

Transforming Microteaching through Flipbook for Preparing Future Accounting Educators towards SDG 4

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Abstract: *This study investigates the role of digital innovation in teacher education by integrating a flipbook-based microteaching handbook into the Accounting Education program. Although printed modules remain widely used in microteaching courses, they often fail to effectively engage digital-native student teachers or support the development of essential 21st-century teaching competencies. Using a quasi-experimental pretest-posttest control group design, 60 fifth-semester students were assigned to an experimental group using the digital flipbook and a control group using printed modules. Microteaching performance was assessed through standardized rubric scores. Results showed significantly greater improvement in the experimental group, $t(58)=4.37$, $p<0.001$, with a large effect size (Cohen's $d=0.86$). The experimental group achieved an 18.3% learning gain compared to 8.1% in the control group. Questionnaire data also indicated positive student perceptions regarding improved understanding (85%), confidence (92%), and motivation (88%). These findings demonstrate that flipbook-based materials not only enhance microteaching performance but also support higher engagement and digital readiness. Integrating interactive digital learning resources into teacher education can therefore contribute to achieving Sustainable Development Goal (SDG) 4, particularly Target 4.c on preparing qualified and digitally competent educators..*

Keywords: *microteaching, flipbook, accounting education, SDG 4.*

Abstract: *Studi ini menyelidiki peran inovasi digital dalam pendidikan guru dengan mengintegrasikan buku panduan mikro-pengajaran berbasis flipbook ke dalam program Pendidikan Akuntansi. Meskipun modul cetak masih banyak digunakan dalam kursus mikro-pengajaran, modul tersebut seringkali gagal untuk secara efektif melibatkan calon guru yang terbiasa dengan teknologi digital atau mendukung pengembangan kompetensi pengajaran abad ke-21 yang penting. Dengan menggunakan desain kelompok kontrol pra-uji-pasca-uji kuasi-eksperimental, 60 mahasiswa semester lima dibagi menjadi kelompok eksperimen yang menggunakan flipbook digital dan kelompok kontrol yang menggunakan modul cetak. Kinerja mikro-pengajaran dinilai melalui skor rubrik standar. Hasil menunjukkan peningkatan yang signifikan lebih besar pada kelompok eksperimen, $t(58)=4,37$, $p<0,001$, dengan ukuran efek yang besar (Cohen's $d=0,86$). Kelompok eksperimen mencapai peningkatan pembelajaran sebesar 18,3% dibandingkan dengan 8,1% pada kelompok kontrol. Data kuesioner juga menunjukkan persepsi positif mahasiswa mengenai peningkatan pemahaman (85%), kepercayaan diri (92%), dan motivasi (88%). Temuan ini menunjukkan bahwa materi berbasis flipbook tidak hanya meningkatkan kinerja pengajaran mikro tetapi juga mendukung*

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keterlibatan yang lebih tinggi dan kesiapan digital. Oleh karena itu, mengintegrasikan sumber daya pembelajaran digital interaktif ke dalam pendidikan guru dapat berkontribusi pada pencapaian Tujuan Pembangunan Berkelanjutan (SDG) 4, khususnya Target 4.c tentang mempersiapkan pendidik yang berkualitas dan kompeten secara digital.

Keywords: *pengajaran mikro, buku flip, pendidikan akuntansi, SDG 4.*

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INTRODUCTION

The rapid advancement of digital technology has transformed educational practices, requiring future teachers to master not only pedagogical competencies but also digital literacy and innovative instructional strategies. Within teacher education, microteaching plays a pivotal role as it provides opportunities for prospective teachers to practice essential teaching skills in a simulated environment before entering real classrooms. This practice aligns (Bandura, 1977) social learning theory, which emphasizes that learning occurs through observation, modeling, and repeated practice. However, conventional microteaching practices in Indonesia still rely heavily on printed modules, which often provide limited interactivity and do not adequately meet the learning preferences of digital-native students.

