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The Effectiveness of Continuous Formative Assessment in Hybrid Learning Models: An Empirical Analysis in Higher Education Institutions

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ABSTRACT

This study evaluates the effectiveness of Continuous Formative Assessment (CFA) in enhancing student learning outcomes within hybrid learning environments. Data was collected through surveys and tests involving a sample of 120 students. The findings indicate that 85% of students agree or strongly agree that CFA is a beneficial evaluation model for improving learning outcomes. The average score for students' opinions on CFA, based on a 4-point Likert scale, is 3.35 (standard deviation = 0.697), reflecting a positive perception. Additionally, a high average confidence score of 3.78 indicates that students can achieve the necessary learning attainment levels when implementing CFA. The study emphasizes that adopting CFA as a learning evaluation model is beneficial, but it requires lecturers to be dedicated and attentive to its implementation. Lecturers should carefully analyze current educational system policies and their chosen learning strategies. Recommendations for lecturers include integrating CFA with existing educational policies, providing continuous feedback, and adapting teaching methods based on assessment results. This research significantly contributes to the advancement of learning evaluation techniques and highlights CFA's potential impact on hybrid learning models. It underscores the importance of lecturer involvement in effectively implementing CFA and provides insights into students' perceptions and confidence in their learning attainment. The findings suggest that CFA can enhance learning outcomes and student confidence, with implications for future research and practice in educational evaluation and hybrid learning environments.

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1. INTRODUCTION

The hybrid learning strategy, as emphasized by Aristika et al. (2021), is currently regarded as the most effective approach in education. According to Hapke et al. (2021) and Nørgård & Hilli (2022), hybrid learning effectively combines online and offline learning. The global impact of social distancing measures enacted to curb the spread of COVID-19 has significantly affected numerous sectors, including higher education (Nurunnabi & Almusharraf, 2020). Although traditional educational methods are being partially restored, hybrid learning approaches are increasingly becoming preferred. Hybrid learning has been implemented worldwide with varying degrees of effectiveness. In the UK, hybrid learning has improved student engagement and flexibility (Hill & Smith, 2023), while in Europe, countries like Finland have successfully integrated hybrid models to enhance personalized learning experiences (Myyryläinen et al., 2022). This global shift towards hybrid learning underscores its universal applicability and potential benefits. Rafiola et al. (2020) describe hybrid learning as a blend of traditional in-person educational practices and online computer-based technology, offering students greater flexibility and more effective and efficient learning opportunities.

Recent studies underscore the immediate need for effective hybrid learning strategies, showing substantial increases in student satisfaction and learning outcomes when hybrid models are employed (Al-Maroof et al., 2022). As hybrid learning becomes more prominent, bridging the gap between students' expectations and experiences in online learning is crucial. Landrum et al. (2021) found a disconnect between students' perceptions of online learning and their expectations, identifying a negative gap across 17 examined categories. This highlights the need to address inadequacies in the current learning process through hybrid learning (Raes et al., 2020). This research addresses gaps in hybrid learning practices by focusing on student engagement, flexibility, and resource access. By regulating lecturers and students separately, traditional and

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online learning can become more effective. A well-planned hybrid program ensures that every student has an equal opportunity to participate in learning regardless of location or time constraints. This hybrid learning technique benefits lecturers and students by enabling active engagement without the challenges that may arise in purely online or entirely offline learning (Wijaya & Budiman, 2021). As a result, the learning environment becomes more flexible and adjustable, enhancing learning effectiveness and overall student satisfaction. Recent advancements in hybrid learning technologies include the integration of AI-driven personalized learning platforms, which adapt to individual student needs and provide real-time feedback (Tan, 2023). Innovative pedagogical strategies such as flipped classrooms and gamified learning experiences have enhanced student motivation and engagement (Lo et al., 2022). This study builds upon these advancements by incorporating Continuous Formative Assessment (CFA) within hybrid learning environments.

