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Comparison Analysis of Hybrid Learning and Full Online toward Students' Critical Thinking Skills

Taofan Ali Achmadi[1], Devi Anggriyani[1], Sapitri Januariyansah[2], Ayub Budhi Anggoro[3]

[1]Universitas Negeri Semarang, Indonesia
[2]Universitas Negeri Medan, Indonesia
[3]National Yunlin University of Science and Technology, Taiwan

Abstract

This study aims to compare the effectiveness of hybrid learning and fully online learning in enhancing students' critical thinking skills. The research employs a quasi-experimental design with a nonrandomized control group and pretest-posttest approach, involving 90 sixth-semester students from the Family Welfare Education Study Program at Semarang State University. Participants were divided into two groups: hybrid learning and fully online learning, with 45 students each. The instruments used included validated and reliable critical thinking tests and open-ended questionnaires to gather data on learning experiences. Data analysis utilized descriptive and inferential statistics, including paired t-tests and independent t-tests, with preliminary normality and homogeneity assessments. The results indicate significant improvement in critical thinking skills with both learning methods, but hybrid learning showed a more substantial increase in scores ($p < 0.000$) compared to fully online learning ($p < 0.006$). Thus, hybrid learning is more effective in fostering critical thinking skills, underscoring the benefits of combining face-to-face and online learning for optimal student development.

Keywords: hybrid learning, online learning, critical thingking

INTRODUCTION

In the 21st century, critical thinking has become increasingly important for students to navigate the complex and rapidly changing world. Critical thinking is a crucial skill for students in the 21st century, as it involves analyzing, reasoning, problem-solving, creative thinking, and making informed decisions (Hussin et al., 2018). According to (Rizaldi et al., 2020), 21st century skills are categorized into four main areas: ways of thinking, ways of working, tools for working, and life in the world. Ways of thinking include creativity, innovation, critical thinking, problem-solving, and decision-making. These skills are considered one of the essential skills for students to succeed in education and work (Marinda Sari Sofiyana & Mar`atus Sholihah, 2022). With the abundance of information and the prevalence of misinformation, students need to develop the ability to analyze, evaluate, and interpret information critically. Similarly, Goel (Goel et al., 2017) emphasize the importance of critical thinking in real-world control systems, where decentralized components react quickly using local information and centralized components react slowly using a more global view.

Critical thinking enables students to make informed decisions, solve problems, and communicate effectively in various academic and professional contexts. Enhancing critical thinking skills is a priority in education, and various approaches have been explored to achieve this goal. The integration of critical thinking skills into the curriculum is essential for preparing students for the challenges of the 21st century. This integration can be achieved through the use of teaching strategies that promote active and meaningful learning (Siti Nazuar Sailin & Noor Aida Mahmor, 2021). With the advancement of technology, various educational approaches have emerged, including hybrid learning and full online learning.

Hybrid learning, also known as blended learning, is an instructional approach that combines face-to-face classroom instruction with online learning components. On the other hand, full online learning refers to a mode of education where all instruction and learning activities are conducted online without any in-person interaction. One advantage of hybrid learning is its flexibility and convenience. Students have the opportunity to engage in self-paced online learning activities while still benefiting from face-to-face interactions with instructors and peers during in-person sessions (Tetiana Vereshchahina et al., 2018). This combination allows for a more personalized learning experience and accommodates different learning styles

and preferences. Additionally, hybrid learning can provide a seamless transition between online and offline learning, allowing for a more integrated and comprehensive educational experience (Shimkovich et al., 2022). Another advantage of hybrid learning is its potential to enhance student engagement and motivation. Research has shown that student motivation is a significant predictor of learning satisfaction in both traditional and online learning environments (Wen-Wen Chua & Ying-Leh Ling, 2022). However, it is important to note that not all studies have found a direct relationship between student motivation and hybrid learning satisfaction. Further research is needed to explore the specific factors that contribute to student motivation and satisfaction in hybrid learning settings.

Furthermore, there are also challenges and disadvantages associated with hybrid learning. One of the main challenges is the need for effective time management and self-regulation skills. Students must be able to balance their time between online and in-person learning activities and stay motivated to complete online assignments (Wen-Wen Chua & Ying-Leh Ling, 2022). Without proper time management skills, students may struggle to keep up with the demands of hybrid learning. Meanwhile, as students engage in online learning activities, they become familiar with various digital tools and platforms, which are increasingly important in today's digital age (Shimkovich et al., 2022). full online learning can promote the development of essential digital literacy skills. This acquisition of digital literacy skills can prepare students for future academic and professional endeavors.

