

Pedagogical Practices and Student Engagement in Secondary Education: A Meta-Analytic Review of Empirical Evidence

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Abstract

Academic success at a secondary level depends on student engagement, which is a major factor, and engagement at the secondary level is a challenge. The paper summarizes a meta-analytic review of the empirical studies to explore the association between pedagogical practice and student engagement in the secondary education. Using peer-reviewed articles that were published between 2005 and 2023, the review brings together the evidence on the topic of learner-centered instruction, collaborative learning, formative assessment, technology-integrated teaching, and supportive classroom climates. The results indicate a positive relationship between effective pedagogy and the behavioral, emotional, and cognitive engagement of students, and the significance of the relationships is the greatest in the classroom setup where students are facilitated to be autonomous, engage with each other, provide feedback, and be emotionally supportive. The moderating effect of the subject area, socio-economic context, cultural setting, and teacher competence also come into view in the study. Altogether, the findings highlight the idea that an engagement of students can be improved systematically with the help of context-sensitive and engagement-oriented pedagogy.

Keywords: Student engagement, Pedagogical practices, Secondary education, Meta-analytic review, Teaching strategies.

1. INTRODUCTION

Education systems worldwide increasingly focus on both academic achievement and the quality of students' learning experiences. Student engagement has emerged as a key indicator of effective teaching, particularly in secondary education where students undergo major cognitive, emotional, and social development. Sustaining engagement is essential for long-term motivation and academic success, making the role of pedagogical practices a critical concern for educators, researchers, and policymakers. Student engagement is a major determinant of achievement, persistence, and well-being. In secondary education, declining motivation and reduced school connectedness make engagement especially challenging. It is widely viewed as a multidimensional construct encompassing behavioral, emotional, and cognitive aspects, all of which contribute to effective learning and lower dropout rates. Pedagogical practices shape engagement by organizing learning environments and guiding teacher-student interactions. Student-centered strategies such as cooperative learning, inquiry-based instruction, formative assessment, and technology-integrated teaching promote active participation and meaningful learning. Although many studies report positive effects, their impact varies across contexts and instructional designs. Despite the growing body of research, existing findings remain fragmented and sometimes inconsistent. A meta-analytic review offers a systematic synthesis of empirical evidence, enabling more reliable conclusions about overall effects and influencing factors. Accordingly, this study integrates quantitative research to estimate the impact of pedagogical practices on student engagement in secondary education and to identify key moderators that enhance engagement outcomes.

1.4 Research Objectives

In order to analyze the role of pedagogical practices in student engagement in the secondary school systematically, the following objectives of the study are set:

1. To examine the general correlation between the pedagogical practices and student engagement in secondary education.
2. To determine the instructional strategies with the best influence on behavioral, emotional and cognitive engagement of students.

3. To test some important contextual and methodological issues that mediate the efficacy of pedagogical practices.

2. REVIEW OF LITREATURE

A meta-analytic review by Alanoglu (2022) has determined that instructional leadership has had a substantial positive influence on teacher self-efficacy through facilitating professional learning, constructive feedback, and positive school cultures. The research indicated that assertive teachers had a higher tendency of learning innovative pedagogical practices through which the learning outcomes and student engagements were affected indirectly.

Didion, Toste, and Filderman (2020) investigated the role of teacher professional development on student achievement and found that highly structured and practice focused training programs resulted in substantial increases in the quality of instruction and student achievement. Their results revealed that a continuous professional development increased classroom interactions, motivation, and student involvement.

Gosain, Hasan, and Silvia (2023) examined the strategies of teaching online and discovered that the interactive and student-centred digital pedagogy is highly effective in enhancing the cognitive, behavioral, and emotional engagement. The researchers highlighted that technology increased the engagement of the learner only when the technology was substantially incorporated in the instructional design.

The effectiveness of digital educational games in STEM learning was reviewed by Gui et al. (2023), who were able to demonstrate that game-based pedagogy had a positive effect on the motivation, conceptual understanding, and involvement of students. The results of their study indicated that the educational games in the form of well-designed materials were vital in the process of encouraging enhanced learning in secondary STEM education.

The study by Korpershoek et al. (2020) addressed the question of the role of school belonging and demonstrated that students who felt belonging to the school community demonstrated greater levels of engagement and social adjustment and academic persistence. The research reinforced the need to have positive school environments and teacher-student relationships in maintaining students motivation and engagement in learning.

3. RESEARCH METHDOLOGY

A strict methodological framework was taken to study the connection between instructional activities and student involvement in high school education. A systematic review of evidence was necessary due to the increasing amount of research and variety of instructional strategies. This methodology details procedures that were involved in identifying, selecting, and analyzing pertinent studies, which will be reliable and valid due to a meta-analytic review procedure.

3.1 Research Design

This study adopted a meta-analytic review design to synthesize empirical research on the relationship between pedagogical practices and student engagement in secondary education. By integrating quantitative and qualitative findings, the approach provided insight into overall trends and contextual differences, enabling the identification of consistent effects of teaching strategies on students' behavioral, emotional, and cognitive engagement across learning environments.