Indonesia's national education objectives depend on collaborating all educational components to achieve shared goals. The role of lecturers becomes crucial in any hybrid approach to learning when both online and offline instruction are effectively blended. Lecturers serve not only as educators but also as facilitators who help students create engaging learning experiences. They must comprehend the integration of diverse learning components, including curriculum, technology, peer interaction, and assessment (Frye & Hemmer, 2012). Consequently, lecturers must be capable of designing, planning, implementing, and assessing effective learning experiences (Budiman et al., 2021). Goldfarb and Morrison (2014) emphasize the importance of lecturers' roles as facilitators and motivators in creating an engaging learning environment and encouraging positive interaction between students and lecturers (Morris et al., 2021). Additionally, lecturers' evaluation of the learning process is a tool for monitoring and managing the learning process to improve future learning experiences (Anh, 2018; Leenknecht et al., 2021). Thus, collaborative efforts from all educational components, including lecturers and students, and proper learning methodologies, such as hybrid learning, can aid in achieving Indonesia's national education goals.

Assessment practices in education are significantly influenced by effective lecturers' planning, execution, and evaluation of learning experiences (Romero-Rodriguez et al., 2020). Assessing students' understanding of the subject is essential for tracking their progress. Current summative assessment methods affect whether a student passes or fails and provide an evaluation of student performance, achievement, and final grades. Universitas Dian Nuswantoro (UDINUS), known for its dedication to enhancing the standard of higher education in Indonesia, is implementing a formative-summative evaluation methodology. According to this model, summative exams are given after the semester, while formative exams occur during the semester. Despite its implementation, this methodology still faces challenges in tracking objectives for each lecture session and monitoring the entire learning process (Sudakova et al., 2022). Also, lecturers struggle to identify potential learning obstacles that can hinder students' understanding (Sanderson et al., 2022). A novel evaluation approach, CFA, has been developed for post-pandemic education. This model uses the hybrid learning technique to monitor student development and accomplishment more effectively, introducing a fresh aspect and advancing education. Our approach to CFA in hybrid learning integrates real-time feedback mechanisms and personalized learning paths, which are expected to yield higher student engagement and better learning outcomes than previous studies. As a result, UDINUS continues to innovate to raise the standard of higher education and promote Indonesia's educational advancement. Section II of this paper details the methodology and explains the research process, including population, sample, class background, lecturers, students, instruments, and data analysis. Section III presents research findings, including an evaluation of the hybrid learning model, the role of the lecturer, and its impact on the student experience. Section IV summarizes the main findings and provides recommendations for further development.

2. MATERIAL AND METHOD

This chapter discusses the research design, data collection, and analysis processes. Each step of the research process is described comprehensively to provide a clear understanding of the procedures and strategies used in this study.

Research Design

The study employed a quasi-experimental design with experimental and control groups, each taught by different lecturers. The experimental group used the CFA evaluation strategy, while the control group used the formative-summative test evaluation methodology. By comparing these two assessment techniques, the study

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aims to evaluate the effectiveness of CFA in teaching project management courses. The research design is illustrated in **Figure 1**.

