocated, which may limit the generalizability of the findings. Furthermore, the study was conducted in a single school setting with a specific club context, which may not be fully representative of other educational environments. Future research with larger, randomly selected samples across multiple sites is recommended to validate these findings.

Research Results

The implementation of cooperative learning activities yielded statistically significant outcomes for junior high school students. Following the intervention, the experimental group (n=21) demonstrated statistically significant improvements ($p < 0.05$) across all dimensions of self-directed learning (SDL) as defined by the Knowles et al. (2005) framework compared with baseline measures.

Objective 1: Experimental Group (CL Instruction)

Objective 1 (O1) sought to investigate changes in self-directed learning (SDL) among students in the experimental group from pre- to post-intervention. The results are presented in Table 1.

Table 1 Improvements of Self–Directed Learning (SDL) across All Dimensions among the Experimental Group Students

Self–Directed Learning (SDL) Competency Domains	pre (n=21)		post n=21)		t	df	p	Cohen's d
	M	SD	M	SD				
1. Self–Perception as Learners	3.04	.66	4.04	.66	–4.583	20	.000	1.00
2. Self–Analysis of Learning Needs	3.04	.66	4.14	.72	–4.256	20	.000	1.17
3. Self–Designed Learning Plans	3.00	.44	4.23	.83	–6.012	20	.000	.94
4. Self–Implemented Learning	3.33	.73	4.04	.80	–3.101	20	.006	1.05
5. Self–Evaluated Learning Outcomes	3.14	.47	4.09	.76	–4.740	20	.000	.92
Aggregate SDL Competencies	3.11	.28	4.11	.45	–7.105	20	.000	.64

As detailed in Table 1, effect sizes ranged from Cohen's d = 0.64 (Aggregate SDL) to d = 1.17 (Self–Analysis of Learning Needs). This included particularly notable gains in Self–Design of a Learning Plan (t(20) = –6.012, p < 0.001) and Self–Evaluation of Learning Outcomes (t(20) = –4.740, p < 0.001).

Objective 2: Control Group (Conventional Instruction)

Objective 2 (O2) examined changes in self–directed learning (SDL) among students in the control group from pre– to post–intervention. Table 2 details these results.

Table 2 Improvements of Self–Directed Learning (SDL) across All Dimensions among the Control Group Students

Self–Directed Learning (SDL) Competency Domains	pre (n=21)		post n=21)		t	df	p	Cohen's d
	M	SD	M	SD				
1. Self–Perception as Learners	3.61	.66	3.38	.58	1.558	20	.135	.70
2. Self–Analysis of Learning Needs	3.23	.53	3.04	.80	.890	20	.384	.98
3. Self–Designed Learning Plans	3.19	.60	3.42	.74	–1.558	20	.135	.70
4. Self–Implemented Learning	3.14	.47	3.23	.62	–.568	20	.576	.76
5. Self–Evaluated Learning Outcomes	3.23	.53	3.33	.73	–.525	20	.605	.83
Aggregate SDL Competencies	3.30	.33	3.28	.31	.206	20	.839	.42

In contrast, the control group (n=21) in Table 2 exhibited no statistically significant change in SDL competencies after conventional instruction. While some minor fluctuations occurred in subdomains, no dimension reached statistical significance (all p > 0.05), and the aggregate SDL score showed a small effect size (d = 0.42).

Objective 3: Post–Intervention Comparison

Objective 3 (O3) determined whether statistically significant differences exist between the experimental and control groups in post–intervention self–directed learning (SDL) levels. Table 3 presents the results of the post–intervention comparison.

Table 3 Improvements of Self–Directed Learning (SDL) across All Dimensions in Comparisons

Self–Directed Learning (SDL) Competency Domains	Experimental group (n=21)		Control group n=21		t	df	p	Cohen's d
	M	SD	M	SD				
1. Self–Perception as Learners	4.04	.66	3.38	.58	3.426	40	.001	.63
2. Self–Analysis of Learning Needs	4.14	.72	3.04	.80	4.628	40	.000	.76
3. Self–Designed Learning Plans	4.23	.83	3.42	.74	3.321	40	.002	.78
4. Self–Implemented Learning	4.04	.80	3.23	.62	3.641	40	.001	.72
5. Self–Evaluated Learning Outcomes	4.09	.76	3.33	.73	3.294	40	.002	.74
Aggregate SDL Competencies	4.11	.45	3.28	.31	6.835	40	.000	.39

Crucially, post–intervention comparisons revealed that the experimental group's SDL performance was significantly superior across all measures (Table 3). Independent t–tests confirmed substantial between–group differences in Self–Perception as Learners ($t(40) = 3.426$, $p = 0.001$, $d = 0.63$), Self–Analysis of Learning Needs ($t(40) = 4.628$, $p < 0.001$, $d = 0.76$), and particularly in Self–Evaluation of Learning Outcomes ($t(40) = 3.294$, $p = 0.002$, $d = 0.74$). The Aggregate SDL Competencies score showed a robust advantage for cooperative learning participants ($t(40) = 6.835$, $p < 0.001$, $d = 0.39$), substantiating the intervention's efficacy in enhancing self–directed learning capacities relative to traditional methods.

