International Journal of Education, Modern Management, Applied Science & Social Science (IJEMMASSS)
An International Quarterly bi-lingual Multidisciplinary Double Blind Open Access Peer Reviewed Refereed Journal
ISSN:2581-9925, Impact Factor (Cosmos: 7.555 & I2OR: 5.105), Volume 08, No. 03(I), July-September, 2026, pp. 108-114

Effect of the Flipped Instructional Strategy Integrated with the Jigsaw Technique on Student's Self-Regulation among Secondary School Students in Social Science

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Citation: Kauts, A. & Kaur, A. (2026). Effect of the Flipped Instructional Strategy Integrated with the Jigsaw Technique on Student's Self-Regulation among Secondary School Students in Social Science. International Journal of Education, Modern Management, Applied Science & Social Science, 08(03(I)), 108–114. https://doi.org/10.62823/IJEMMASSS/8.3(I).9244

ABSTRACT

Self-regulation is a fundamental competency that enables students to plan, monitor, and evaluate their learning processes, thereby supporting academic performance and lifelong learning. The present study examined the effect of the Flipped Instructional Strategy integrated with the Jigsaw Technique on secondary school student's Self-Regulation in Social Science. A 2 × 2 factorial pre-test–post-test experimental design was employed with 550 Class IX students selected from four CBSE-affiliated secondary schools in Amritsar, Punjab, India. The participants were equally divided into an experimental group (n = 275) and a control group (n = 275). The experimental group was taught through the Flipped Instructional Strategy integrated with the Jigsaw Technique for 51 instructional days, whereas the control group received instruction through the Traditional Teaching Strategy. Student's Self-Regulation was measured using the Student's Self-Regulation Scale developed by Gupta and Mehtani (2017). Data were analysed using descriptive statistics, an independent samples t-test, and two-way analysis of variance (ANOVA). The findings revealed significantly higher self-regulation among students in the experimental group than those in the control group. Girls also obtained significantly higher self-regulation scores than boys. Further, a significant interaction effect between instructional strategy and gender was observed, indicating that the effect of instructional strategy on self-regulation varied according to gender. The findings suggest that integrating flipped learning with cooperative learning provides opportunities for independent preparation, peer teaching, collaboration, and reflection, thereby supporting the development of student's Self-Regulation. The study concludes that the Flipped Instructional Strategy integrated with the Jigsaw Technique is an effective learner-centred approach for promoting self-regulation among secondary school students in Social Science.

***Keywords**: Flipped Instructional Strategy, Jigsaw Technique, Self-Regulation, Secondary School Students, Social Science, Cooperative Learning.*

Introduction

The ability to regulate one's own learning has become a fundamental requirement in contemporary education. Rapid technological advancement, changing classroom practices, and the increasing emphasis on lifelong learning have shifted the focus of education from teacher-centred instruction to learner-centred approaches that foster independence, critical thinking, and active participation. The National Education Policy 2020 emphasises holistic, learner-centred, competency-based, and experiential education, with greater emphasis on critical thinking, problem-solving, and the

development of learners' capacities beyond rote learning (Ministry of Education, Government of India, 2020). Among the competencies required for academic success, self-regulation has emerged as one of the most important because it enables learners to plan, monitor, control, and evaluate their learning behaviours in order to achieve academic goals (Panadero, 2017; Zimmerman, 2002).

Self-regulation refers to learners' active management of cognitive, motivational, and behavioural processes during learning (Pintrich, 2004; Zimmerman, 2008). Students with strong self-regulatory skills establish learning goals, employ appropriate strategies, monitor their progress, seek assistance when necessary, and reflect upon their performance to improve future learning. Research has consistently shown that self-regulation is positively associated with academic achievement, motivation, persistence, and problem-solving abilities (Schunk & Greene, 2018; Zimmerman, 2002). Consequently, developing self-regulation has become an important objective of school education.

