Enhancing Self-Regulated Learning Through Blended Learning: Insights from Educational Theories and Practices

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ARTICLE INFO | ABSTRACT

The COVID-19 pandemic has forced us to transform traditional learning methods into online or distance learning. This shift has affected not only students but also teachers and parents. Face-to-face learning was replaced by the use of platforms such as Google Classroom, WhatsApp groups, and others. Students, who previously interacted directly with teachers, had to adapt to learning through Google Classroom or WhatsApp groups. This transition required students to develop their learning patterns and self-regulated learning (SRL). By combining simple online learning via WhatsApp groups or Google Classroom with more interactive learning methods, students' SRL can be enhanced. Observations from teachers and responses from students indicate that blended learning has a positive impact on SRL among vocational high school students.

Introduction

In the past two years, the COVID-19 pandemic has necessitated numerous restrictions, significantly impacting various sectors, including education [1]-[3]. Distance learning replaced traditional face-to-face learning, with all educational activities conducted online [4]. This transition posed substantial challenges due to students' and teachers' uneven understanding

and technology usage. Distance learning often involved teachers merely delivering material via Google Classroom, followed by students completing assigned tasks. Monitoring student engagement and learning processes became increasingly difficult during the pandemic [5]. Attendance data revealed less than full participation, with presences in various sessions never being complete. Additionally, average student grades reflected the challenges faced. Table 1 shows the observation results in the vocational higher education school in Indonesia during the pandemic.

Table 1. Student Participation and Learning Achievement

No	Group	Number of Students	Attendance	Average Score
1	X TKJ 1	36	75.43%	69.2
2	X TKJ 2	36	81.21%	71.1
3	X TKJ 3	36	78.63%	73.5

Ref. [6] indicated that education increasingly leans towards open education models by implementing distance learning systems. It highlights the integration of shared learning resources among educational institutions within a network, the use of interactive information technology devices, and the gradual replacement of television and video by the Internet for optimal learning development [7]. This trend blends conventional learning with information and communication technology (ICT)-based learning, known as blended learning.

The significance of this study lies in its potential to enhance the educational experience and outcomes of students, particularly in the context of the ongoing pandemic. Prior research has demonstrated the effectiveness of blended learning in fostering self-regulated learning (SRL) among students. Ref. [8] found that Moodle-based blended learning significantly and positively impacts students' SRL abilities in mathematics. This suggests that integrating technology with traditional teaching methods can help students manage their learning processes more effectively, leading to improved academic performance.

Additionally, Ref. [9] studied the impact of blended learning on college students' SRL during distance learning in a geometry course reinforcing the positive effects of this approach. This research indicates that blended learning not only adapts well to the constraints imposed by the pandemic but also actively contributes to students' development of SRL skills. This is particularly relevant as students are required to be more autonomous and proactive in their learning due to the reduced direct supervision from teachers.

Furthermore, the findings of Ref. [10] highlight the broader applicability of blended learning in promoting self-regulated learning. Their research concludes that the blended learning model positively influences students' independence and self-management in their studies, demonstrating its effectiveness across different subjects and educational levels.

By focusing on the impact of blended learning on vocational high school students' SRL, this study aims to contribute valuable insights into how this educational approach can be optimized to support student learning in diverse contexts. The positive implications of previous research underscore the importance of exploring blended learning as a means to enhance SRL, ultimately leading to better educational outcomes and more resilient learners in the face of ongoing and future challenges.

Based on these observations, we have chosen to study the impact of blended learning on the SRL of students in group X TKJ 1, hypothesizing that blended learning positively affects the SRL of vocational high school students.

Material and Methods

This study was conducted at SMK Negeri 1 Kemangkon, Purbalingga, from April 2022 to June 2022. The research utilized qualitative methods to observe changes in the selected subjects, focusing specifically on groups of X TKJ 1, which experienced challenges in the learning process. Instead of including all students, this class was chosen to assess the impact of blended learning on self-regulated learning (SRL).

The researchers used two primary tools to collect data: questionnaire sheets for students, which employed the Likert scale, and observation sheets to monitor student activity in the classroom. Data collection involved distributing questionnaires and conducting classroom observations. These observations aimed to compare the level of student engagement before and after the implementation of blended learning, thereby assessing changes in students' SRL.