Online platforms, such as learning management systems, can facilitate student-centered environments and active student interactions (Zulkifli et al., 2020). However, challenges may arise when relying solely on online platforms for teaching and learning purposes, it is important to design online learning activities that promote active learning and critical thinking (Tathahira, 2020). Despite these challenges, online learning has been found to have advantages such as flexibility, convenience, and the enhancement of students' learning abilities and critical thinking skills (Bogomolets National Medical University, Kyiv et al., 2020). Several studies have examined the impact of full online learning on critical thinking skills in various disciplines. For example, a study in the field of dentistry found that the implementation of an online, preclinical hybrid curriculum improved students' critical thinking skills (Farah-Franco et al., 2021). Another study in the field of mathematics education found that problem-centered learning approaches in online settings can enhance students' mathematical critical thinking abilities (Lidya Putri Apriliana et al., 2019). However, it is important to note that there are also challenges associated with online learning, including the need for teachers to master technology and the socio-cultural factors that may affect students' online learning experiences (Tathahira, 2020). Additionally, the level of student-student interaction in online learning environments may impact the development of critical thinking skills (Anwar & Muti'ah, 2022).

This comparison analysis aims to evaluate the impact of hybrid learning and full online learning on critical thinking skills. Previous research suggests that both modes of learning can contribute to the development of critical thinking skills, but challenges and considerations need to be addressed to ensure effective implementation. This research is needed to explore which strategies and approaches can enhance critical thinking skills between hybrid and full online learning. Additionally, it will offer an overview of students' experiences when they are exposed to hybrid and fully online learning in developing their critical thinking skills.

METHOD

This study employs a quasi-experimental design through a Nonrandomized Control Group Pretest-Posttest approach to compare the critical thinking abilities of sixth-semester students in the Family Welfare Education Program at the Faculty of Engineering, Universitas Negeri Semarang. This design was chosen because the study could not fully randomize group assignments. Data collection involved a pretest administered before the commencement of learning, followed by instruction according to each group's modality (hybrid and fully online). The pretest aimed to measure the students' initial critical thinking abilities prior to receiving instruction from either model. After the pretest, the first group (hybrid learning group) received hybrid instruction, while the second group (fully online learning group) received online instruction for four weeks. Upon the completion of the learning period, all research subjects were given a critical thinking test as a posttest and a questionnaire. The posttest measured students' critical thinking abilities after the learning period, while the questionnaire was designed to capture their experiences with hybrid or fully online learning.

The study's subjects comprised 150 students, with 90 selected as the sample. This sample was divided into two groups: the hybrid learning group and the fully online learning group, each consisting of 45 students. Critical thinking abilities were assessed using a previously adapted and validated critical thinking test, which included five essay items designed to measure analytical, evaluative, and creative thinking skills. This test was aligned with concepts relevant to the Research Methodology course provided to both groups and covered

five learning outcomes: identifying research stages, determining research variables, formulating hypotheses, analyzing populations and samples, and designing methods and data collection tools. The test instrument adopted questions based on Higher Order Thinking Skills (HOTS).

An open-ended questionnaire was also administered to understand students' experiences with hybrid and fully online learning in developing critical thinking skills. The critical thinking questionnaire was developed based on related literature and similar studies. It measured five indicators: material analysis ability, interaction in learning, student engagement, flexibility of time and location, use of technology, and collaborative learning. The instrument underwent validity and reliability testing to ensure that the questionnaire items accurately measured the relevant critical thinking skills. The content validity test yielded an Aiken's V index of 0.7, indicating that the instrument is valid. Reliability testing using KR20 resulted in a coefficient of 0.815, demonstrating that the instrument is reliable. The research results were analyzed using descriptive and inferential statistics. Descriptive analysis involved calculating summary statistics for each questionnaire item, such as mean, standard deviation, and percentage analysis of the distribution of responses. Inferential statistics employed paired t-tests and independent t-tests to test the hypotheses. Prior to hypothesis testing, data normality and homogeneity were assessed using the Shapiro-Wilk and Levene tests, respectively. Data analysis was conducted using IBM SPSS Statistics 24 with a significance level of 5%.