Discussion

The first objective was to investigate students' self–directed learning (SDL) levels in the experimental group before and after the cooperative learning (CL) intervention. The results indicated a statistically significant increase in SDL scores across all five competency domains. This finding aligns with the theoretical propositions of Johnson and Johnson (1994), who argued that CL's structured positive interdependence and individual accountability create a natural scaffold for self–regulatory behaviors. The significant improvement in Self–Design of a Learning Plan ($t(20) = -6.012$, $p < 0.001$) and Self–Evaluation of Learning Outcomes ($t(20) = -4.740$, $p < 0.001$)

suggests that the group processing and reflective components of the CL activities directly fostered metacognitive skills. This supports Zimmerman's (2002) assertion that SDL development requires structured opportunities for planning and self-evaluation, which are embedded in the CL roles and reflection phases. Furthermore, the results are consistent with the work of Laal and Ghodsi (2012), who found that collaborative environments provide the feedback and diverse perspectives necessary for learners to assess their own understanding and needs critically.

The second objective was to examine the SDL level in the control group before and after conventional instruction. The analysis revealed no significant changes in SDL competencies, with only minor, non-significant fluctuations in subdomain scores. This outcome was anticipated and reinforces the critique of traditional, teacher-centered methods, which often limit student agency and metacognitive engagement (Woods & Copur-Gencturk, 2024). The absence of growth in the control group contrasts with the gains seen in the experimental group, highlighting that the mere passage of time or exposure to standard club activities was insufficient for developing SDL. This finding is consistent with Slavin's (1995) research, which indicates that without intentional instructional designs that promote active participation and accountability, significant gains in complex skills such as self-direction are unlikely.

The third objective was to determine the difference in SDL levels between the experimental and control groups post-intervention. The post-test results demonstrated that the CL group significantly outperformed the control group across all SDL measures. This finding corroborates the meta-analysis by Yang (2023), which synthesized evidence of CL's positive effects on various learner outcomes. However, this study extends that work by specifically quantifying its impact on multidimensional SDL in a non-Western context. The significant between-group differences, particularly in Self-Analysis of Learning Needs ($t(40) = 4.628$, $p < 0.001$), suggest that the peer interactions and discourse in CL activities were more effective than teacher-led instruction in helping students identify their own knowledge gaps, a process essential for SDL (Knowles et al., 2005). This finding partially contrasts with Mendo-Lázaro et al. (2022), who emphasized the importance of cultural adaptation. However, in this study, a CL model based on Western principles still yielded significant effects, suggesting its core mechanisms may be universally applicable when implemented with fidelity.

The findings strongly support integrating cooperative learning as a standard pedagogical approach in early secondary education to cultivate self-directed learning capabilities. The study demonstrates that the theoretical link between CL's social-constructivist foundations and SDL, as

proposed by theorists like Johnson and Johnson (1994) and Zimmerman (2002), is empirically valid in a Thai educational context. Practically, the results suggest that curriculum designers and teachers should prioritize creating structured collaborative experiences with defined roles and consistent reflection periods. Successful implementation hinges on program consistency, varied activity design to maintain engagement, and supportive facilitation that guides rather than directs the learning process.

New Knowledge from Research

This study provides clear evidence that structured cooperative learning (CL) significantly enhances the self-directed learning (SDL) capabilities of early secondary education students. The quasi-experimental findings demonstrate that an eight-week CL program led to marked improvements across all five SDL competencies defined by Knowles et al. (2005), with substantial effect sizes (Cohen's d ranging from 0.64 to 1.17). The results empirically validate the theoretical link between CL's social-constructivist processes and SDL development, a relationship previously suggested but less rigorously tested in non-Western contexts (Johnson & Johnson, 1994; Zimmerman, 2002).

Theoretically, this work advances pedagogical understanding by pinpointing the specific mechanisms through which CL fosters SDL. The significant gains in Self-Design of a Learning Plan (d = 0.94) and Self-Evaluation of Learning Outcomes (d = 0.92) indicate that CL's structured peer engagement and group reflection serve as direct scaffolding for metacognitive growth. This offers a nuanced contribution to the frameworks of Knowles et al. (2005) and Slavin (1995), showing that CL is not merely a tool for academic achievement but a catalyst for cultivating intrinsic motivation and learning ownership during early adolescence.

