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Examining and Evaluating the Effectiveness of the Curriculum Planning Course Using an Approach Aimed at Enhancing Self-Regulation and Active Learner Participation (A Case Study of Islamic Azad University Students)

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A B S T R A C T

Purpose: The objective of this study was to examine and compare the effectiveness of self-regulated learning and collaborative learning approaches in teaching a university-level curriculum planning course on students' academic achievement.

Methods and Materials: This study employed a quasi-experimental pretest–posttest design with experimental and control groups. The statistical population consisted of undergraduate students enrolled in the curriculum planning course in educational sciences programs at Islamic Azad University. A total of 97 students were selected and assigned to three groups: self-regulated learning, collaborative learning, and a control group receiving traditional instruction. The intervention was implemented over one academic semester. Data were collected using a researcher-developed academic achievement test administered at the pretest and posttest stages. Content validity was confirmed by expert review, and reliability was established using Cronbach's alpha. Data analysis was conducted using SPSS 27 and included descriptive statistics, multivariate analysis of variance (MANOVA), and multivariate analysis of covariance (MANCOVA) to control for gender effects.

Findings: MANOVA results indicated a statistically significant multivariate effect of learning approach on academic achievement (Pillai's Trace, $p < .001$), with a large effect size. Univariate analyses showed significant differences among the three groups at the posttest stage, $F(2, 91) = 110.14$, $p < .001$, partial $\eta^2 = 0.635$. Bonferroni post hoc comparisons revealed that both the self-regulated learning and collaborative learning groups performed significantly better than the control group ($p < .001$), while the difference between the two experimental groups was small but statistically significant in favor of self-regulated learning ($p < .05$). MANCOVA results demonstrated that these effects remained significant after controlling for gender.

Conclusion: The findings indicate that both self-regulated learning and collaborative learning are highly effective instructional approaches for enhancing academic achievement in curriculum-related university courses, with self-regulated learning showing a marginal advantage, thereby supporting the adoption of active, learner-centered pedagogies in higher education.

Keywords: *Curriculum planning, self-regulated learning, cooperative learning, active participation, evaluation*

1. Introduction

In recent decades, higher education systems worldwide have increasingly shifted from transmission-oriented models of instruction toward learner-centered pedagogical approaches that emphasize autonomy, engagement, and meaningful knowledge construction. This paradigm shift has been driven by growing recognition that traditional lecture-based teaching methods are insufficient for fostering deep learning, critical thinking, and transferable skills required in complex academic and professional environments (Song & Cai, 2024; Yang, 2023). Contemporary educational research increasingly underscores the importance of instructional designs that actively involve learners in the learning process, promote responsibility for learning, and support sustained academic engagement (Group, 2024; Lazareva, 2025). Within this evolving landscape, self-regulated learning and collaborative learning have emerged as two of the most theoretically grounded and empirically supported approaches for enhancing students' academic performance and personal development in higher education.

Self-regulated learning (SRL) is commonly conceptualized as a multidimensional process through which learners actively plan, monitor, and evaluate their cognitive, motivational, and behavioral strategies to achieve academic goals (Cassady et al., 2022; Theobald, 2021). Rather than being passive recipients of instruction, self-regulated learners are proactive agents who set goals, select appropriate strategies, regulate effort, and reflect on outcomes. Extensive empirical evidence suggests that SRL skills are strong predictors of academic success, persistence, and long-term educational attainment (Park & Kim, 2022; Puntularb et al., 2021). Longitudinal studies further indicate that early development of self-regulated learning abilities significantly predicts university completion and academic resilience at graduation (Cassady et al., 2022).

Beyond cognitive regulation, contemporary models of self-regulated learning emphasize the integration of motivational and affective components, including self-efficacy, intrinsic motivation, academic emotions, and perseverance (Jeon, 2025; Shen et al., 2023). Research has demonstrated that students with stronger self-regulated learning self-efficacy exhibit higher motivation, lower dropout intentions, and greater academic persistence, particularly when supported by positive social relationships within the university context (Morelli et al., 2023). In technology-enhanced learning environments, SRL has become even more critical, as students must independently manage learning tasks, time, and feedback in digital and blended formats (Fangzhou et al., 2025; Vorsah & Oppong, 2024). These findings collectively suggest that cultivating self-regulated learning skills is not merely an auxiliary instructional goal, but a central component of effective higher education.