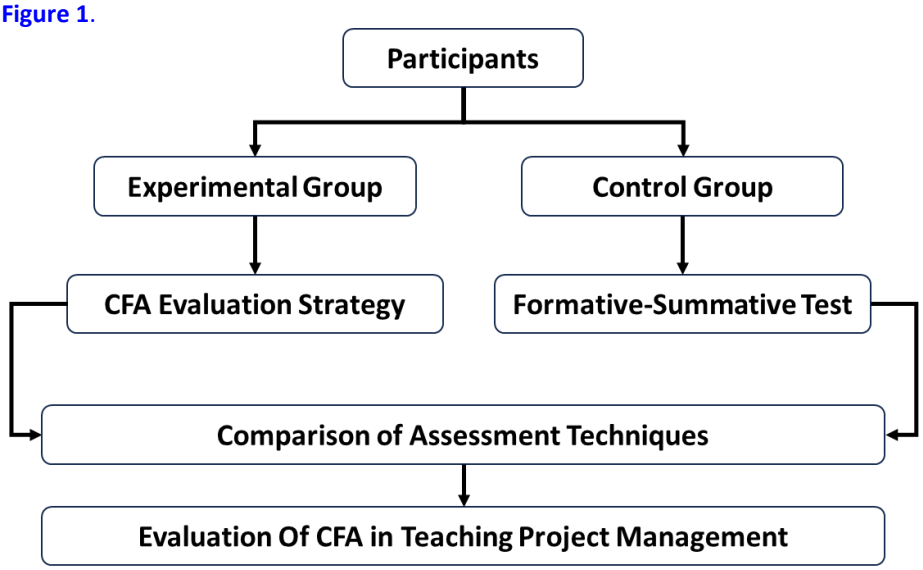

Figure 1. The flowchart of the research design

Participants and Data Collection

The study sample consisted of two lecturers specializing in information systems who taught project management courses at UDINUS. Additionally, several project management students from four distinct groups, totaling 120 students (30 students per class across 4 classes), were included in the study. This diverse participant group provided a range of perspectives and experiences crucial to understanding the learning process. Data was gathered using a questionnaire designed to gauge students' perceptions. The survey included five questions rated on a Likert scale (1 to 4), where 4 means "strongly agree," 3 means "agree," 2 means "disagree," and 1 means "strongly disagree." This scale allows students to indicate their level of agreement with the statements in the questionnaire (Improta et al., 2019).

Its reliability and validity were tested before using the questionnaire to collect data. Content validity ensured that the questions appropriately covered all relevant subjects (Sürücü & Maslakçı, 2020). Construct validity confirmed a theoretical connection between the study's subject and the questionnaire. Reliability was tested by calculating Cronbach's alpha coefficient (Amirrudin et al., 2021; Malkewitz et al., 2023), ensuring the questionnaire consistently captured student viewpoints.

Data Analysis and Validity of Instruments

Various statistical methods were employed to analyze the collected data. Descriptive statistics were calculated for all variables, including mean, standard deviation, and frequencies. A t-test was conducted to compare significant differences between the control and experimental groups (Mishra et al., 2019). The t-test assessed whether CFA significantly affected student knowledge before and after the intervention (Moscarelli, 2023). Key components of the t-test results included the t-score, degrees of freedom, and two-tailed significance (Urbano et al., 2019). The t-score indicates the significance of the knowledge difference between the groups. Degrees of freedom (D.F.) refer to the amount of data used in the analysis. The two-tailed significance indicates the statistical significance of the change. The mean difference between the groups was also recorded to understand the extent of knowledge improvement due to CFA. Additionally, a normality test was conducted to ensure the data followed a normal distribution before performing the t-test (Kwak & Park, 2019), a key assumption for the t-test.

The overall validity and reliability of the data collection instruments were ensured through rigorous testing. Content validity was confirmed to ensure the questionnaire covered all relevant topics comprehensively (Sürücü & Maslakçı, 2020). Construct validity was assessed to establish a theoretical connection between the study's objectives and the questionnaire. Reliability was measured using Cronbach's alpha coefficient, confirming the questionnaire's consistency in capturing student viewpoints (Amirrudin et al., 2021).

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3. FINDINGS

The results highlight students' positive reception of CFA, viewing it as an effective assessment tool and a catalyst for enhancing learning experiences. Following the implementation of CFA, there was a noticeable increase in student engagement and interest. Factors contributing to these positive attitudes include CFA's design, which emphasizes regular feedback and active student participation, and external influences, such as prior assessment experiences.

Design and Implementation of CFA

CFA was implemented to evaluate student learning progress effectively. The process of designing CFA for learning is illustrated in **Figure 1**. Initially, educational materials were developed and distributed to students. Students engaged with the content during lectures, and CFA was utilized to monitor their learning progress—this iterative assessment method aimed to identify learning barriers and optimize educational outcomes (**Figure 2**).