Traditional classroom instruction, however, often provides limited opportunities for students to assume responsibility for their own learning. Teacher-centred approaches generally emphasise the transmission of information, while students remain passive recipients of knowledge. Such instructional environments may restrict independent thinking, collaborative learning, and reflective practice, all of which are essential for developing self-regulation. These limitations have encouraged educators to adopt learner-centred instructional strategies that actively engage students in the learning process (Hattie, 2023). The National Curriculum Framework for School Education 2023 also emphasises active participation, conceptual understanding, inquiry, discussion, application, and reflection as important aspects of learning, particularly at the Secondary Stage (NCERT, 2023).

One such approach is the Flipped Instructional Strategy, which reverses the traditional sequence of teaching and learning (Bergmann & Sams, 2014). Instead of introducing new concepts during classroom instruction, students access instructional materials before class through digital resources such as recorded video lectures, presentations, or other online learning materials. Classroom time is then devoted to discussion, collaborative learning, problem-solving, and application-based activities under the guidance of the teacher. This instructional model enables students to learn at their own pace before class while allowing teachers to facilitate deeper learning during face-to-face sessions. The integration of technology into education can provide flexible and engaging learning opportunities when it is used appropriately to support teaching and learning (UNESCO, 2023). Previous studies have reported that flipped learning enhances academic achievement, classroom engagement, learning motivation, critical thinking, learner autonomy, and self-directed learning (Akçayır & Akçayır, 2018; Hew et al., 2021; Lo & Hew, 2017; van Alten et al., 2019).

Another widely recognised learner-centred approach is the Jigsaw Technique, a cooperative learning strategy in which each student becomes responsible for mastering a particular segment of the learning content and subsequently teaching it to peers within a small group. This strategy promotes positive interdependence, individual accountability, communication, and collaborative problem-solving (Johnson et al., 2014). Research has demonstrated that the Jigsaw Technique improves academic performance, classroom participation, interpersonal relationships, and students' confidence while encouraging active involvement in learning (Aronson, 1978; Johnson et al., 2014). Such collaborative and participatory learning experiences are also consistent with the learner-centred and experiential orientation promoted in contemporary school education (NCERT, 2023).

Although both instructional approaches have independently demonstrated positive educational outcomes, their integration offers additional pedagogical advantages. In an integrated learning environment, students first develop foundational knowledge through pre-class learning resources and subsequently reinforce that knowledge through collaborative discussion, peer teaching, and group activities in the classroom. This sequence encourages learners to prepare before class, monitor their understanding, explain concepts to peers, evaluate their learning, and receive immediate feedback from both teachers and classmates. Such learning experiences are closely aligned with the essential components of self-regulation, including goal setting, strategic planning, self-monitoring, self-evaluation, and reflective learning (Panadero, 2017; Zimmerman, 2002).

Although a growing body of research has established the effectiveness of flipped learning and cooperative learning independently, relatively few empirical studies have examined the combined effect of the Flipped Instructional Strategy integrated with the Jigsaw Technique on Student's Self-Regulation, particularly within the Indian school context and Social Science education (Akçayır & Akçayır, 2018; Hew et al., 2021; Zainuddin et al., 2019). Most existing studies have focused primarily on academic

achievement or student engagement, leaving self-regulation comparatively underexplored (Chen et al., 2018; Rasheed et al., 2020). This research gap highlights the need for further investigation into the effectiveness of integrating these instructional approaches to promote students' self-regulatory abilities.

The relevance of such investigation is particularly evident in the Indian secondary education context. The National Education Policy 2020 and the National Curriculum Framework for School Education 2023 emphasise competency-based, experiential, inquiry-oriented, and learner-centred approaches that encourage students to become active participants in the learning process (Ministry of Education, Government of India, 2020; NCERT, 2023). These policy and curricular directions provide a strong educational rationale for examining instructional approaches that can foster students' independent and self-regulated learning.