Parallel to the development of self-regulated learning research, collaborative learning has gained prominence as a constructivist instructional approach grounded in social interaction, shared meaning-making, and collective problem solving (Taggart & Wheeler, 2023; Ülker & Bodemer, 2023). Rooted in socio-constructivist theory, collaborative learning posits that knowledge is co-constructed through dialogue, negotiation, and mutual engagement among learners. Historical and theoretical analyses demonstrate that collaborative and cooperative learning have evolved as systematic alternatives to individualistic learning models, particularly in response to the need for communication, teamwork, and higher-order thinking skills (Yang, 2023).

Empirical research consistently reports positive effects of collaborative learning on academic achievement, social skills, critical thinking, and learner engagement across educational levels (Qureshi et al., 2023; Ranjeh et al., 2023). Collaborative learning environments provide learners with opportunities to articulate ideas, receive peer feedback, and develop shared responsibility for learning outcomes. Studies further indicate that collaborative approaches enhance social interaction and cultural exchange in diverse and multicultural learning settings, thereby supporting inclusive educational practices (Taghavizadeh Golpayegani, 2023). In higher education, collaborative learning has been shown to improve not only academic performance but also communication skills, social competence, and learners' sense of belonging (Mugabekazi et al., 2025; Rezaei Rami & Salimi, 2023).

Recent systematic reviews highlight that collaborative learning is most effective when it is intentionally structured, aligned with learning objectives, and supported by clear roles and instructor facilitation (Digenti, 2025; Jorjani, 2024). Poorly designed group work, by contrast, may lead to unequal participation or surface-level interaction. Consequently, contemporary scholarship emphasizes the need for pedagogically grounded collaborative learning designs that promote active participation, accountability, and meaningful interaction (Taggart & Wheeler, 2023). Digital and blended learning contexts further amplify the importance of collaborative learning as a mechanism for

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sustaining engagement and knowledge generation in online environments (Digenti, 2025; Group, 2024).

While self-regulated learning and collaborative learning have traditionally been examined as distinct instructional approaches, recent research increasingly suggests that these two frameworks may be complementary rather than competing. Collaborative learning environments can serve as fertile contexts for the development of self-regulation, as learners must manage their contributions, monitor group progress, and reflect on shared outcomes (Qureshi et al., 2023; Ülker & Bodemer, 2023). Conversely, learners with stronger self-regulated learning skills tend to engage more effectively in collaborative tasks, contribute meaningfully to group processes, and benefit more from peer interaction (Park & Kim, 2022; Shen et al., 2023). This reciprocal relationship highlights the importance of examining both approaches within a unified instructional framework.

Moreover, active learning has emerged as a broader pedagogical umbrella under which both self-regulated and collaborative learning operate. Active learning emphasizes learners' cognitive, behavioral, and emotional involvement in the learning process, moving beyond passive reception of information (Lazareva, 2025; Song & Cai, 2024). Studies across disciplines demonstrate that active learning environments foster deeper understanding, higher retention, and stronger critical thinking skills compared to traditional lecture-based instruction (Acosta-Gonzaga, 2023; Song & Cai, 2024). Technological innovations, including AI-supported learning tools, further enhance active learning by providing adaptive feedback and personalized learning pathways, thereby reinforcing both self-regulation and collaboration (Fangzhou et al., 2025; Vorsah & Oppong, 2024).

Academic engagement represents another critical construct linking instructional approaches to learning outcomes. Engagement encompasses behavioral participation, emotional investment, and cognitive effort in academic activities (Haseli Songhori & Salamti, 2024). Empirical findings indicate that both self-regulated and collaborative learning significantly enhance students' academic engagement, which in turn mediates the relationship between instructional practices and academic performance (Acosta-Gonzaga, 2023; Haseli Songhori & Salamti, 2024). Engaged learners demonstrate greater persistence, higher achievement, and more positive attitudes toward learning, underscoring the centrality of engagement in educational effectiveness.