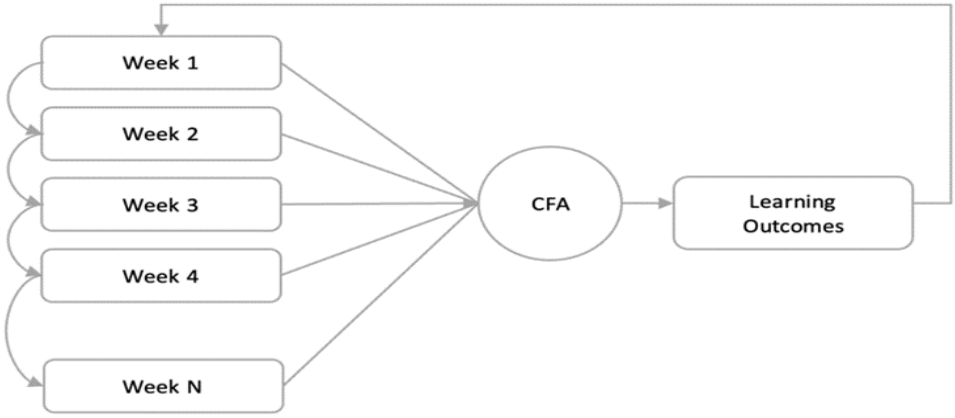

Figure 2. The procedure of CFA design for learning

Based on Moodle, the KULINO Learning Management System was pivotal in supporting online lectures and facilitating CFA (**Figure 3**). KULINO facilitated the creation of semester learning plans (RPS), distribution of instructional materials, delivery of video lessons, and formulation of assessment tasks. Its adaptable features enabled UDINUS to maintain high-quality education amid the COVID-19 pandemic by ensuring accessibility and continuity in learning.

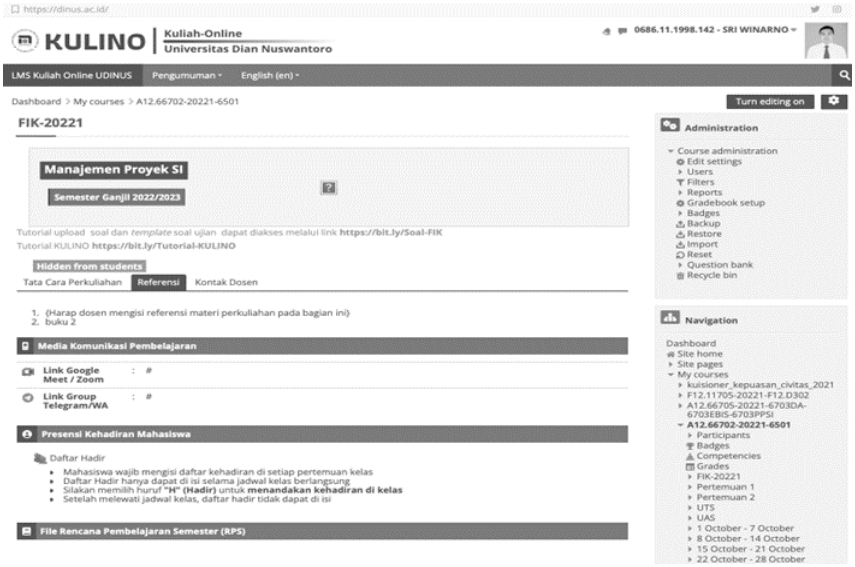

Figure 3. KULINO Learning Management System based on Moodle to support online lectures at UDINUS

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Performance evaluation in each lecture is also an important component of the learning process. Lecturers create an assessment framework used as a reference in each lecture meeting to determine how well students understand the subject being delivered. Every week, this evaluation form tracks student progress throughout the learning process. Furthermore, after 14 courses, students must complete a questionnaire via the Google Form platform. The goal of this questionnaire was to assess students' attitudes about the use of CFA as a learning evaluation strategy. A total of 54 students completed this survey. The data analysis results suggest that this questionnaire has a high level of reliability, with a Cronbach's alpha score of 0.791, indicating that it is consistent and reliable in capturing student perceptions.

Table 1. Average score of students' attitudes towards using CFA

Variable	Group	Mean	Standard Deviation	t-test result			
				t-test score	Degree of freedom (d.f)	Significance (2Tailed)	Mean Difference
Attitude Pre-Test	Control	75.113	2.00	1.191	54	.000*	0.558
	Experiment	75.671	6.481				
Attitude Post-Test	Control	76.117	6.925	1.428	54	.000*	2.904
	Experiment	79.021	7.477				

Note :*) Significant at α=5%

The findings presented in **Table 1** provide a detailed comparison of the average student attitude scores before and after implementing CFA as a learning evaluation strategy in both the control and experimental groups. Initially, before introducing the CFA (Attitude Pre-Test), the control group had an average attitude score of 75.113, while the experimental group averaged 75.671. The statistical analysis showed a non-significant difference between the two groups, with a t-value of 1.191 and a p-value of 0.000, indicating that their attitudes toward learning material were comparable. After implementing CFA (Attitude Post-Test), significant changes were observed in both groups. The control group's average attitude score increased to 76.117, while the experimental group's score rose to 79.021. The t-test results revealed a statistically significant difference with a t-value of 1.428 and a p-value of 0.000, indicating that the improvement in attitudes toward learning material was more pronounced in the experimental group compared to the control group. These findings underscore the positive impact of using CFA as a learning evaluation method in enhancing students' attitudes toward learning material. Specifically, students in the experimental group showed greater improvement, highlighting CFA's effectiveness in fostering a positive and supportive learning environment and improving learning quality at UDINUS.