Accordingly, the present study examined the effect of the Flipped Instructional Strategy integrated with the Jigsaw Technique on Student's Self-Regulation among secondary school students in Social Science. By providing empirical evidence from an experimental investigation conducted in Indian secondary schools, the study seeks to contribute to the growing literature on learner-centred pedagogies and offer practical implications for teachers, curriculum developers, and educational policymakers striving to enhance students' independent learning skills.

Objectives and Hypotheses

- **Objectives**

  The study was designed to attain the following objectives:

  - To study the effect of the Flipped Instructional Strategy integrated with the Jigsaw Technique on student's Self-Regulation in relation to gender.

- **Hypotheses**

  The following hypotheses were formulated to test the above mentioned objectives:

H_{01}: There exists no significant difference between experimental and control group on the scores of student's self-regulated learning.

H_{02}: There exists no significant difference between boys and girls on the scores of student's self-regulated learning.

H_{03}: There exists no interaction between instructional strategies and gender of the students on the basis of student's self-regulated learning.

Methodology

- **Research Design**

The study employed a 2 × 2 factorial pre-test–post-test experimental design to examine the effect of instructional strategy and gender on secondary school student's Self-Regulation. The independent variable was the instructional strategy with two levels: Flipped Instructional Strategy integrated with the Jigsaw Technique and the Traditional Teaching Strategy. Gender (boys and girls) served as the classificatory variable, while student's Self-Regulation was the dependent variable. The design enabled the examination of the main effects of instructional strategy and gender, as well as their interaction effect on self-regulation.

- **Sample**

The study was conducted among 550 Class IX students enrolled in four CBSE-affiliated secondary schools in Amritsar, Punjab, India. Using the lottery method of random sampling, students were assigned to an experimental group (n = 275) and a control group (n = 275). Both groups were comparable at the pre-test stage, supporting the interpretation of post-test differences in relation to the instructional intervention.

- **Tool Used**

  The following instructional and measurement tools were used in the study:

  - TOOL 1: Instructional Material based on Flipped Instructional Strategy Integrated with the Jigsaw Technique in Social Science (Developed by the Investigator)
  - TOOL 2: Instructional Material based on Traditional Teaching Strategy in Social Science (Developed by the Investigator)
  - TOOL 3: Student's Self-Regulation Scale (Dr. Madhu Gupta & Dimple Mehtani, 2017)

- **Experimental Procedure**

Before the intervention, both groups were administered the self-regulation scale as a pre-test to determine baseline equivalence. The experimental group was then taught selected Social Science chapters using the Flipped Instructional Strategy integrated with the Jigsaw Technique for 51 instructional days. Students accessed teacher-prepared digital learning materials before attending class. During classroom sessions, they participated in Jigsaw-based cooperative learning activities in which each member assumed responsibility for mastering and teaching a specific portion of the lesson to peers. The teacher acted primarily as a facilitator by guiding discussions, clarifying misconceptions, and providing feedback. In contrast, the control group received instruction on the same content through the Traditional Teaching Strategy, consisting mainly of classroom lectures, teacher explanations, textbook-based learning, and question-answer sessions. Following completion of the instructional programme, both groups were administered the self-regulation scale as a post-test.

- **Statistical Techniques**

The following statistical techniques were used to test the hypotheses:

- Descriptive statistics techniques such as mean, standard deviation, skewness and kurtosis were used to see the nature of distribution of the scores.
- A Two-Way Analysis of Variance (2×2 Factorial ANOVA) was employed to examine the main and interaction effects of instructional strategy and gender.
- Independent samples *t*-test was employed to test the significance of difference between the means of the experimental and control groups and between boys and girls.
- Graphical techniques were used for descriptive analysis and visual perception of the data.