RESULT AND DISCUSSION

The critical thinking skills of students were measured using essay tests, administered twice, before and after the implementation of hybrid and fully online learning. The results of the normality and homogeneity tests are presented in **Table 1**. Based on the analysis of normality using the Shapiro-Wilk test, the significance values (sig.) for the pretest and posttest in the hybrid learning group and the fully online learning group were 0.647, 0.242, 0.275, and 0.425, respectively. The results of the Levene's test for homogeneity showed significance values of 0.918 for the pretest data and 0.921 for the posttest data for both groups. These results indicate that the p-values for both the Shapiro-Wilk test and the Levene's test are greater than 0.05. In other words, all the data obtained in the study meet the assumptions of normality and homogeneity. Further analysis using inferential statistics can be conducted to determine the impact on students' critical thinking skills.

Table 1. The results of normality and homogeneity tests

Group	Statistical Tesst	p-value	
		Pretest	Posttest
Hybrid Learning	Shapiro-Wilk	0.647	0.242
	Levene	0.918	0.921
Fully Online Learning	Shapiro-Wilk	0.275	0.425
	Levene	0.918	0.921

This study aims to demonstrate the improvement in students' critical thinking skills before and after the implementation of hybrid and fully online learning. A *paired t-test* analysis was used to address the research questions: To what extent do students' critical thinking skills improve after receiving hybrid learning (**H1**); and to what extent do students' critical thinking skills improve after receiving fully online learning (**H2**). **Table 2** presents the results of the *paired t-test* analysis.

Table 2. The results of *paired t-tests*

Group	Data	Mean Difference	Std. Deviation	t	df	p-value
Hybrid Learnning	Pretest-Posttest	11.174	7.154	10.479	44	0.000
Full Online	Pretest-Posttest	3.189	7.452	2.871	44	0.006

Based on the paired t-test analysis results, there is a significant improvement in students' critical thinking skills in both groups; however, this improvement is more significant in the experimental group compared to the control group. The average posttest score in the experimental class increased significantly compared to the pretest score. A *p-value* of less than 0.000 indicates that this increase is highly significant, with an average increase of 11.174 points. The average posttest score in the control class also increased compared to the pretest score. In the control class, a *p-value* of less than 0.006 indicates that this increase is also significant, but with an average increase of only 3.189 points. Based on these results, it can be concluded that the hybrid learning method is more effective in enhancing students' critical thinking skills compared to the fully online method. Although both methods lead to improvements, hybrid learning has a more

significant impact. This conclusion is further supported by the independent t-test analysis to determine the extent of the difference in critical thinking skills between the experimental class using hybrid learning and the control class using fully online learning (**H3**). The results of the *independent t-test* analysis are presented below.

Table 3. The results of *independent t-test*

Group	Mean Posttest	*Std. Deviation*	*Mean Difference*	*Std. error Difference*	*t*	*Df*	*p-value*	*Cohen`s d*
Hybrid Learnning	80.09	4.676						
Full Online	72.87	4.826	7.21	5.941	7.213	88	0.000	1.52

Based on the independent t-test analysis, a t-value of 7.213 with a p-value of 0.000 indicates that the difference between the posttest results of the experimental group and the control group is highly significant. Since the p-value is less than 0.05, the alternative hypothesis (H3) that there is a significant difference in students' critical thinking skills between the implementation of hybrid learning and fully online learning is accepted. Furthermore, the difference in means and standard deviations between the two groups allows for the calculation of the effect size using Cohen's d. A Cohen's d value of approximately 1.52 indicates a very large effect, suggesting that hybrid learning significantly enhances critical thinking skills compared to fully online learning.

This research shows that hybrid learning provides a very significant improvement in critical thinking skills compared to full online learning. While both hybrid and full online courses can foster critical thinking, the effects are significantly stronger in hybrid settings (Li et al., 2020). Several studies have found that students in hybrid courses demonstrate greater gains in analytical and synthesis-based thinking compared to their peers in traditional face-to-face or fully online sections (Aisling Tierney et al., 2023). Hybrid courses, which blend in-person instruction with online activities, appear to provide an optimal balance that enhances critical thinking development. Hybrid learning, which combines traditional face-to-face instruction with online components, has been shown to enhance student engagement in discussions and reflections, leading to the development of critical thinking skills. Research indicates that the hybrid approach in education has transformed teaching methods, allowing for deeper engagement and reflection among students (Johnson et al., 2018). Students in hybrid learning environments have reported better understanding of content, increased retention, and more time for critical thinking compared to traditional lecture-based instruction (Goldberg et al., 2006). The flexibility and online communication tools offered by hybrid instruction have been highlighted as key benefits, although challenges such as technical and psychological isolation have also been noted (Palmer et al., 2022).

