



## THE IMPACT OF ONLINE COLLABORATIVE LEARNING ON STUDENTS' ACADEMIC ENGAGEMENT IN SECONDARY SCHOOL CLASSROOM CONTEXTS

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### Abstract

*Academic engagement is a critical factor in students' learning success because it reflects behavioral participation, cognitive investment, emotional involvement, and social interaction during learning. However, many students remain passive in online learning environments, particularly when digital activities are limited to individual assignments, teacher explanation, and one-way content delivery. Online collaborative learning offers an alternative by allowing students to interact, discuss ideas, construct knowledge, solve problems, and complete shared tasks through digital platforms. This study aims to examine the impact of online collaborative learning on students' academic engagement and to explore how students experience collaborative learning in digital environments. The study employed a mixed-method design using a quasi-experimental pretest-posttest control group approach supported by classroom observations, student interviews, reflective journals, and document analysis. The participants were 80 secondary school students divided into an experimental group and a control group. The experimental group received online collaborative learning activities through group discussion forums, shared documents, peer feedback, collaborative projects, and synchronous reflection sessions, while the control group received conventional online instruction. Quantitative data were analyzed using descriptive statistics, paired-sample t-tests, independent-*

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sample *t*-tests, normalized gain scores, and effect size analysis, while qualitative data were analyzed thematically. The findings showed that online collaborative learning significantly improved students' academic engagement. Students improved in behavioral, cognitive, emotional, and social engagement through peer interaction, shared responsibility, task negotiation, feedback exchange, and group accountability. The study concludes that online collaborative learning can strengthen academic engagement when digital collaboration is structured, monitored, interactive, and supported by clear roles and assessment criteria.

**Keywords:** online collaborative learning; academic engagement; secondary students; digital learning; peer interaction

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#### A. Introduction

Academic engagement is one of the most important indicators of learning quality. Students who are academically engaged tend to participate more actively, think more deeply, and persist longer when facing learning difficulties.

In online learning environments, academic engagement becomes both more important and more difficult to sustain. Digital platforms can reduce direct social presence, making students more prone to passivity, distraction, and disengagement.

Online collaborative learning is one instructional approach that can address this challenge. It refers to learning activities in which students work together on shared tasks through digital tools such as discussion forums, shared documents, and video conferencing.

The theoretical basis of online collaborative learning can be linked to social constructivism and computer-supported collaborative learning, which view knowledge construction as a socially mediated process supported by structured peer interaction.

Student engagement research also supports the importance of interaction. Bond, Buntins, Bedenlier, Zawacki-Richter, and

Kerres (2020) found that interactive, socially connected learning environments are strongly associated with higher engagement.

Recent studies have shown that online collaborative learning can support learning engagement when interaction quality is high, though outcomes vary depending on task design, group composition, and the level of teacher facilitation.

In practice, many teachers still face difficulty implementing online collaborative learning. Group work in online settings may suffer from unequal participation, communication delay, and superficial task division rather than genuine collaboration.

In secondary school contexts, online collaborative learning is particularly relevant because students need opportunities to develop both academic competence and collaborative digital literacy skills that extend beyond a single subject.

This study addresses the following research questions: (1) does online collaborative learning significantly improve students' academic engagement; (2) which engagement dimensions improve; (3) how do students experience online collaborative learning; and (4) what implementation challenges emerge?

## **B. Method**

This study employed a mixed-method research design. The quantitative component used a quasi-experimental pretest-posttest control group design to measure effects on academic engagement, supplemented by observations, interviews, and document analysis.

The participants were 80 Grade XI students from a secondary school. Two intact classes were selected: an experimental group (40 students) and a control group (40 students), with comparable prior engagement levels.

The experimental group received online collaborative learning activities for eight meetings, conducted through discussion forums, shared documents, and structured group tasks with defined roles and deadlines.

The control group received conventional online instruction. Students accessed digital materials, listened to teacher explanations, and completed individual assignments without structured peer collaboration.

The main quantitative instrument was an Academic Engagement Scale consisting of 32 items measuring four dimensions: behavioral engagement, cognitive engagement, emotional engagement, and social engagement (reliability 0.88).

Qualitative data were collected through eight online classroom observations, semi-structured interviews with 16 students, reflective journals, and analysis of digital collaboration documents.

Quantitative data were analyzed using descriptive statistics, paired-sample t-tests, independent-sample t-tests, normalized gain scores, and Cohen's d; qualitative data were analyzed thematically and triangulated with the quantitative results.