From a practical perspective, the study offers an actionable model for educators. It demonstrates that CL frameworks, when implemented with continuity and developmental appropriateness, can be systematically integrated into standard curricula to nurture self-regulatory practices. For educational practitioners in similar contexts, the findings underscore the importance of investing in teacher training for CL implementation and designing participatory learning structures that explicitly build SDL competencies through collaborative practice.
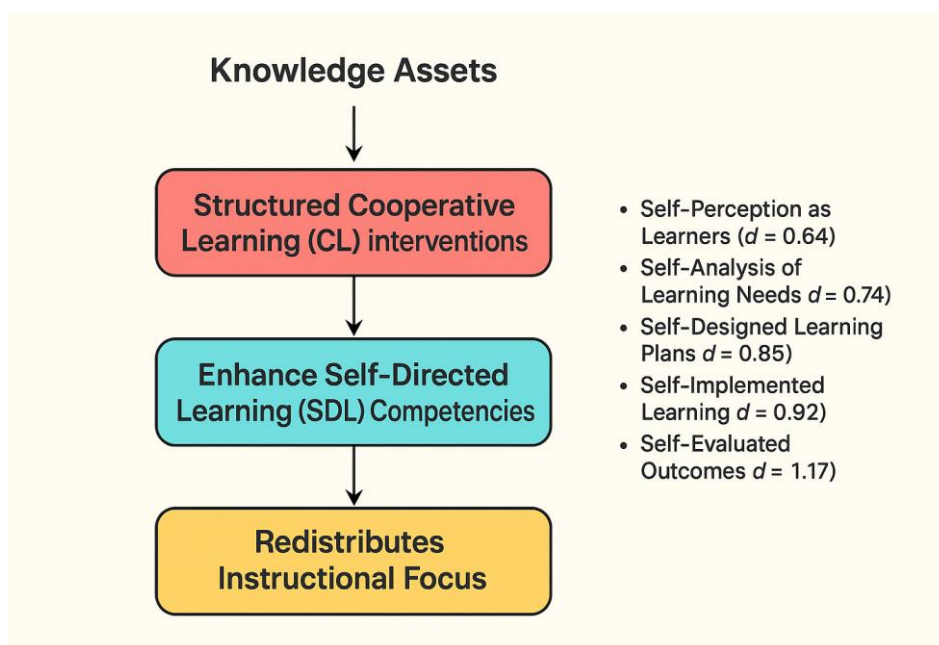
Figure 2 Knowledge Assets

Conclusion

The central finding of this study is the demonstrated efficacy of structured cooperative learning (CL) as a powerful pedagogical approach for developing self-directed learning (SDL) competencies in early adolescent students. The significant gains observed across all SDL domains underscore that the intentional design of CL, with its emphasis on positive interdependence, defined roles, and guided group reflection, effectively creates the conditions necessary for metacognitive skill development. The principal contribution of this work is to provide a validated, actionable model for bridging the gap between the theoretical potential of collaborative learning and its practical application in cultivating lifelong learning skills. Moving beyond general academic outcomes to focus on specific SDL capabilities, this study offers educators a clear framework for intentional instructional design. The findings compellingly argue for a shift away from purely teacher-centered paradigms towards interactive, student-led learning environments. In practical terms, the successful implementation of this eight-week program confirms that integrating CL as a standard practice in secondary education is both feasible and highly beneficial. For schools and curriculum developers aiming to foster resilience, adaptability, and intrinsic motivation in students, deliberately incorporating well-structured cooperative activities is a critical pathway to achieving these essential 21st-century learning goals.

Suggestions

Based on the compelling evidence of its efficacy, this study recommends that educational institutions systematically integrate cooperative learning (CL) into secondary education curricula as a primary strategy for developing self-directed learning (SDL) skills. This integration should be supported by mandatory, ongoing professional development for teachers, focusing on the practical design and facilitation of structured CL activities rather than superficial group work.

These findings underscore the need for policymakers and curriculum designers to prioritize pedagogical frameworks that foster metacognition and learner autonomy. Allocating resources to create supportive ecosystems —including instructional materials and collaborative classroom spaces —is essential for sustainable implementation. Future research should build upon this work by investigating the optimal duration and format of CL interventions (e.g., intensive workshops versus sustained programs) across diverse socioeconomic and cultural settings. Such studies will help refine scalable models that effectively equip a broader range of students with the foundational skills for lifelong learning.

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