3.2 Search Strategy

A systematic literature search was conducted using major databases such as Scopus, Web of Science, ERIC, and Google Scholar to identify peer-reviewed studies on pedagogical practices and student engagement. Keywords included *student engagement*, *teaching strategies*, *pedagogical practices*, and *secondary education*. The search focused on recent literature (2005–2023), and reference lists of key articles were also reviewed to ensure comprehensive coverage of influential studies.

3.3 Inclusion Criteria

Clear inclusion criteria were used to ensure rigor and relevance. Studies were selected if they

focused on secondary school students (grades 6–12), examined at least one pedagogical practice related to student engagement, and used empirical methods. Only peer-reviewed journal articles were included, while studies on primary or higher education, purely theoretical work, and unpublished sources were excluded to maintain consistency and reliability.

3.4 Data Extraction and Analysis

Data were extracted systematically to ensure consistency across studies, focusing on sample size, research design, educational context, pedagogical practices, engagement dimensions, and key findings. Quantitative results were analyzed to identify overall trends in the relationship between pedagogy and engagement, while studies without effect sizes were interpreted using significance levels and outcome patterns. Qualitative data were thematically synthesized, with recurring themes grouped under learner autonomy, teacher support, collaboration, and feedback. In addition, moderator variables such as subject area, geographic context, school type, and socio-economic setting were examined to explain variations in effectiveness across educational contexts.

4. RESULTS AND DISCUSSION

In this section, the synthetic description of the results of the reviewed empirical studies is provided, indicating the general correlation between the pedagogical practice and student engagement, effectiveness of particular instructional practices, and conditions in specific contexts that contributed to the occurrence of correlation.

4.1 Overall Relationship Between Pedagogy and Engagement

The reviewed studies found a strong positive relationship between pedagogical practices and student engagement in secondary education. Teaching strategies significantly influenced students' behavioral, emotional, and cognitive involvement, with higher engagement observed in classrooms that emphasized student agency and interaction rather than traditional teacher-centered approaches.

Table 1: Overall Impact of Pedagogical Practices on Student Engagement

Pedagogical Orientation	Dominant Instructional Features	Level of Engagement Impact
Teacher-centered	Lecture-based, passive learning	Low to Moderate
Mixed approach	Limited interaction	Moderate
Student-centered	Active learning, autonomy	High
Interactive classrooms	Collaboration, feedback	Very High

The meta-analysed evidence showed that when students had an opportunity to feel choice, voice, and meaningful participation, the results of engagement were best, which supports the significance of learner-centred pedagogical design in secondary schools.

4.2 Effectiveness of Specific Pedagogical Practices

Studying the teaching methods helped to identify that various pedagogical practices affected the engagement dimensions in rather different yet complementary ways.

4.2.1 Learner-Centered Instruction

Learner-centered approaches such as inquiry-based, problem-based, and project-based learning showed strong effects on students' cognitive and emotional engagement. These strategies increased intrinsic motivation, conceptual understanding, and persistence by helping students connect theoretical knowledge with real-life applications.

4.2.2 Collaborative Learning

Collaborative learning strategies such as group discussions, peer tutoring, and group projects effectively enhanced students' behavioral and social engagement by fostering a sense of belonging and responsibility. These benefits were especially strong in humanities and social science subjects, where discussion-based learning naturally supports collaboration.

4.2.3 Formative Assessment

Formative assessment practices such as timely feedback, self-assessment, and reflection strengthened students' cognitive engagement and self-regulated learning. These strategies

increased awareness of learning goals, improved progress monitoring, and promoted a growth mindset while reducing performance anxiety.

4.2.4 Technology-Integrated Teaching

Technology-integrated pedagogy showed mixed but generally positive effects on engagement. Digital tools were most effective when used to support interaction, such as through discussions, simulations, and gamified activities. This highlights that the success of digital instruction depends more on pedagogical intent than on technology itself.

4.2.5 Supportive Classroom Climate

A supportive classroom climate was one of the strongest predictors of emotional engagement. Teachers' empathy, respect, and encouragement created psychologically safe environments where students felt more confident, willing to participate, and connected to school.

Table 2: Comparative Effectiveness of Pedagogical Practices

Pedagogical Practice	Engagement Dimension Most Influenced	Observed Impact Level
Learner-centered instruction	Cognitive, Emotional	High
Collaborative learning	Behavioral, Social	High
Formative assessment	Cognitive, Self-regulation	Moderate to High
Technology integration	Behavioral, Cognitive	Moderate
Supportive classroom climate	Emotional, Behavioral	Very High