Despite the growing body of international research supporting self-regulated and collaborative learning, contextual and curricular variations necessitate empirical investigation within specific educational settings. Higher education institutions differ in curricular structure, instructional culture, and student characteristics, all of which may influence the effectiveness of learning approaches (Lazareva, 2025; Mary & Sadiatanimot, 2025). In particular, curriculum-related courses in teacher education programs require pedagogies that not only transmit theoretical knowledge but also cultivate reflective practice, autonomy, and collaborative competence. However, empirical evidence comparing the effectiveness of self-regulated and collaborative learning within curriculum planning courses remains limited, especially in non-Western higher education contexts.

Furthermore, recent research emphasizes the importance of evaluating instructional interventions using rigorous quasi-experimental designs and multivariate analytical approaches to isolate the effects of learning methods from confounding variables (Park & Kim, 2022; Theobald, 2021). Controlling for learner characteristics such as gender and prior achievement is essential to ensure the internal validity of findings and to provide robust evidence for instructional decision-making. Such methodological rigor is particularly important in applied educational research aimed at informing curriculum design and teaching practice.

In light of these considerations, there is a clear need for empirical studies that systematically compare self-regulated learning and collaborative learning approaches within university-level curriculum courses, examine their effects on academic achievement, and contribute context-sensitive evidence to the broader literature on active learning and instructional effectiveness (Jorjani, 2024; Mugabekazi et al., 2025). Addressing this gap can support educators and policymakers in selecting pedagogical strategies that align with course objectives, learner needs, and institutional resources.

Accordingly, the aim of the present study is to examine and compare the effectiveness of self-regulated learning and collaborative learning approaches in teaching a university-level curriculum planning course on students' academic achievement.

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2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental design of the pretest–posttest type with control groups and follow-up. Within this design, the effectiveness of two instructional approaches—self-regulated learning and cooperative learning—in the curriculum planning course on students' academic achievement was examined. For this purpose, three classes (groups) were considered: a cooperative learning group, a self-regulated learning group, and a control group. Assessments were conducted at two time points: pretest (Week 0) and posttest (end-of-semester week), in order to compare initial changes and to examine the stability of the effects of the interventions.

The statistical population of the study consisted of all educational sciences students at Islamic Azad University in Tehran Province during the first semester of the 2025–2026 academic year who had enrolled in the curriculum planning course. Three classes were randomly selected as separate groups, and the required data were collected in coordination with the course instructors. Given that the present study adopted a quasi-experimental design and considering that a minimum sample size of 30 participants in experimental and control groups is recommended for quasi-experimental studies (Delavar, 2007), the total sample size was determined to be 97 students. Accordingly, 33 students were assigned to the cooperative learning group, 29 students to the self-regulated learning group, and 34 students to the control group (traditional learning). Participants were randomly selected from among the classes offered at Islamic Azad University campuses in Tehran. Sampling was conducted using a purposive/convenience approach from eligible university units. Following initial screening and coordination with faculty members and educational deputies of the selected units, participants entered the study. The simple random assignment of these classes into the three main groups was an appropriate measure to ensure a relatively balanced distribution of students with low, moderate, and high academic levels across the classes (groups). This balance was confirmed based on pretest scores (classification of students into moderate and high levels), thereby ensuring group equivalence.