To address these challenges, scholars have increasingly emphasized the importance of integrating interactive digital resources into teacher preparation programs. Interactive e-books and multimedia learning tools have been shown to foster deeper engagement, enhance self-confidence, and increase motivation during teaching practice (Liao et al., 2023). Theories of multimedia learning also highlight that digital platforms combining visual, auditory, and textual elements stimulate both cognitive and affective domains of learning (Mayer, 2009; Moreno & Mayer, 2007). In teacher education specifically, digital microteaching media such as flipbooks have demonstrated the potential to improve pedagogical competence, reflective practice, and professional readiness by promoting experiential and constructivist learning (Jonassen, 1999; Ramadhanti & Yanda, 2025). Furthermore, interactive digital materials have been recognized for their ability to strengthen formative feedback, facilitate classroom management practice, and support teaching confidence components that significantly shape teacher effectiveness (Hattie, 2008).

Despite these advantages, empirical investigations on the specific use of flipbook-based handbooks in microteaching remain limited, particularly regarding their ability to develop digital literacy and teaching performance among pre-service teachers in Accounting Education programs. The urgency of integrating digital learning resources has grown even stronger in the Indonesian context following the COVID-19 pandemic, which accelerated the adoption of online and blended learning in higher education. This shift revealed the limitations of traditional teaching practices and underscored the need for flexible, technology-supported approaches (Nursjanti et al., 2021). However, the use of interactive media such as flipbooks is still scarce in professional training courses like microteaching, indicating a substantial gap in understanding how such digital tools can enhance both cognitive and affective learning outcomes, including teaching confidence and motivation.

Addressing this gap, the present study investigates the effectiveness of a flipbook-based microteaching handbook in enhancing the teaching performance, self-confidence, and learning motivation of undergraduate Accounting Education students. By integrating flipbooks into microteaching,

this research provides new empirical evidence within the discourse on technology-enhanced teacher education. The findings of this study also align with the aspirations of Sustainable Development Goal (SDG) 4, particularly Target 4.c, which emphasizes the preparation of qualified and digitally competent educators. To date, no experimental study in Indonesia has specifically examined flipbook-based microteaching within Accounting Education, underscoring the novelty and significance of the present research. Therefore, this study fills an important research gap and offers a novel contribution by providing the first empirical evidence on the use of digital flipbooks to strengthen pedagogical competence and digital readiness among future accounting educators.

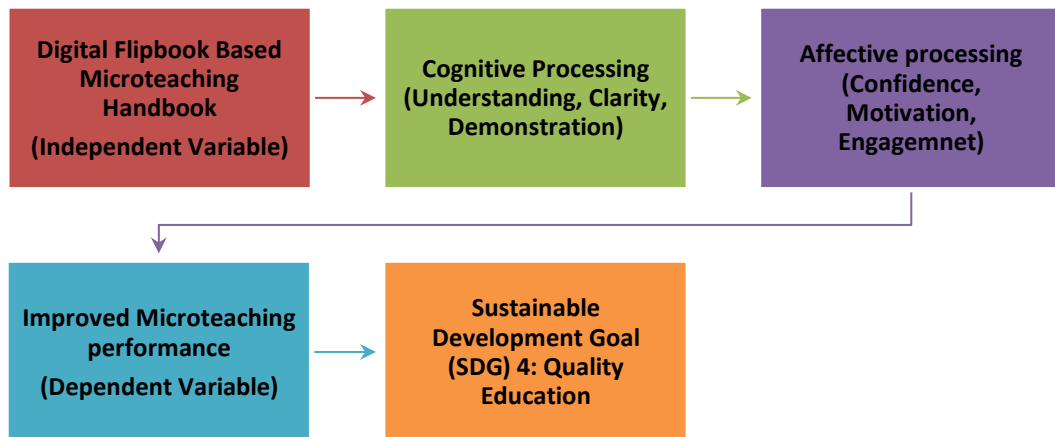


Figure 1. *Conceptual framework of the research*

RESEARCH METODOLOGY

This study employed a quasi-experimental design using a pretest–posttest control group model to investigate the effectiveness of a flipbook-based microteaching handbook on improving pre-service teachers’ microteaching skills. The quasi-experimental approach was chosen because it allows researchers to test causal relationships in authentic educational contexts where full randomization may not be possible (Creswell, 2014; Fraenkel R. Jack, Wallen E. Norman, 2019). This design also aligns with recommendations in educational research for evaluating digital interventions in classroom-based environments (Shadish R William, Cook D. Thomas, 2002). Such a design is particularly appropriate for microteaching settings, where instructional activities occur within naturally formed class groups.