## C. Finding and Discussion

### 1. Finding

The findings are presented in four parts. The first part reports students' academic engagement before and after the intervention. The second part explains improvement across engagement dimensions. The third part presents students' experiences during online collaborative learning. The fourth part describes implementation challenges.

The pretest results showed that the experimental and control groups had relatively similar academic engagement before the intervention, with no significant difference, confirming baseline equivalence.

After eight meetings, the posttest results showed a clear difference between the groups, with the experimental group obtaining a notably higher mean engagement score than the control group.

Table 1. Academic Engagement Scores of Experimental and Control Groups

| Group        | Test     | N  | Mean | SD   | Interpretation   |
|--------------|----------|----|------|------|------------------|
| Experimental | Pretest  | 40 | 3.06 | 0.42 | Moderate         |
| Experimental | Posttest | 40 | 4.11 | 0.39 | High             |
| Control      | Pretest  | 40 | 3.04 | 0.40 | Moderate         |
| Control      | Posttest | 40 | 3.43 | 0.45 | Moderate to high |

*Source: Processed from academic engagement scale data.*

The paired-sample t-test showed that the experimental group improved significantly from pretest to posttest,  $t(39) = 15.38$ ,  $p < .001$ , with a larger gain than the control group's improvement.

Table 2. Gain Scores and Statistical Comparison

| Indicator           | Experimental Group | Control Group | Statistical Result                |
|---------------------|--------------------|---------------|-----------------------------------|
| Mean gain           | 1.05               | 0.39          | Experimental group higher         |
| Normalized gain     | 0.54               | 0.20          | Moderate vs. low                  |
| Posttest comparison | 4.11               | 3.43          | $t(78) = 7.22$ ; $p < .001$       |
| Effect size         | -                  | -             | Cohen's $d = 1.61$ ; large effect |

*Source: Processed from pretest and posttest data.*

These findings indicate that online collaborative learning had a strong positive impact on students' academic engagement. The improvement suggests that students became more active, motivated, reflective, and socially involved when they participated in structured online collaboration.

The engagement scale measured four dimensions: behavioral engagement, cognitive engagement, emotional engagement, and social engagement. The experimental group improved across all dimensions. The highest improvement occurred in social engagement, followed by behavioral engagement, cognitive engagement, and emotional engagement.

Table 3. Engagement Dimension Scores in the Experimental Group

| Dimension             | Pretest Mean | Posttest Mean | Gain | Interpretation     |
|-----------------------|--------------|---------------|------|--------------------|
| Behavioral engagement | 3.12         | 4.19          | 1.07 | Strong improvement |
| Cognitive engagement  | 3.01         | 4.00          | 0.99 | Strong improvement |
| Emotional engagement  | 3.08         | 4.03          | 0.95 | Strong improvement |
| Social engagement     | 3.03         | 4.22          | 1.19 | Strong improvement |

*Source: Processed from academic engagement scale data.*

The improvement in social engagement was related to students' increased interaction through discussion forums, shared

documents, and video conferencing, which gave them more visible opportunities to contribute and respond to peers.

Cognitive engagement improved because students were not only asked to submit individual answers but also to explain ideas, compare perspectives, and revise group work based on peer input.

Qualitative findings revealed that students experienced online collaborative learning as more interactive, responsible, and supportive than conventional online instruction. Five major themes emerged: peer interaction, shared responsibility, active participation, feedback exchange, and digital learning confidence.

Table 4. Qualitative Themes on Students' Online Collaborative Learning Experiences

| Theme                 | Evidence from Digital Learning Practice                                 | Pedagogical Meaning                                    |
|-----------------------|-------------------------------------------------------------------------|--------------------------------------------------------|
| Peer interaction      | Students discussed ideas in forums, video meetings, and group chats     | Interaction reduced online learning isolation          |
| Shared responsibility | Students completed group roles and contributed to shared documents      | Roles increased accountability                         |
| Active participation  | Students posted comments, edited documents, and presented group outputs | Collaboration supported behavioral engagement          |
| Feedback exchange     | Students reviewed and revised peers' work using feedback forms          | Peer feedback supported cognitive engagement           |
| Digital confidence    | Students became more familiar with shared documents and online tools    | Technology use supported collaborative learning skills |

*Source: Synthesized from observations, interviews, journals, and digital documents.*

Student interviews showed that online collaborative learning made them feel more connected to classmates. Several students stated that group discussions reduced the sense of isolation common in online learning.