The data collection instruments included questionnaires to evaluate students' SRL and observation sheets to monitor student engagement and differentiate between students with high and low SRL levels. Data collection began in May 2022, aligning with the start of face-to-face learning activities. During this period, data was gathered from questionnaires completed by 35 students and through observations conducted by teachers or observers. A second round of data collection took place in June 2022, after the implementation of blended learning, which combined face-to-face and online learning methods. This allowed for a comparative analysis to determine the impact of blended learning on students' SRL. The instrument is shown in Table 1. It includes several factors: Impulse Control, Planning and Organization, Self-Evaluation, and Time Management.

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Table 2. Student Participation and Learning Achievement

Factor	Item
Impulse Control	1. Controlling Impulsive Behavior
	2. Response to Challenges
Planning and Organization	3. Setting Clear Goals
	4. Organizing Tasks
Self-Evaluation	5. Reflecting on Behavior and Decisions
	6. Accepting Feedback and Self-Improvement
Time Management	7. Managing Time

Results

The data collected revealed significant changes in students' self-regulated learning (SRL) after implementing blended learning. Fig 1 shows the results for each stage.

	Low	Medium	High
Stage 2	7	19	9
Stage 1	15	17	3
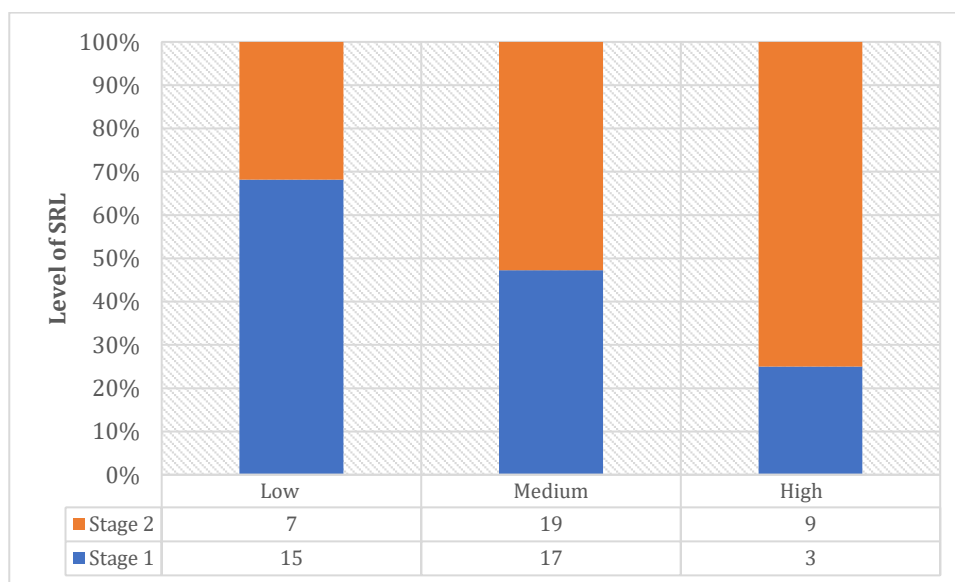
Remark for SRL Criteria: Low (N<65%); Medium (66%<N<79%); High (N>80%)

Fig. 1. SRL Criteria in Stage 1 and Stage 2

In Stage 1 (see Fig. 1), before the implementation of blended learning, 15 students (43%) had low SRL, 17 students (49%) had medium SRL, and only 3 students (8%) exhibited high SRL. This indicates that a majority of students were struggling with self-regulated learning, with nearly half falling into the low and medium categories. After the implementation of blended learning, there was a noticeable improvement in SRL among the students. The number of students with low SRL decreased to 7 (20%), showing a significant reduction. Meanwhile, the number of students with medium SRL slightly increased to 19 (54%), and the number of students with high SRL increased substantially to 9 (26%).

This shift highlights the positive impact of blended learning on SRL. The reduction in the number of students with low SRL and the increase in those with high SRL suggest that

blended learning helped students become more autonomous and effective in managing their learning processes. The data underscores the effectiveness of blended learning in enhancing students' self-regulation skills, thereby improving their overall learning experience and outcomes.

The positive changes observed in students' self-regulated learning (SRL) after implementing blended learning can be effectively explained using Self-Determination Theory, Social Cognitive Theory, and Goal-Setting Theory. These theories provide a comprehensive understanding of how blended learning environments foster SRL and improve educational outcomes.