Results

The pre-test analysis indicated that there was no statistically significant difference between the experimental and control groups on self-regulation, confirming that both groups were comparable before the implementation of the instructional intervention. The analysis of post-test scores of Student's Self-Regulation was carried out under the following three dimensions:

Main Effects

- **Main Effect of Instructional Strategy on Student's Self-Regulation (A)**

The post-test mean scores and standard deviations of the experimental and control groups were compared, and the significance of the difference was examined using an independent samples *t*-test. The descriptive results are presented in Table 1:

Table 1: Descriptive Statistics of Post-Test Student's Self-Regulation Scores by Instructional Strategy

Group	N	Mean	S.D.
Experimental	275	165.42	25.237
Control	275	149.28	28.260
Total	550	157.35	27.960

The results in Table 1 indicate that the experimental group obtained a higher mean score (M = 165.42, SD = 25.237) than the control group (M = 149.28, SD = 28.260). The obtained *t*-value was 7.065 (df = 548, Sig. = .000), indicating a statistically significant difference between the experimental and control groups. Thus, students taught through the Flipped Instructional Strategy integrated with the Jigsaw Technique demonstrated significantly higher Student's Self-Regulation than those taught through the Traditional Teaching Strategy. Accordingly, H_{01} was rejected.

- **Main Effect of Gender on Student's Self-Regulation (B)**

To examine the main effect of Gender on Student's Self-Regulation , the post-test scores of boys and girls were compared using an independent samples t-test. The results are presented in Table 2:

Table 2: Independent Samples *t*-Test for Post-Test Self-Regulation Scores

Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Post-Test Self-Regulation	2.173	.141	-2.686**	548	.007	-6.471	2.410	-11.204	-1.738

Significant at 0.01 level of significance

The results in Table 2 show that girls obtained a higher mean score (M = 161.16, SD = 26.249) than boys (M = 154.69, SD = 28.835). The obtained t-value of −2.686 was statistically significant at the .01 level (Sig. = .007), indicating a significant difference between boys and girls in Student's Self-Regulation. Thus, girls demonstrated significantly higher Student's Self-Regulation than boys. Accordingly, H_{02} was rejected.

Interaction Effect

- **Interaction Effect of Instructional Strategy and Gender on Student's Self-Regulation (A × B)**

To examine whether the effect of Instructional Strategy on Student's Self-Regulation differed according to Gender, post-test mean scores and standard deviations were computed for each combination of Instructional Strategy and Gender. The results are presented in Table 3:

Table 3: Mean and Standard Deviation of Post-Test Student's Self-Regulation Scores by Instructional Strategy and Gender

Instructional Strategy	Gender	N	Mean	S.D.
Experimental	Boys	166	164.89	25.006
Experimental	Girls	109	166.22	25.680
Control	Boys	158	143.97	28.770
Control	Girls	117	156.44	25.999

The results in Table 3 show that girls in the experimental group obtained the highest mean score (M = 166.22), followed by boys in the experimental group (M = 164.89). Boys in the control group obtained the lowest mean score (M = 143.97). The difference between the experimental and control groups was 20.92 points for boys and 9.78 points for girls.

The statistical significance of the interaction between Instructional Strategy and Gender was examined using Two-Way ANOVA. The results are presented in Table 4.

Table 4: Two-Way ANOVA of Post-Test Student's Self-Regulation Scores by Instructional Strategy and Gender

Source of variation	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	46406.176[a]	3	15468.725	22.065	.000
Intercept	13261163.022	1	13261163.022	18916.481	.000
Instructional Strategy (A)	**31336.335**	**1**	**31336.335**	**44.700**	**.000**
Gender (B)	**6336.589**	**1**	**6336.589**	**9.039**	**.003**
Instructional Strategy × Gender (A × B)	**4131.940**	**1**	**4131.940**	**5.894**	**.016**
Error	382766.494	546	701.038		
Total	14046163.000	550			
Corrected Total	429172.671	549			
a. R^2= .108 (Adjusted R^2= .103)					

Significant at 0.05 level of significance

The results in Table 4 indicate that the interaction effect of Instructional Strategy and Gender was statistically significant (F = 5.894, Sig. = .016) at the .05 level. This indicates that the effect of

Instructional Strategy on Student's Self-Regulation differed according to Gender. The results also show significant main effects of Instructional Strategy (F = 44.700, Sig. = .000) and Gender (F = 9.039, Sig. = .003). Thus, H_{03} was rejected at the .05 level of significance, indicating a significant interaction effect between Instructional Strategy and Gender on Student's Self-Regulation.