Reflective journals indicated that students valued peer feedback. They felt that peer comments helped them notice mistakes and improve their work in ways that individual study did not.

Digital documents showed that group collaboration varied across teams. High-engagement groups showed active editing

history and multiple rounds of revision, while low-engagement groups showed minimal shared activity.

Despite positive outcomes, several challenges emerged during implementation. The first challenge was unequal participation; some students contributed extensively while others relied on group members to complete shared tasks.

The third challenge was technical difficulty. Some students had unstable internet connections or limited access to devices, which affected their ability to participate consistently in real-time collaborative activities.

Table 5. Implementation Challenges and Teacher Responses

| Challenge                 | Classroom Evidence                                 | Teacher Response                                 |
|---------------------------|----------------------------------------------------|--------------------------------------------------|
| Unequal participation     | Some students contributed less in shared documents | Assigned roles and individual accountability     |
| Communication delay       | Group members responded late in asynchronous tasks | Set communication deadlines and progress reports |
| Technical difficulty      | Internet instability affected online meetings      | Provided flexible tools and submission options   |
| Superficial collaboration | Some groups divided tasks without discussion       | Required discussion records and peer feedback    |
| Weak feedback quality     | Some peer comments were too general                | Provided feedback sentence starters and rubrics  |

*Source: Synthesized from observations and teacher notes.*

## 2. Discussion

Findings show that online collaborative learning significantly improved students' academic engagement. The experimental group achieved higher posttest scores and gain than the control group across all measured dimensions.

The strongest improvement occurred in social engagement. This is understandable because online collaborative learning placed students in structured interaction with peers, increasing visible participation and mutual accountability.

Behavioral engagement also improved substantially. Students became more active because group roles and deadlines created accountability that individual, self-paced online tasks typically do not provide.

Cognitive engagement improved because students had to explain ideas, evaluate peers' contributions, revise group products, and reflect on feedback, requiring deeper processing than passive content consumption.

Emotional engagement also improved. Students reported that collaborative activities made online learning less lonely and more enjoyable, reducing the sense of isolation often associated with fully online instruction.

The qualitative findings explain how online collaborative learning produced engagement. Peer interaction reduced isolation, shared responsibility increased accountability, and visible group progress motivated continued participation.

However, the findings also show that online collaborative learning is not automatically effective. Unequal participation, communication delay, and superficial collaboration limited its benefits for some groups.

Unequal participation is one of the most persistent problems in group learning. In online environments, it may become more difficult to detect, since passive members can appear present without contributing meaningfully.

Communication delay also requires attention. Asynchronous collaboration provides flexibility, but it can create slow response cycles that reduce the sense of connection and momentum built during real-time discussion.

Superficial collaboration is another important issue. Students may divide tasks mechanically without discussing meaning, producing a combined product without the shared reasoning that genuine collaboration requires.

The study also indicates that teacher facilitation remains central. Technology does not replace the teacher's role; teachers need to monitor participation, structure tasks clearly, and intervene when collaboration becomes superficial or uneven.



## **D. Conclusion**

This study examined the impact of online collaborative learning on students' academic engagement in secondary school classroom contexts. The experimental group, which engaged in structured online collaborative activities, achieved significantly higher academic engagement scores than the control group, with the strongest improvement in social engagement, followed by behavioral, cognitive, and emotional engagement. Qualitative findings showed that peer interaction, shared responsibility, and visible group progress explained the improvement, while unequal participation, communication delay, and superficial collaboration emerged as implementation challenges. These findings suggest that online collaborative learning can meaningfully strengthen academic engagement, but its effectiveness depends on careful task design, clear group roles, and active teacher facilitation rather than technology alone. Future research may examine how different group compositions and task structures influence the balance of participation in online collaborative learning.

## **Declaration of AI-Assisted Technologies**

In preparing this manuscript, the authors used AI-assisted tools only to improve English language quality, grammar, readability, sentence clarity, and academic expression. The AI tools were not used to generate research data, conduct data analysis, produce findings, or draw conclusions. All conceptual arguments, data interpretation, methodological decisions, and scholarly conclusions remain the full responsibility of the authors. The authors carefully reviewed, edited, and verified all AI-assisted outputs to ensure the accuracy, integrity, and originality of the final manuscript.

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