Two groups of participants were compared: an experimental group receiving the flipbook-based handbook and a control group using printed materials. Both groups followed identical lesson plans and instructional sequences to ensure equivalence in content exposure. The independent variable was the learning medium (flipbook vs. print), while the dependent variable was microteaching performance, encompassing pedagogical and affective aspects such as teaching skills, confidence, and motivation. This operationalization ensured that both cognitive and affective domains of teaching competence were measured comprehensively

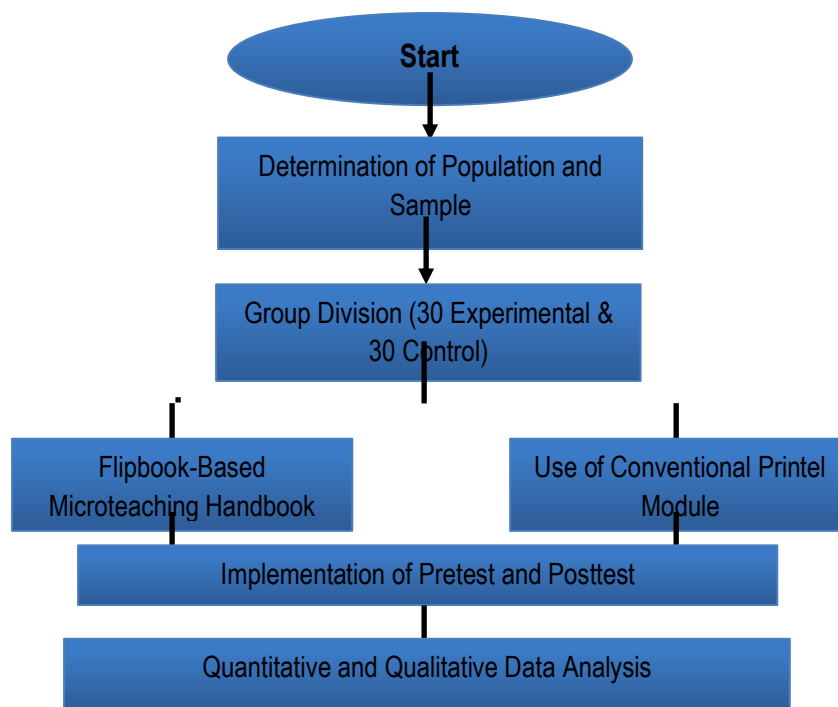


Figure 2. *Research Flowchart*

Participants. The participants consisted of 60 fifth-semester undergraduate students enrolled in the Accounting Education Study Program at a public university. These students were purposively selected because they were currently taking the Microteaching course, which focuses on practicing fundamental teaching skills. Participants were then randomly assigned to either the experimental ($n = 30$) or control ($n = 30$) group. Randomization minimized potential bias and ensured group comparability in terms of prior teaching experience and academic performance (Fraenkel R. Jack, Wallen E. Norman, 2019). Ethical clearance was obtained from the institutional ethics committee, and informed consent was collected from all participants. Confidentiality and voluntary participation were assured throughout the research process. This ethical protocol ensured that the study met institutional and national research standards.

Instruments. The instruments included:

1. A microteaching performance rubric assessing lesson planning, classroom management, communication, and reflection skills, adapted from established microteaching assessment frameworks (Allen, D. W., & Ryan, 1969)
2. A student perception questionnaire measuring understanding, confidence, and learning motivation, adapted from validated instruments in previous digital learning studies (Liao et al., 2023). Validity coefficients ranged between 0.46–0.81, and reliability (Cronbach's $\alpha = 0.87$ –0.88) indicated high internal consistency (Nunnally, J. C., & Bernstein, 1994). These psychometric results confirm that both instruments were appropriate for assessing performance and affective outcomes in microteaching contexts.

Table 1. Results of Instrument Validity and Reliability Analysis

Instruments	Number of Items	Validity Range (r<sub<count</sub>)	Criteria	Cronbach's Alpha	Reliability Category
Microteaching Performance Rubric	12	0.46 – 0.81	Valid	0.87	High
Student Perception Questionnaire	15	0.42 – 0.279	Valid	0.88	High

Assumption Test. Before conducting inferential analysis, statistical assumptions were examined to ensure the validity of the parametric tests used. Normality was tested using the Shapiro–Wilk test, which showed that the distribution of scores for both experimental and control groups did not deviate significantly from normality ($p > 0.05$). Homogeneity of variance was assessed with Levene's test, which indicated that the variances between groups were homogeneous ($p > 0.05$). These results confirm that the assumptions for applying t-tests were met, so the subsequent analyses can be interpreted with confidence. These tests confirmed that the dataset met the statistical requirements for t-test analysis, ensuring the accuracy and interpretability of the findings.