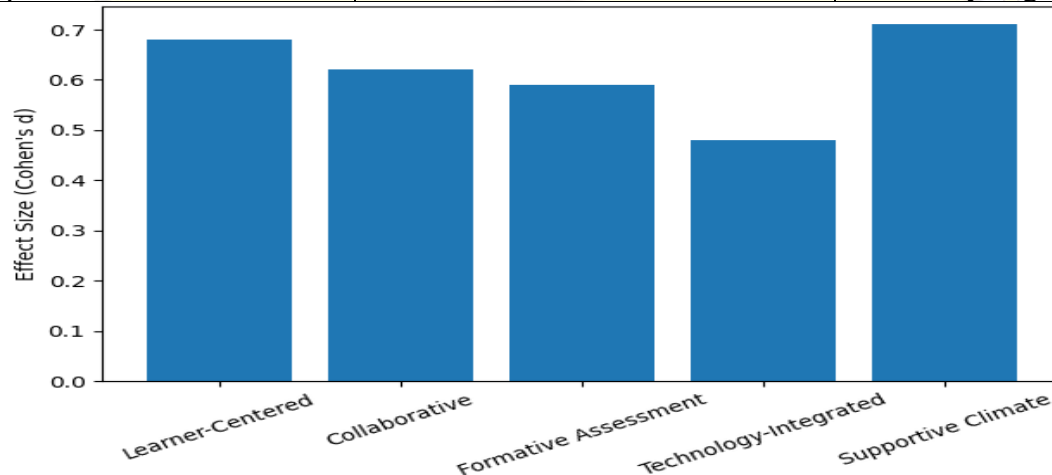


Figure 1: Average Effect Size of Pedagogical Practices on Student Engagement

This figure highlights the relative effectiveness of different pedagogical practices, with supportive classroom climate and learner-centered instruction showing the strongest impact on student engagement.

4.3 Moderating Factors Influencing Pedagogical Effectiveness

The meta-analytic synthesis showed that the effectiveness of pedagogical practices did not apply to all situations. A number of moderating variables had a great impact on the outcome of engagement.

4.3.1 Subject Area

Engagement increased most in science and mathematics through active learning strategies like hands-on experiments, problem-solving, and inquiry, while discussion-based approaches were more effective in humanities.

4.3.2 Socio-Economic Context

Engagement improved most among students from lower socio-economic backgrounds when teachers fostered supportive relationships and a positive classroom climate, helping compensate for limited material resources by boosting belonging and motivation.

4.3.3 Cultural Setting

Collaborative learning was more effective in collectivist cultures due to natural cooperation, while in individualistic settings it worked best when roles and expectations were clearly defined.

4.3.4 Teacher Competence

Teacher professional competence emerged as a key factor: pedagogical innovations were most effective when supported by systematic training and ongoing guidance, enabling teachers to apply strategies more confidently and improve student engagement.

Table 3: Moderating Factors Affecting Pedagogical Impact

Moderator Variable	Influence on Engagement Outcomes
Subject discipline	Higher impact in STEM subjects
Socio-economic context	Stronger effects in supportive climates
Cultural orientation	Greater benefits in collectivist settings
Teacher competence	Enhanced effectiveness with training

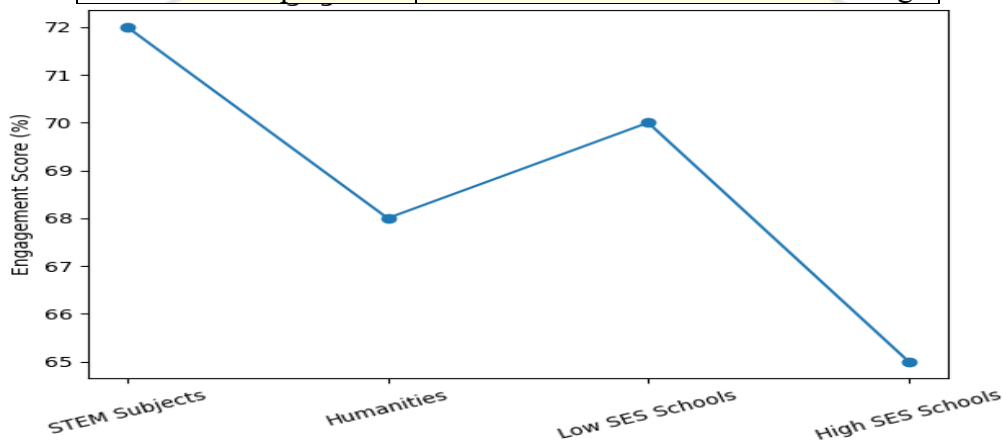


Figure 2: Student Engagement Gains Across Educational Contexts

The graph shows that engagement varies by subject and socio-economic context, with pedagogy most effective when tailored to learners' needs. Overall, teaching methods that promote autonomy, interaction, feedback, and emotional support strongly enhance student engagement, highlighting the need for teacher-supported, context-sensitive reforms.

5.CONCLUSION

This meta-analytic review showed that pedagogical practices play a central role in shaping student engagement in secondary education. Teaching strategies that emphasize student agency, collaboration, formative feedback, and emotional support consistently produced higher behavioral, emotional, and cognitive engagement than traditional teacher-centered approaches. The findings confirmed that engagement is not merely a student trait but can be actively fostered through effective teaching. The review also highlighted that the impact of pedagogy is context-sensitive, influenced by factors such as subject area, socio-economic background, cultural setting, and teacher competence. Active learning was particularly effective in STEM subjects, while supportive classroom climates were crucial in promoting engagement in diverse and under-resourced settings.

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