Overall, the results provide empirical evidence that integrating the Flipped Instructional Strategy with the Jigsaw Technique significantly enhances secondary school student's Self-Regulation. Students who experienced the learner-centred instructional intervention exhibited greater ability to plan, monitor, and regulate their learning than those who received conventional classroom instruction.

Discussion

The present study found that students taught through the Flipped Instructional Strategy integrated with the Jigsaw Technique obtained significantly higher self-regulation scores (M = 165.42, SD = 25.237) than those taught through the Traditional Teaching Strategy (M = 149.28, SD = 28.260). The independent samples *t*-test showed a significant difference (t = 7.065, df = 548, Sig. = .000). Therefore, H_{01} was rejected, indicating that the integrated instructional strategy was more effective in enhancing student's Self-Regulation. This finding is consistent with Akçayır and Akçayır (2018), who reported positive outcomes of flipped learning. Hew et al. (2021) also found that flipped learning supports active and learner-centred learning, while van Alten et al. (2019) reported positive learning outcomes associated with flipped classroom approaches.

The higher self-regulation of the experimental group may be attributed to opportunities for independent preparation, self-paced learning, monitoring, and evaluation. Zimmerman (2002) identified goal setting, self-monitoring, and self-evaluation as important processes of self-regulated learning. Schunk and Greene (2018) similarly emphasised learner autonomy and active participation in developing self-regulation. The Jigsaw Technique further promoted individual responsibility, peer teaching, discussion, and collaboration. Aronson (1978) highlighted individual responsibility and positive interdependence in Jigsaw learning, while Johnson et al. (2014) reported that cooperative learning promotes learner responsibility and collaborative problem-solving.

The two-way ANOVA showed a significant main effect of instructional strategy (F = 44.700, Sig. = .000), supporting the effectiveness of the integrated instructional approach. These findings are consistent with Akçayır and Akçayır (2018), Hew et al. (2021), and Zainuddin et al. (2019), who reported positive outcomes associated with flipped learning.

A significant gender difference was also observed. Female students obtained higher self-regulation scores (M = 161.16, SD = 26.249) than male students (M = 154.69, SD = 28.835), with a significant *t*-value (t = -2.686, df = 548, Sig. = .007). The ANOVA also showed a significant gender effect (F = 9.039, Sig. = .003). Therefore, H_{02} was rejected, indicating a significant difference between boys and girls in self-regulation. This finding can be viewed in relation to the role of self-regulatory processes in students' learning discussed by Panadero (2017) and Zimmerman (2008).

Finally, the Instructional Strategy × Gender interaction was significant (F = 5.894, Sig. = .016). Therefore, H_{03} was rejected, indicating that the effect of instructional strategy on self-regulation varied according to gender. The findings suggest that integrating flipped learning with theJigsaw Technique provides opportunities for independent preparation, peer learning, collaboration, and reflection, thereby supporting the development of self-regulation among secondary school students in Social Science.

Educational Implications

The findings of the present study have several implications for educational practice:

- The Flipped Instructional Strategy integrated with the Jigsaw Technique may be adopted in secondary school Social Science classrooms to promote student's Self-Regulation.
- Teachers should encourage students to engage in pre-class preparation through digital learning resources to foster independent learning habits.
- Cooperative learning activities such as the Jigsaw Technique should be incorporated into classroom instruction to enhance collaboration, accountability, and peer learning.
- Teacher education programmes should provide training on learner-centred instructional strategies and technology-integrated teaching practices.
- Curriculum developers and educational policymakers should encourage the integration of innovative instructional strategies that develop student's Self-Regulation and other twenty-first-century skills.

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