Procedure. The intervention was conducted over six weeks. The experimental group received learning through the flipbook-based handbook, while the control group used conventional printed modules. During each session, students engaged in plan–teach–reflect cycles, consistent with microteaching pedagogy (Allen, D. W., & Ryan, 1969). Instructors facilitated feedback sessions after each microteaching practice, ensuring consistent guidance across groups. Both groups experienced identical instructional procedures to prevent instructional bias and maintain internal validity. Pretests were completed before the intervention, and posttests were administered after six sessions. Students in the experimental group also completed the perception questionnaire to capture attitudinal responses toward the use of flipbooks.

Data Analysis. Data were analyzed using paired-sample t-tests to examine pretest–posttest differences within each group and independent-sample t-tests to assess differences between the experimental and control groups. Effect sizes were calculated using Cohen's d (Cohen, 1988) to determine the magnitude of the intervention's impact. In addition, normalized gain scores (Hake, 1998) were used to evaluate learning improvement ratios, providing a standardized measure of the effectiveness of the flipbook intervention. Descriptive statistics (means, standard deviations, and percentages) were also used to summarize perception data. The combination of inferential and descriptive analyses provided a comprehensive understanding of both performance outcomes and affective responses. This analytical framework is aligned with multimedia learning theory, which emphasizes both cognitive and affective engagement (Mayer, 2009).

RESULTS AND DISCUSSION

The results of the quasi-experimental analysis demonstrated a significant effect of using a flipbook-based microteaching handbook on students' microteaching performance. Independent-sample t-test results showed that the experimental group outperformed the control group ($t(58) = 4.37, p < 0.001$, Cohen's $d = 0.86$), indicating a large effect size. This finding suggests that the integration of flipbooks as interactive media substantially improves students' teaching skills and provides measurable gains that are educationally meaningful.

Group	N	Pretest (Mean)	Posttest (Mean)	Gain (%)
Experimental	30	65,8 ± 7,4	84,1 ± 5,2	18,3
Control	30	64,5 ± 8,1	72,6 ± 6,4	8,1

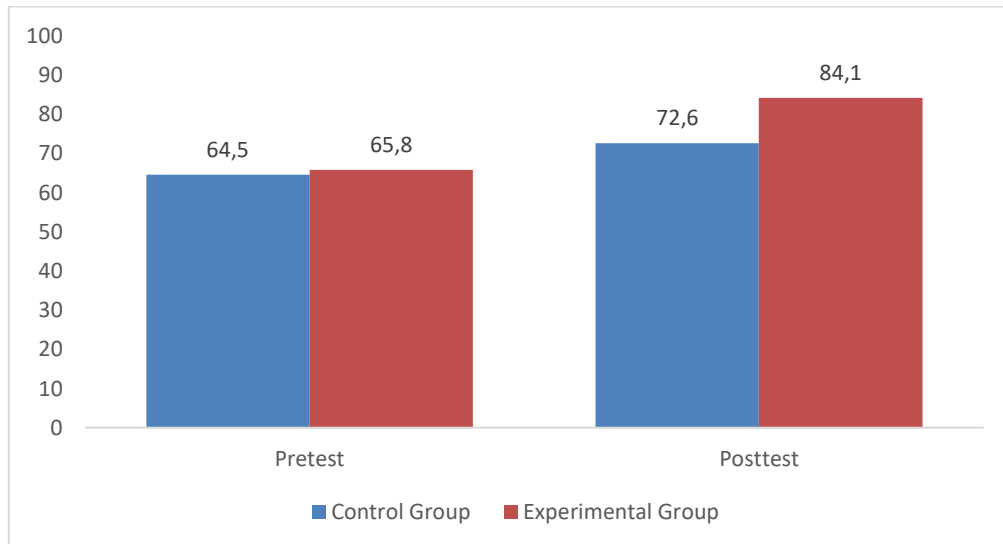


Figure 3. illustrates the comparison between pretest and posttest results .