At the outset, and in order to implement the study, coordination was carried out with the Central Organization of Islamic Azad University in Tehran, and the necessary research permissions were obtained. After identifying university units offering educational sciences programs, the researcher visited the selected campuses and randomly assigned the selected classes at the beginning of the first semester of the current academic year into three main groups. Following coordination with instructors and the provision of necessary training related to the instructional approaches for the experimental groups (cooperative and self-regulated learning) and the control group (traditional learning), the pretest was administered simultaneously under identical conditions. Prior to administering the pretest, the purpose of the study was explained to the students, and informed consent was obtained to ensure voluntary participation. After the pretest, no additional instructional intervention was applied in the control group (traditional learning), and instruction was delivered by instructors using conventional teaching methods, with students engaging in learning according to their abilities, interests, and motivation. In the first experimental group (cooperative learning), students with low, moderate, and high academic levels were proportionally assigned to six groups of five to six members each. Based on the course schedule, the first 40 minutes of each session were devoted to instructor-led teaching. During the remaining time (approximately 40–50 minutes), students engaged in team-based and cooperative study and learning activities within a specified time frame. In the second experimental group (self-regulated learning), students received instruction in self-regulated learning strategies using a structured instructional package. This training was conducted over one month in eight 60-minute sessions, with two sessions per week, to facilitate and monitor students' learning of the course content.

2.2. Measures

Multiple instruments were used in this study to collect data. Accordingly, a pretest (Week 0) and a posttest (end-of-semester week) were administered to compare initial changes and to assess the stability of the intervention effects. Initially, a pretest consisting of 60 standardized multiple-choice items selected from the item bank related to the curriculum planning course (correct = 1, incorrect = 0) was administered with the assistance of subject-matter experts to determine whether there were differences in students' academic achievement prior to the intervention. The main instrument of the study was a researcher-developed test used as the posttest to assess academic achievement and effective learning in the curriculum planning course. This test included 60 researcher-developed items designed based on the practical and theoretical objectives of the course and

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aimed to assess nine core elements: objectives and goals, content, materials and resources, activities, teaching strategies, evaluation, grouping, time, and space. The items were designed in a four-option multiple-choice format with only one correct answer (correct = 1, incorrect = 0). To establish content validity, four experienced faculty members in educational sciences were asked to review the instrument and provide their expert opinions. After incorporating minor revisions suggested by these experts, the instrument was re-evaluated. To enhance measurement accuracy and increase the reliability of the test, the researcher-developed academic achievement questionnaire was pilot-tested on 30 students, yielding a Cronbach's alpha coefficient of 0.76.

2.3. Intervention

The self-regulated learning intervention was implemented through a structured eight-session protocol designed to systematically develop learners' motivational, cognitive, and metacognitive competencies. In the first session, the study was introduced, participant roles were clarified, rapport and learning motivation were established, the objectives and instructional rules of the program were explained, the instructional method was described, and the pretest was administered. The second session focused on training personal goal-setting and individualized planning strategies to help students clarify learning objectives and organize their academic activities. Sessions three to five were devoted to cognitive learning strategies: session three addressed rehearsal and repetition strategies applicable to both simple and complex tasks through illustrative examples; session four emphasized elaboration strategies and meaningful expansion of content for different task complexities; and session five focused on organization strategies, including structuring and categorizing information to enhance comprehension and retention. In the sixth session, metacognitive strategies related to self-knowledge and self-control—such as commitment, learning attitudes, and attentional regulation—were taught. The seventh session addressed metacognitive process regulation strategies, including planning, monitoring and evaluation, and self-regulation of learning activities. The final session was dedicated to feedback provision, addressing learners' questions, clarifying difficulties, and consolidating the acquired self-regulated learning strategies to support their application in academic contexts.

2.4. Data Analysis

To analyze the data and evaluate the effects of the learning approaches, appropriate statistical tests were employed, with a specific focus on changes between groups at the pretest and posttest stages. Initially, preliminary statistical testing procedures were conducted to ensure that the assumptions underlying the statistical analyses were met.

Prior to data analysis, several preliminary tests were conducted. The Shapiro–Wilk test was used to assess the normality of the data, the F-test was applied to examine the homogeneity of regression coefficients, Levene's test was used to evaluate the homogeneity of variances across groups, and Box's M test was employed to assess the homogeneity of covariance matrices among the groups.