Self-determination theory (SDT), developed by Deci and Ryan, emphasizes the role of intrinsic motivation in fostering self-regulation [11]-[13]. According to SDT, three fundamental psychological needs must be met to enhance intrinsic motivation: autonomy, competence, and relatedness. Blended learning addresses these needs in multiple ways. By allowing students greater control over their learning processes, blended learning enhances their sense of autonomy [14]. For instance, students can choose when and where to study online materials, fostering a sense of ownership and control over their learning journey. The interactive and varied content in blended learning improves students' sense of competence by matching individual learning styles and paces, which helps them feel more capable and confident in their abilities. Additionally, the combination of online and face-to-face interactions helps maintain a sense of community and support, fulfilling the need for relatedness [15]. These interactions encourage collaboration and peer support, which are crucial for maintaining motivation and engagement. Collectively, these factors increase intrinsic motivation and promote higher levels of SRL, as students become more self-directed and proactive in their learning.

Bandura's Social Cognitive Theory (SCT) also provides valuable insights into the mechanisms behind the observed improvements in SRL [16]-[18]. SCT emphasizes the importance of self-efficacy and self-regulation in the learning process. In blended learning environments, students have the opportunity to observe peer interactions and receive feedback from teachers in various settings. This exposure helps them learn effective strategies for managing their learning, contributing to higher SRL levels. The opportunities for success in different tasks within blended learning environments boost students' self-efficacy, making them more likely to engage in self-regulated behaviors such as setting goals, monitoring progress, and adjusting strategies as needed [19]. For example, online platforms like Google Classroom and WhatsApp groups provide students with immediate feedback and the ability to revisit materials, reinforcing their belief in their ability to succeed. This continuous practice in

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self-regulation enhances their overall SRL skills, as they learn to navigate and balance the demands of both online and offline learning environments.

Lastly, the Goal-Setting Theory (GST) by Locke and Latham posits that setting specific, challenging, and attainable goals can enhance motivation and performance [20],[21]. Blended learning provides clear goals and deadlines for both online and offline activities, helping students understand what is expected of them and encouraging them to set personal learning goals [22]. For instance, students might have specific assignments to complete online and projects to work on during face-to-face sessions, each with defined objectives and deadlines. Regular feedback within blended learning environments helps students gauge their progress toward these goals, maintaining motivation and allowing them to adjust strategies for improvement [23]. This feedback loop is essential for keeping students engaged and focused on their learning objectives. The structured nature of blended learning, with its mix of independent and collaborative tasks, encourages students to take an active role in their learning, set meaningful goals, and work diligently to achieve them. These elements contribute significantly to the observed increase in SRL among students, as they become more adept at planning, monitoring, and evaluating their learning processes.

In summary, the combined influence of SDT, SCT, and GST underscores the effectiveness of blended learning in creating a supportive and motivating educational environment that enhances SRL. By fulfilling students' psychological needs for autonomy, competence, and relatedness, boosting self-efficacy through observational learning and feedback, and encouraging goal-setting and self-monitoring, blended learning environments help students become more self-regulated learners. This leads to better educational outcomes and prepares students to be more independent and effective in their future learning endeavors.

Conclusion

In conclusion, the implementation of blended learning at SMK Negeri 1 Kemangkon has demonstrated significant positive impacts on students' SRL. The findings from this study align with theoretical frameworks such as SDT, SCT, and GST, which collectively explain the mechanisms through which blended learning enhances SRL. Blended learning environments effectively address students' intrinsic motivation by providing autonomy in learning choices, fostering competence through tailored learning experiences, and promoting relatedness through collaborative activities. These aspects empower students to take ownership of their learning process, adapt their strategies to varying tasks, and engage meaningfully with peers and educators both online and offline. This engagement not only enhances their self-efficacy but also strengthens their ability to regulate their learning behaviors effectively. Moreover, the structured goal-setting and feedback mechanisms inherent in blended learning help students

set clear objectives, monitor their progress, and make necessary adjustments to achieve academic goals. This iterative process of goal-setting and self-monitoring encourages students to be proactive learners, thereby cultivating robust self-regulation skills essential for lifelong learning. The transition from higher numbers of students with low SRL before blended learning to a notable increase in those exhibiting medium to high levels of SRL underscores the effectiveness of this educational approach. By integrating online and face-to-face learning components, blended learning has successfully supported students in becoming more independent, motivated, and effective learners. In essence, the positive outcomes observed in this study suggest that blended learning not only addresses the challenges posed by traditional classroom settings but also enhances students' educational experiences by fostering autonomy, self-efficacy, and goal-oriented behavior. As educational institutions continue to navigate the complexities of modern learning environments, the adoption of blended learning stands as a promising approach to nurturing students' self-regulated learning abilities and preparing them for future academic and professional success.

Conflict of Interest

The authors declare that there is no conflict of interest.

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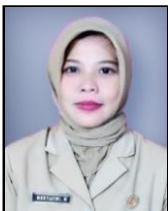
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