Students' Attitudes and Knowledge Towards CFA

Figure 4 compares data between the control and experimental groups at two different time points: before and after the introduction of CFA. Before using CFA, the experimental group had an average student attitude score of 75.671, while the control group had an average score of 75.113 at the pre-test stage. At this point, there were no significant differences between the two groups, with the difference in scores being minimal. However, significant changes occurred at the post-test stage after the application of CFA. The experimental group's average student attitude score increased to 79.021, whereas the control group's average score rose to 76.117.

This disparity indicates that both groups showed increased student attitudes after implementing CFA, but the experimental group demonstrated a more significant improvement. This graph illustrates how applying CFA positively impacts students' views towards learning material. Although the control group had a lower mean beginning score, both groups exhibited beneficial changes in student attitudes. However, the experimental group saw more substantial increases in their students' attitudes after using CFA, highlighting the positive influence of this evaluation approach in enhancing students' perceptions of learning.

Table 2 compares the mean student knowledge scores before and after applying CFA as a learning evaluation approach in the control and experimental groups. The statistical analysis revealed significant disparities in the average knowledge scores of the two groups. The control group had an average knowledge score of 75.133 before using CFA, while the experimental group had an average score of 75.717.

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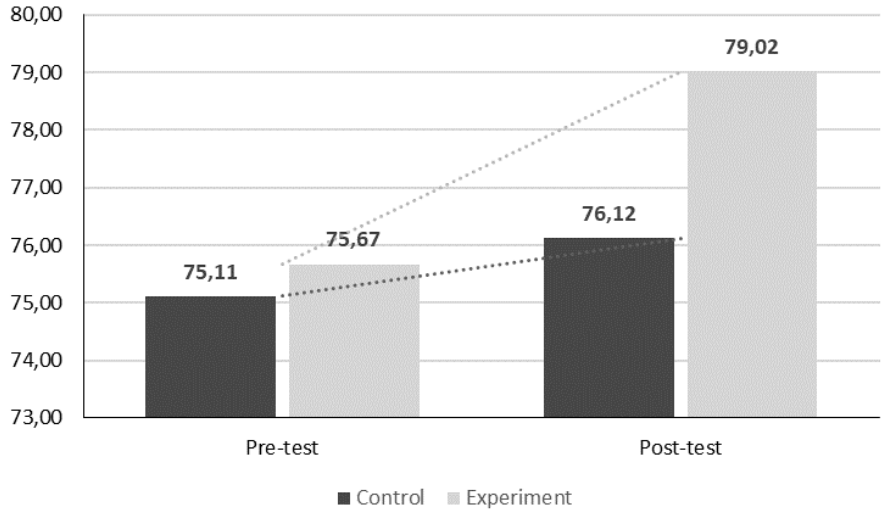

Figure 4. Results of Students' Attitude before and after CFA was applied in class

Table 2. The average score of students' knowledge of using CFA

Variable	Group	Mean	Standard Deviation	t-test result			
				t-test score	Degree of freedom (d.f)	Significance (2Tailed)	Mean Difference
Knowledge Pre-Test	Control	75.133	2.002	0.879	54	.000*	0.584
	Experiment	75.717	11.081				
Knowledge Post-Test	Control	78.117	6.225	1.53	54	.000*	3.635
	Experiment	81.752	8.077				

Note :*) Significant at α=5%

After implementing CFA, the mean knowledge scores in both groups increased significantly. The control group's average knowledge score increased to 78.117, while the experimental group's average knowledge score rose to 81.752. The 3.635-point difference in average knowledge scores between the two groups indicates that CFA effectively enhances students' comprehension and knowledge of the subject matter. This demonstrates the benefits of using CFA as an assessment tool during the UDINUS learning process. Students who employ this kind of instruction are more knowledgeable than those who do not, highlighting the success of the CFA evaluation approach in enhancing students' understanding in this study.