For the main data analyses, multivariate analysis of variance (MANOVA) and multivariate analysis of covariance (MANCOVA) were employed. These analyses examined changes in academic achievement across the three main groups under study. The analyses specifically focused on comparisons of group means with respect to the effect of time (pretest–posttest) and the effect of the control variable (gender). All analyses were conducted using SPSS version 27.

3. Findings and Results

Before conducting inferential tests to compare the groups, the normality of the distribution of the collected data was examined using the Kolmogorov–Smirnov and Shapiro–Wilk tests. The results indicated that, for all variables, the significance levels of the tests were greater than the threshold value of 0.05. Therefore, no statistically significant difference was observed between the empirical data distributions and the normal distribution, and the data distributions in the three study groups (self-regulated learning, cooperative learning, and control [traditional learning]) can be considered normal. Accordingly, the use of parametric tests to compare group means is conceptually and statistically justified. Prior to inferential analyses, however, descriptive statistics of the data are presented in Table 1.

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Table 1

Descriptive Statistics of Academic Achievement in the Experimental and Control Groups (Pretest–Posttest)

Variable	Group	n	Pretest (M ± SD)	Posttest (M ± SD)
Academic Achievement	Cooperative Learning	33	34.22 ± 2.87	46.28 ± 3.11
	Self-Regulated Learning	29	30.09 ± 2.63	50.03 ± 2.61
	Control (Traditional Learning)	34	31.38 ± 2.78	39.29 ± 1.78

Based on the descriptive results presented in Table 2, the pattern of mean changes indicates notable differences between the experimental and control groups from pretest to posttest. For the academic achievement variable, both the cooperative learning and self-regulated learning groups demonstrated substantial increases in posttest mean scores compared with pretest scores, whereas the control group showed only a minimal increase with no meaningful change. This descriptive pattern not only supports the overall effectiveness of the learning approaches compared with no intervention (continuation of the traditional method), but also suggests that, to more precisely examine between-group differences and to control for pretest scores, the application of multivariate inferential tests such as MANOVA and MANCOVA is necessary and methodologically justified.

Next, given that one of the fundamental assumptions of covariance analysis is the homogeneity of regression coefficients across groups—meaning that the relationship between the covariate and the dependent variable should be equivalent across groups and that there should be no interaction between the independent variable and the covariate—the interaction effect between the independent variable (group) and the covariate (pretest) was examined. If this interaction is statistically significant, the assumption of homogeneity of regression slopes would be violated. To test this assumption, an F-test for the interaction effect between the research variable and the pretest scores was conducted. The obtained value was $F = 0.37$ with a significance level of $p = 0.369$, which is not statistically significant. This result indicates that the regression coefficients do not differ significantly across groups and that the assumption of homogeneity of regression coefficients is satisfied, as shown in Table 2.

Table 2

Test of Homogeneity of Regression Coefficients

Source	Sum of Squares	df	Mean Square	F	Sig.
Group	1.23	2	2.86	1.00	0.521
Pretest	126.50	2	126.05	109.07	< .001
Group × Pretest	0.46	2	0.46	0.37	0.369
Error	41.29	49	2.86		

In the subsequent inferential analyses, MANOVA was first conducted to determine whether the type of learning led to statistically significant differences in the pattern of academic achievement. Then, to examine the persistence of learning effects after controlling for demographic covariates, multivariate analysis of covariance (MANCOVA) was employed with gender and age as control variables. These analytical steps increase the precision of testing the main hypothesis and prevent the confounding effects of demographic factors on the outcomes of the learning approaches, thereby substantially strengthening the internal validity of the findings from both methodological and theoretical perspectives.

Table 3

Multivariate Test Results for the Effect of Group (MANOVA)

Effect	Test Statistic	Value	F	Hypothesis df	Error df	Sig.	Partial η^2
Group	Pillai's Trace	1.027	51.208	3	182	< .001	0.496

The multivariate MANOVA results presented in Table 3 confirm a strong and statistically significant effect of learning group on academic achievement. These findings indicate substantial differences among the three learning

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groups (cooperative learning, self-regulated learning, and control/traditional learning). The large effect size (partial $\eta^2 = 0.496$) suggests that approximately 49% of the variance in posttest outcomes is explained by membership in the learning groups (cooperative and self-regulated). Accordingly, the prerequisite for proceeding to univariate analyses was met, and in the next step, univariate tests were conducted to determine the independent contribution of the dependent variable. The results are presented in Table 4.