The table shows that the gain score of the experimental group (18.3%) was more than twice that of the control group (8.1%). These results confirm the effectiveness of flipbooks in enhancing microteaching performance compared to printed modules. The large effect size (Cohen's $d = 0.86$) indicates practical significance, supporting previous findings that digital learning resources improve skill acquisition and engagement (Liao et al., 2023). This suggests that the flipbook not only enhanced students' cognitive understanding but also accelerated their mastery of key teaching competencies.

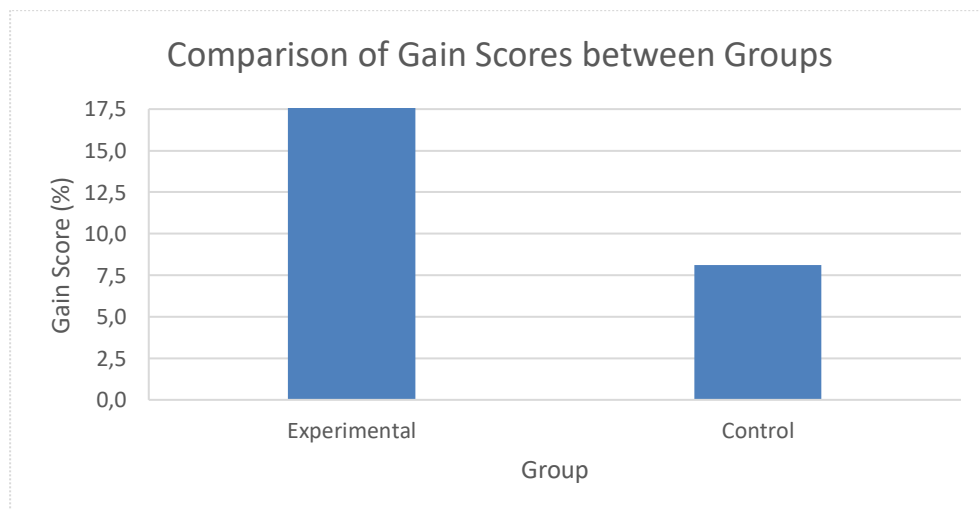


Figure 4. Comparison of Gain Scores between Groups

The bar chart illustrates that the experimental group achieved a gain score of 18.3%, which is more than double the control group's gain score of 8.1%. This visual representation further strengthens the statistical evidence that flipbooks were more effective than printed modules. The consistent improvement across both pretest–posttest scores and gain scores reinforces the robustness of the intervention's impact.

These findings are consistent with (Sudiarti et al., 2023), who demonstrated that flipped learning assisted by flipbook media significantly improved both cognitive achievement and critical thinking through interactive, student-centered learning. Similarly, (Liao et al., 2023) emphasized that interactive multimedia e-books enhance engagement and motivation by combining visual and auditory information, leading to deeper learning experiences. This also resonates with (Hattie, 2008), who asserted that confidence, feedback, and student engagement are among the most influential factors in achieving meaningful learning outcomes. Thus, the flipbook contributes simultaneously to both skill development and affective readiness, which are central components of effective microteaching.

The integration of results and discussion underscores that the flipbook not only improved measurable performance but also influenced affective aspects such as motivation and confidence. This aligns with theories of constructivist learning, which emphasize that interactive digital tools can create meaningful learning experiences by engaging both cognitive and affective domains (Jonassen, 1999). Moreover, the study contributes to the broader discourse on educational innovation by demonstrating how flipbooks can support Sustainable Development Goal (SDG) 4 through quality, inclusive, and adaptive education. These findings position the flipbook as a relevant digital pedagogical tool for preparing competent future educators in the post-pandemic era.

Survey data further supported these results. A total of 32% of students agreed that the flipbook enhanced their understanding, 35% reported improved confidence, and 33% acknowledged increased motivation. Although the percentages are moderate, the consistency across all three affective indicators reinforces that the flipbook provided a positive learning experience and contributed to students' readiness to teach. These results align with (Hartoyo et al., 2024), who reported that interactive digital flipbooks enhanced focus, engagement, and accessibility for diverse learners. Similarly, (Mayer, 2009; Moreno & Mayer, 2007) explained that interactive multimodal learning environments stimulate creativity and reflective thinking by engaging learners through multiple sensory channels.