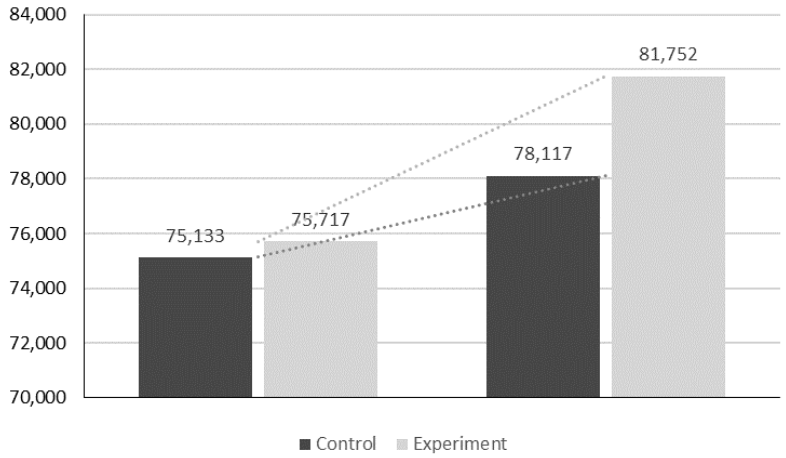

Figure 5. Results of Students' Knowledge before and after CFA was applied in class.

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Figure 5 displays statistics comparing student understanding before and after implementing CFA in the classroom, distinguishing between the experimental and control groups. Initially, both groups had comparable average knowledge scores—75.717 for the experimental group and 75.133 for the control group. Post-implementation, the experimental group showed a significant increase in average knowledge score, rising from 75.717 to 81.752 points. In contrast, the control group also improved, but to a lesser extent—from 75.133 to 78.117. This visual difference in Figure 5 supports the earlier findings that CFA significantly enhances students' comprehension and knowledge. Using CFA as an evaluation method improves students' subject-matter understanding and competence.

Students' Perceptions of the CFA Approach

This study gathered data on student learning outcomes and evaluations of the learning environment. Questionnaires comprising five specific questions were employed to gauge student perceptions of CFA as an evaluation tool. These questions covered topics such as student interest in CFA, satisfaction with its use, expectations of improved learning outcomes, and the perceived enjoyment of the learning experience facilitated by CFA. Gathering such data through questionnaires provides valuable insights into how students perceive and benefit from CFA in their learning process. This information is essential for evaluating CFA's effectiveness in learning assessment and understanding its impact on student motivation and learning experiences.

Table 3. Students' perceptions of the CFA approach

Questions List	Mean	Standard Deviation
I am interested in CFA as the current evaluation model (Q1).	3.11	0.607
CFA is fun (Q2).	3.20	0.632
CFA has a chance to fix learning achievement (Q3).	3.32	0.611
Using CFA, I can reach the desired learning achievement levels (Q4).	3.78	0.713
Every lecture becomes more interesting (Q5).	3.34	0.617

Table 3 presents students' perceptions of CFA in the learning process, showing mean scores and standard deviations for each questionnaire topic. The average overall score of 3.35 indicates general favorability towards CFA. Students show significant interest in CFA (Q1, 3.11), find CFA fun (Q2, 3.20), and believe it aids learning achievement (Q3, 3.32). Additionally, they feel CFA helps achieve academic goals (Q4, 3.78) and makes learning more engaging (Q5, 3.34). Overall, students favor CFA to enhance learning outcomes and experiences.

Hybrid learning approaches effectively address the limitations of online learning, aligning with findings from Anwar Korompot (2022) and Hakim et al. (2023). Combining online and face-to-face interactions, hybrid learning enhances student perspectives and learning expectations. This study supports Xiao et al. (2020), showing that CFA positively impacts attitudes, knowledge, and perceptions and makes learning more engaging. Students' favorable views of CFA indicate its potential to boost motivation and interest in education. These findings highlight the effectiveness of hybrid learning and CFA, providing a foundation for developing better teaching strategies in the online learning era.

4. DISCUSSION

The discussion delves into the implications of these findings for educational practices. It suggests strategies for educators to effectively leverage CFA to improve learning outcomes, emphasizing the importance of cultivating positive attitudes toward formative assessments. Additionally, it aligns with existing literature that supports the role of formative assessment in creating conducive learning environments and supporting hybrid learning models.