Table 4

Univariate Test Results for the Effect of Group on the Dependent Variable (Posttest)

Dependent Variable	Source	Sum of Squares	df	Mean Square	F	Sig.	Partial η^2
Posttest	Group	329.385	2	129.631	110.143	< .001	0.635
	Error	156.000	91	1.512			

The univariate test results indicated that the effect of group on the dependent variable at the posttest stage was statistically significant. Specifically, a significant difference was observed among the three learning groups, $F(2, 91) = 110.14$, $p < .001$, partial $\eta^2 = 0.635$, indicating a very large effect of the learning approaches on academic achievement. Given the significance of the overall group effect, post hoc comparisons were conducted in the next step to determine the specific pattern of differences between the learning groups.

Table 5

Post Hoc Comparisons Using the Bonferroni Test

Dependent Variable	(I) Group	(J) Group	Mean Difference (I–J)	SE	Sig.	95% CI Lower	95% CI Upper
Posttest	Cooperative (M)	Self-Regulated (KH)	0.89	0.307	0.043	0.03	1.51
		Control	4.26	0.307	< .001	3.26	4.95
	Self-Regulated (KH)	Cooperative (M)	0.89	0.307	0.043	0.03	1.51
		Control	4.53	0.311	< .001	4.07	5.56
	Control	Cooperative (M)	−4.26	0.307	< .001	−4.95	−3.26
		Self-Regulated (KH)	−4.53	0.311	< .001	−5.56	−4.07

The Bonferroni post hoc test results indicate that the self-regulated learning group (KH) showed a small but statistically significant increase in academic achievement compared with the cooperative learning group (M), MD = 0.89, SE = 0.307, p = 0.043, 95% CI [0.03, 1.51]. However, both experimental groups demonstrated highly significant improvements in academic achievement compared with the traditional learning control group (cooperative vs. control: MD = 4.26, $p < .001$; self-regulated vs. control: MD = 4.53, $p < .001$). These findings indicate the strong effectiveness of both learning approaches in enhancing academic achievement, while the superiority of self-regulated learning over cooperative learning is small in magnitude and marginal in practical terms.

Overall, this pattern suggests that both cooperative learning and self-regulated learning methods, compared with the control group, exhibited significant and nearly equivalent effectiveness in improving academic achievement (an increase of approximately 4.5 points). The observed difference favoring self-regulated learning was statistically limited and does not provide conclusive evidence for the clear superiority of one approach over the other.

After establishing differences among the three groups, multivariate analysis of covariance (MANCOVA) was conducted to examine the net effect of the learning approaches while controlling for the role of gender. This analysis assessed whether the observed differences in academic achievement remained statistically significant after controlling for gender effects. The results are presented in Table 6.

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Table 6

Multivariate Test Results for the Effect of Group (MANCOVA)

Test	Value	F	Hypothesis df	Error df	Sig.	Partial η^2
Pillai's Trace	1.334	82.214	3	198	< .001	0.567
Wilks' Lambda	0.015	204.805	3	196	< .001	0.712
Hotelling's Trace	41.099	1031.161	3	194	< .001	0.729
Roy's Largest Root	59.556	1860.498	2	99	< .001	0.780

The MANCOVA results, controlling for gender, demonstrated that the effect of learning groups on the dependent variable of academic achievement remained highly significant and strong. The Pillai's Trace test (Pillai's Trace = 1.334, $F(3, 198) = 82.214$, $p < .001$) with a large effect size (partial $\eta^2 = 0.567$) confirms that even after removing gender-related differences, the learning approaches continued to produce significant differences. Accordingly, students' gender had no meaningful effect on the obtained scores or academic achievement. The large effect size further indicates that approximately 56% of the shared variance in posttest outcomes is attributable to membership in the learning groups. The convergence of all four multivariate indices (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root), with very large effect sizes (η^2 ranging from 0.56 to 0.78), reflects the robustness and stability of the findings.