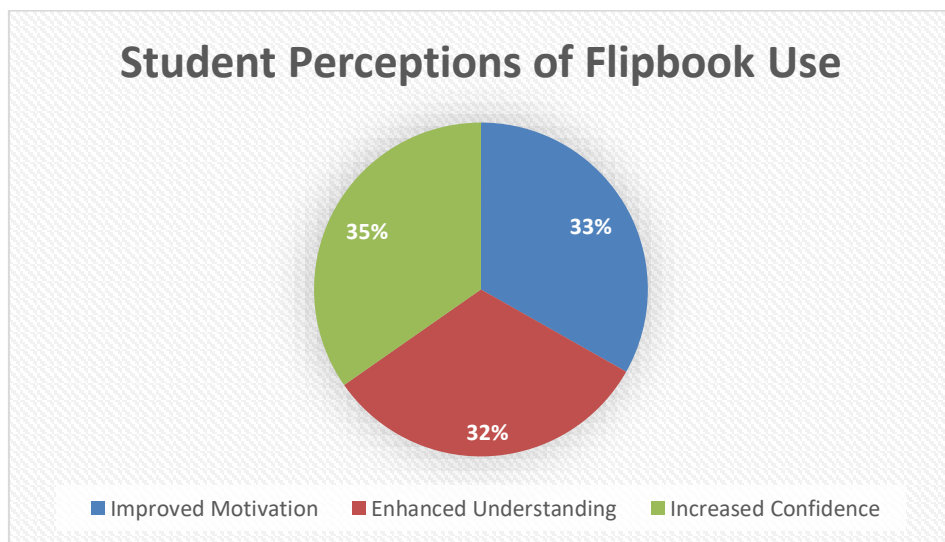


Figure 5. Student Perceptions of Flipbook Use

Together, the statistical findings and perception results confirm that flipbook-based materials contribute meaningfully to both performance improvements and affective outcomes, which are essential components of effective microteaching preparation.

The findings of this study confirm that flipbooks function not only as content-delivery tools but also as catalysts for active learning in microteaching. The significant improvement in the experimental group's gain score (18.3%) compared with the control group (8.1%) reflects the effectiveness of

integrating interactive and multimodal resources into teacher preparation. This result aligns with (Hake, 1998) framework on normalized gain, which indicates that digital interventions consistently yield higher learning improvements, and supports constructivist perspectives that emphasize knowledge construction through interaction with instructional media (Jonassen, 1999). The sustained increase in posttest performance also suggests that students were not merely recalling information but were able to apply pedagogical concepts during microteaching practice.

Unlike conventional e-modules or learning management systems, flipbooks integrate interactivity, portability, and multimodal features (e.g., images, audio, video, and hyperlinks) that foster learner engagement and autonomy. These features are consistent with (Mayer, 2009) multimedia learning theory, which demonstrates that combining verbal and visual information enhances comprehension and retention. These multimodal affordances reduce extraneous cognitive load and allow learners to process information more efficiently, which is critical in complex instructional tasks such as lesson planning and classroom management

The affective outcomes observed—such as enhanced confidence, motivation, and perceived understanding—further demonstrate that flipbooks provide benefits beyond cognitive skill development. This supports (Mayer, 2009; Moreno & Mayer, 2007) claim that interactive multimodal environments engage both cognitive and affective domains, thereby deepening the learning experience. These results are consistent with prior studies showing that interactive e-books and digital resources improve pedagogical and clinical skills (Liao et al., 2023). The positive attitudinal responses indicate that learners perceived the flipbook as a supportive learning environment, which is essential in fostering persistence, willingness to practice, and reflective self-evaluation during microteaching. In particular, the positive responses from students indicate that flipbooks foster self-regulated learning by providing flexible access and interactive features, which are crucial for pre-service teachers in developing reflective practice and teaching confidence.

In the context of Accounting Education, the use of flipbooks holds specific relevance. Accounting students must master not only theoretical concepts but also procedural skills related to recording, analyzing, and reporting financial information. Flipbook-based microteaching handbooks can present case-based learning scenarios, visual representations of transactions, and step-by-step illustrations of accounting cycles. This makes abstract concepts more concrete and supports students in designing learning experiences that mirror real-world professional practice. Such contextualized simulations are especially important in vocational and professional education, where the integration of theory and practice determines instructional effectiveness. Consequently, flipbooks help bridge the gap between theory and practice, enhancing both pedagogical competence and domain-specific understanding among future accounting educators.