Studies have demonstrated the effectiveness of hybrid learning in improving student attitudes, attendance, quiz performance, and overall engagement compared to traditional methods (Hapke et al., 2021). Hybrid learning environments have been found to foster cognitive engagement, emotional engagement, social engagement, behavioral engagement, and collaborative engagement among students (Laily et al., 2024). Additionally, the implementation of student-centered principles in hybrid learning can promote active learning, increase learner engagement, autonomy, and metacognitive development (Amiruddin et al., 2023). Furthermore, research has shown that hybrid learning can lead to increased academic achievement, improved cognitive learning outcomes, and enhanced development of generic skills such as critical thinking (Kurniawan et al., 2022). The use of gamification features in hybrid learning, such as mobile apps and progressive leveling, has been found to keep students engaged and facilitate learning anytime and anywhere (Petritis et al., 2022). Hybrid learning has also been associated with improved learner performance compared to fully online or face-to-face instruction (Musdariah et al., 2022). While critical thinking skills have been a key focus in the literature on hybrid learning, the benefits of this approach extend well beyond this domain.

Research suggests that the ability to personalize the learning experience and incorporate multimedia resources in a hybrid model can enhance student motivation and self-regulation, leading to better learning outcomes. The flexible nature of hybrid courses, with a combination of synchronous and asynchronous activities, allows students to manage their time more effectively and engage with content at their own pace. Another finding in this research, based on responses from students who experienced full online learning, is that one of the main issues in full online learning is internet stability. In line with the research findings (Aisling Tierney et al., 2023; Jitendra Singh et al., 2021), the lack of reliable internet access and the inability to consistently participate in real-time discussions can hinder the development of critical thinking skills in a fully online environment. This can hinder learning and affect students' academic outcomes.

Additionally, The lack of face-to-face interaction poses a significant challenge in full online learning, impacting various aspects of the educational experience. Research indicates that face-to-face interactions facilitate better learning outcomes and higher levels of engagement compared to online learning (Hamid &

Yahaya, 2023). Additionally, learners transitioning from online to face-to-face instruction struggle with communication, self-regulation, and motivation, highlighting the difficulties faced when moving away from full online learning (Osman et al., 2022). Moreover, students in different academic disciplines, such as agriculture and engineering, have expressed preferences for face-to-face training due to concerns about the effectiveness, relevance, and practicality of online courses (Horowitz-Kraus et al., 2023; Villanca, 2023). These findings underscore the importance of face-to-face interactions in enhancing learning experiences and student engagement, suggesting that the absence of such interactions can indeed be a significant challenge in full online learning environments. Especially in research methodology courses, which require critical thinking skills in designing, conducting, and analyzing research. In other words, the development and effective implementation of hybrid learning models can be a solution to enhance students' critical thinking skills, especially in courses that require this ability, such as research methodology. This research demonstrates the advantages of hybrid learning over full online learning in fostering critical thinking skills among students. The flexibility, personalization, and combination of online and face-to-face components in hybrid learning contribute to improved student engagement, motivation, and learning outcomes, including the development of critical thinking abilities

CONCLUSION

This research compares the effectiveness of hybrid learning and full online learning in enhancing students' critical thinking skills. The findings indicate that both teaching methods significantly improve students' critical thinking abilities. However, hybrid learning has been proven to be more effective than full online learning in enhancing critical thinking skills. Hybrid learning, which combines face-to-face interactions and online learning, has a greater impact on the development of students' critical thinking skills. This conclusion suggests that a combination of traditional learning and digital technology can provide optimal benefits in improving students' critical thinking skills.

Future research is recommended to involve subjects from various disciplines and educational levels to gain a more comprehensive understanding of the effectiveness of these teaching methods in different academic contexts. Future studies could explore the effectiveness of using various technological tools in hybrid and online learning, such as virtual reality or augmented reality, to examine their impact on student engagement and critical thinking skills. It is also necessary to explore the emotional and psychological impacts of hybrid learning and full online learning, including student satisfaction, stress levels, and learning motivation.

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