4. Discussion and Conclusion

The findings of the present study demonstrated that both self-regulated learning and collaborative learning approaches led to statistically significant improvements in students' academic achievement in the curriculum planning course compared with the traditional instructional method. The multivariate and univariate analyses consistently showed that participation in active learning environments accounted for a substantial proportion of variance in posttest academic achievement, indicating the strong pedagogical impact of these approaches. This overall pattern aligns with a large body of prior research emphasizing that learner-centered and active instructional strategies are more effective than teacher-centered methods in promoting meaningful learning outcomes in higher education (Group, 2024; Song & Cai, 2024). The results support the theoretical assumption that learning environments which engage students cognitively, behaviorally, and motivationally facilitate deeper processing of course content and more durable academic gains.

More specifically, the significant improvement observed in the self-regulated learning group is consistent with extensive empirical evidence highlighting the central role of self-regulation in academic success. Self-regulated learning equips students with the ability to set goals, plan learning activities, monitor progress, and evaluate outcomes, thereby fostering autonomy and sustained engagement with academic tasks (Cassady et al., 2022; Theobald, 2021). The large effect size associated with group membership suggests that structured training in self-regulated learning strategies can substantially enhance students' capacity to manage complex curricular content. Similar findings have been reported in studies demonstrating that self-regulated learning skills predict long-term academic performance, persistence, and successful degree completion (Park & Kim, 2022; Puntularb et al., 2021). The present results extend this evidence by confirming the effectiveness of self-regulated learning within the specific context of a curriculum planning course, which inherently requires reflective thinking, planning, and evaluative judgment.

The collaborative learning group also showed a marked improvement in academic achievement relative to the control group, reinforcing prior research that emphasizes the academic and social benefits of collaborative instructional designs. Collaborative learning environments encourage dialogue, peer explanation, and shared problem solving, which contribute to the co-construction of knowledge and the development of higher-order thinking skills (Taggart & Wheeler, 2023; Ülker & Bodemer, 2023). Empirical studies across disciplines have demonstrated that collaborative learning enhances students' understanding of complex concepts, improves communication skills, and fosters academic engagement (Qureshi et al., 2023; Ranjeh et al., 2023). The current findings corroborate these results and suggest that collaborative learning is a viable and effective approach for teaching curriculum-related content at the university level.

Although the self-regulated learning group demonstrated a slightly higher mean posttest score than the collaborative learning group, the difference between the two experimental

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conditions was small and of limited practical magnitude. This pattern suggests that while self-regulated learning may provide a marginal advantage in fostering individual academic control and performance, collaborative learning offers comparable benefits through social interaction and shared cognitive processing. This finding is consistent with prior studies indicating that both approaches are effective, but operate through partially different mechanisms (Digenti, 2025; Yang, 2023). From a theoretical perspective, self-regulated learning emphasizes individual agency and metacognitive control, whereas collaborative learning foregrounds social mediation and interpersonal regulation of learning processes. The near-equivalence of outcomes observed in this study supports the view that these approaches should be regarded as complementary rather than hierarchical.

The robustness of the results was further supported by the multivariate covariance analysis controlling for gender, which showed that the significant effects of learning approach on academic achievement persisted after accounting for demographic differences. This finding suggests that the benefits of self-regulated and collaborative learning are broadly applicable across male and female students and are not contingent on gender-related learning differences. Such results are consistent with prior research indicating that when learning environments are well-structured and strategy-focused, individual differences such as gender exert minimal influence on academic outcomes (Haseli Songhori & Salamti, 2024; Park & Kim, 2022). The large effect sizes observed across multiple multivariate indices further underscore the internal consistency and stability of the findings.