Students' Attitudes towards CFA

In this study, students overwhelmingly expressed positive sentiments towards CFA, viewing it as an assessment tool and an engaging element that enriches their learning experience. Most students indicated satisfaction and interest in integrating CFA into their educational journey. Comparing attitudes before and after the implementation of CFA revealed a notable shift towards increased student interest and engagement (refer to Figure 4). Initially, cautious or neutral attitudes transformed into positive perceptions following exposure to

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CFA practices. This shift underscores the significant impact of CFA on student attitudes toward assessments within learning contexts.

Several factors contributed to these positive attitudes. The well-designed implementation of CFA, which provided regular feedback and opportunities for active engagement, played a crucial role. External factors such as students' previous experiences with assessments and various teaching methods also influenced their perceptions of CFA. The positive attitudes towards CFA highlight its potential to enhance teaching practices by fostering student motivation, engagement, and deeper learning. Educators are encouraged to leverage CFA to improve learning outcomes. Communicating assessment goals and providing timely feedback can further enhance student acceptance of formative assessments. These findings align with previous studies (Ibrahim & Nat, 2019; Leenknecht et al., 2021; Yu et al., 2021), emphasizing the pivotal role of formative assessment in creating engaging learning environments and supporting hybrid learning models. They contribute to the existing body of knowledge by demonstrating CFA's effectiveness in enhancing student learning experiences and promoting active student involvement in the assessment process.

Students' Knowledge and Perceptions of CFA

The study reveals that students significantly improved their knowledge scores through CFA, as evidenced by **Table 2** and **Figure 5** findings. CFA's implementation facilitated better knowledge retention by providing students with regular feedback and fostering active engagement in their learning processes. This continuous assessment helped clarify concepts and identify areas needing improvement, contributing to enhanced understanding and retention of course material. Students generally held positive perceptions of CFA, emphasizing its role in enhancing their learning experience. They appreciated the immediate feedback offered by CFA, which helped them gauge their progress and adjust their learning strategies accordingly. However, some students initially found it challenging to adapt to the increased workload associated with frequent assessments.

Comparative analysis before and after the introduction of CFA indicated a notable shift in students' perceptions. Initially, there were mixed feelings and uncertainties about the effectiveness of continuous assessment. Over time, however, as students experienced the benefits firsthand, perceptions evolved favorably. This transformation underscores the transformative impact of CFA on students' attitudes toward assessment practices, highlighting its potential to foster a more proactive and engaged learning environment. The study's findings suggest implications for educational strategies, emphasizing the importance of integrating CFA more effectively into hybrid learning environments. By leveraging CFA's benefits, educators can optimize student learning outcomes through tailored feedback and enhanced student engagement. This aligns with existing literature on formative assessment and hybrid learning models (Amanina Bizami et al., 2022), which underscore the role of continuous assessment in promoting deeper learning and improving educational practices (Ashdale, 2020; Kulasegaram & Rangachari, 2018).

5. CONCLUSION

This study aimed to evaluate the effectiveness of CFA in enhancing student learning outcomes and attitudes within a hybrid learning environment. The findings indicate that CFA is a potent educational tool significantly improving student achievement and engagement. Most students reported positive perceptions of CFA, with an average perception score of 3.35 and a standard deviation of 0.697, underscoring its role in fostering an enriching learning experience. The research demonstrates that regular feedback and active participation, key components of CFA, contribute to better knowledge retention and understanding. The experimental group, which utilized CFA, showed notable improvements in attitudes and knowledge compared to the control group. These results suggest that CFA supports academic performance and positively influences students' attitudes toward learning. Lecturers' commitment to effectively implementing CFA is crucial. Integrating CFA with existing educational policies and continuously refining teaching strategies to meet students' needs. This commitment can lead to elevated teaching quality and more effective learning outcomes. The study highlights educators' need to adopt formative assessments actively and adapt them to hybrid learning models to maximize their benefits. Overall, this study underscores the potential of CFA to transform educational practices by promoting continuous improvement in both teaching and learning processes. It provides a robust foundation for further research to explore innovative applications of CFA in various educational settings, ensuring that teaching methods evolve to meet the dynamic needs of students in a hybrid learning environment.

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