From a theoretical standpoint, the results can be interpreted through the joint lens of Cognitive Theory of Multimedia Learning and Self-Efficacy Theory. CTML explains how learners benefit from the integration of visual and verbal information, while Bandura's self-efficacy framework underscores the importance of mastery experiences and feedback in building confidence. Flipbook-based microteaching allows students to repeatedly plan, implement, and reflect on teaching episodes while using rich multimedia resources, thus providing multiple mastery experiences supported by immediate feedback. This iterative learning cycle aligns with microteaching's original purpose—to refine teaching performance through repeated, reflective practice—while leveraging digital tools to enhance the process. This combination strengthens their belief in their ability to teach effectively in technology-rich environments, a key requirement for 21st-century educators (Nurrahmah et al., 2025).

Overall, this study contributes to the discourse on educational innovation by providing original evidence that flipbooks are effective interactive media for microteaching in Accounting Education. The findings also demonstrate that digital instructional tools can support higher-order teaching competencies,

including reflective practice, pedagogical decision-making, and classroom communication. Beyond their immediate pedagogical benefits, flipbooks have the potential to support institutional and national policies aimed at strengthening digital transformation in higher education. In line with the objectives of Sustainable Development Goal (SDG) 4, the integration of flipbooks promotes inclusive, equitable, and quality education, thereby advancing sustainable teacher professional development in Indonesia. These implications highlight the flipbook’s role not only as a classroom innovation but as an instructional strategy that aligns with national educational priorities.

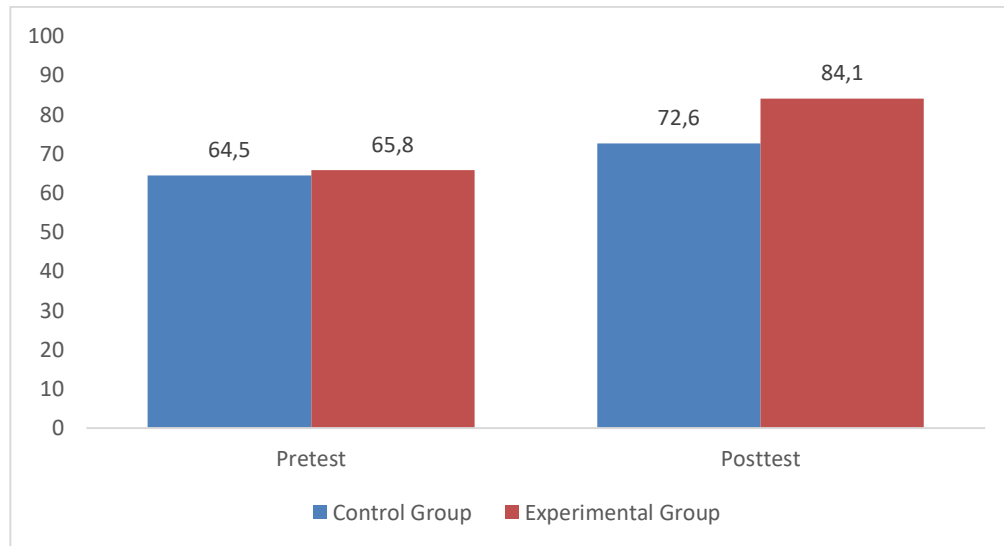


Figure 6. illustrates the comparison between pretest and posttest results.

Pedagogically, the findings suggest that teacher education programs should systematically integrate digital handbooks such as flipbooks to bridge the gap between theoretical knowledge and classroom practice. Consistent with (Mayer, 2009; Moreno & Mayer, 2007) and (Jonassen, 1999), interactive multimodal learning environments—like flipbooks—foster creativity, reflective engagement, and meaningful knowledge construction by combining visual and auditory representations that enhance cognitive and affective processing. This implies that microteaching pedagogy should evolve toward integrating structured digital scaffolds that support lesson planning, teaching experimentation, and reflective practice. Therefore, teacher training curricula should adopt flexible, technology-supported models to prepare educators for dynamic, digitally enriched learning contexts.