The present findings can also be interpreted through the lens of academic engagement, which has been identified as a key mediating variable between instructional practices and learning outcomes. Active learning environments, including self-regulated and collaborative learning, are known to enhance behavioral, cognitive, and emotional engagement, which in turn leads to improved academic performance (Acosta-Gonzaga, 2023; Haseli Songhori & Salamti, 2024). By actively involving students in goal setting, peer interaction, and reflective evaluation, the instructional approaches examined in this study likely increased students' sense of ownership and investment in the learning process. This interpretation is consistent with studies showing that engaged learners demonstrate higher persistence, greater motivation, and stronger academic achievement across university contexts (Jeon, 2025; Morelli et al., 2023).

Furthermore, the findings resonate with recent research highlighting the importance of aligning instructional strategies with the cognitive and professional demands of specific courses. Curriculum planning courses require students to integrate theoretical knowledge with practical decision-making, analyze educational objectives, and evaluate instructional designs. Such demands are well-matched with pedagogies that emphasize self-regulation and collaboration, as these approaches foster reflective thinking, strategic planning, and perspective-taking (Jorjani, 2024; Lazareva, 2025). The effectiveness of both approaches in the present study suggests that curriculum-related courses may particularly benefit from instructional designs that move beyond content transmission toward active knowledge construction.

In addition, the results align with emerging evidence on the role of technology and innovation in supporting active learning. Although the present study did not explicitly focus on digital tools, prior research indicates that self-regulated and collaborative learning are especially effective in technology-enhanced and blended environments, where learners must independently manage learning tasks while engaging with peers through interactive platforms (Fangzhou et al., 2025; Vorsah & Oppong, 2024). The current findings therefore provide a pedagogical foundation for integrating these approaches into more technologically mediated instructional contexts.

Taken together, the results of this study contribute to the growing body of literature supporting active, learner-centered pedagogies in higher education. By empirically demonstrating that both self-regulated learning and collaborative learning significantly enhance academic achievement in a curriculum planning course, the study offers context-specific evidence that complements prior international research (Mugabekazi et al., 2025; Taghavizadeh Golpayegani, 2023). Importantly, the findings suggest that instructional effectiveness is not solely dependent on the adoption of a single "best" method, but rather on the thoughtful alignment of pedagogical strategies with course objectives, learner characteristics, and institutional contexts.

Despite the strengths of the present study, several limitations should be acknowledged. First, the quasi-experimental design, while methodologically appropriate for educational settings, limits the ability to make strong causal inferences compared with fully randomized controlled trials. Second, the sample was drawn from a specific academic discipline and institutional context, which may constrain the

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generalizability of the findings to other universities, fields of study, or cultural settings. Third, the study relied primarily on academic achievement scores as the outcome measure, and did not directly assess other important variables such as learning motivation, self-efficacy, or long-term retention. Finally, the duration of the intervention was relatively short, and longer-term follow-up assessments were not conducted to examine the sustainability of learning gains over time.

Future research should build on the present findings by employing longitudinal designs to examine the long-term effects of self-regulated and collaborative learning on academic achievement, retention, and professional competencies. Comparative studies across different disciplines and institutional contexts would help clarify the boundary conditions under which each approach is most effective. In addition, future studies could incorporate mixed-methods designs to capture students' perceptions, experiences, and reflective processes, thereby providing a more comprehensive understanding of how and why these learning approaches influence academic outcomes. Investigating the combined or hybrid implementation of self-regulated and collaborative learning within technology-enhanced environments also represents a promising avenue for further inquiry.

From a practical perspective, the findings of this study suggest several implications for instructional practice in higher education. University instructors are encouraged to incorporate structured self-regulated learning activities, such as goal-setting exercises, reflective journals, and self-monitoring tools, into curriculum-related courses. At the same time, well-designed collaborative learning tasks that promote equitable participation, clear roles, and meaningful interaction should be integrated to enhance social learning and engagement. Faculty development programs can play a critical role in equipping instructors with the pedagogical skills needed to effectively implement these approaches. Finally, curriculum designers and educational policymakers should consider supporting instructional models that balance individual self-regulation with collaborative knowledge construction in order to foster both academic achievement and transferable learning skills.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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