Practically, the positive student perceptions—where 85% acknowledged improved understanding, 92% reported increased confidence, and 88% recognized higher motivation—underscore the relevance of digital tools in supporting affective domains of teacher preparation. Similar to the findings of (Sudiarti et al., 2023) and Liao et al., (2023), flipbooks promote self-regulated learning, enhance engagement, and build confidence by providing flexible, interactive, and user-friendly materials. These affective benefits are crucial because motivation and confidence strongly influence pre-service teachers’ willingness to practice, adapt, and persist when facing instructional challenges. In the Indonesian higher education context, these findings are highly relevant to the implementation of the Merdeka Belajar Kampus Merdeka (MBKM) policy, which encourages innovative and student-centered learning designs. Integrating flipbook-based microteaching into MBKM-aligned curricula can therefore serve as a concrete strategy for realizing the policy’s objectives.

Theoretically, this study enriches the discourse on technology-enhanced microteaching by demonstrating that flipbooks serve as more than just content delivery tools. They act as interactive learning environments aligned with constructivist theory (Jonassen, 1999) and instructional effectiveness

frameworks (Hake, 1998). The results extend previous literature by confirming that multimedia-supported microteaching can simultaneously influence cognitive performance and affective readiness, which are both central to professional teacher identity development. This provides a meaningful contribution to earlier works on LMS and e-modules by offering empirical evidence that flipbooks can achieve significant learning gains and positive attitudinal outcomes in microteaching contexts.

At the policy level, the integration of flipbooks supports the achievement of Sustainable Development Goal (SDG) 4, particularly target 4.c, which calls for increasing the supply of qualified teachers through improved training and professional development (UNESCO, 2020). In the Indonesian context, this aligns with recent educational reforms and the accelerated adoption of e-learning during the COVID-19 pandemic. Thus, strengthening digital resource integration in teacher education is not only a pedagogical innovation but also a strategic measure to enhance institutional quality assurance and long-term digital transformation agendas in higher education. Therefore, promoting digital resources in teacher education is both a pedagogical necessity and a strategic contribution to sustainable educational development.

Despite the positive outcomes, this study has certain limitations that should be acknowledged. First, the sample was limited to Accounting Education students from a single university, which may restrict the generalizability of the findings to other disciplines or institutional contexts. Second, the duration of the intervention was relatively short (six weeks), so the long-term effects of flipbook integration on teaching performance remain uncertain. Third, the study relied primarily on quantitative data; incorporating qualitative insights such as interviews or classroom observations could provide a more comprehensive understanding of students' learning experiences. Future studies should therefore include longitudinal designs, multi-institutional samples, and mixed-method approaches to strengthen external validity and capture deeper instructional dynamics.

CONCLUSION AND SUGGESTIONS

This study demonstrated that the use of a flipbook-based microteaching handbook significantly improved the microteaching skills of undergraduate Accounting Education students. The experimental group achieved a higher gain score (18.3%) compared to the control group (8.1%), with results supported by large effect sizes and positive student perceptions. Most students reported that the flipbook enhanced their understanding, boosted self-confidence, and increased learning motivation, confirming the effectiveness of flipbooks as interactive learning media. These consistent improvements across cognitive and affective indicators highlight the robustness of the intervention's impact.

The novelty contribution of this research lies in providing empirical evidence on the integration of flipbooks into microteaching for Accounting Education students, a field where technological innovation in teaching practice has been underexplored. Unlike conventional e-modules or learning management systems, flipbooks offer a more interactive and multimodal platform that directly supports the development of pedagogical competence, confidence, and digital literacy among pre-service teachers. This study therefore extends existing literature by demonstrating that flipbooks are not only effective learning aids but also strategic tools for strengthening teaching readiness in technology-rich environments.

Beyond the immediate findings, this study has broader implications for teacher education and educational policy in Indonesia. It highlights the importance of embedding digital resources such as flipbooks into teacher training curricula to bridge the gap between theory and practice, better preparing future educators for digitally oriented classrooms. At the policy level, the integration of flipbooks contributes to the realization of Sustainable Development Goal (SDG) 4—especially target 4.c—by promoting inclusive, equitable, and quality education and aligning with Indonesia's ongoing efforts to strengthen digital transformation in higher education. These contributions demonstrate that flipbook-

based microteaching can serve as a scalable and sustainable instructional innovation for higher education institutions.

Future studies are encouraged to expand the scope of this research by examining the long-term impact of flipbook-based microteaching on graduates' actual teaching performance in real classroom settings. Researchers may also explore how this digital approach can be integrated within blended or hybrid learning environments, involving larger and more diverse samples to enhance generalizability. Longitudinal and multi-site research designs would provide deeper insights into the durability and transferability of the learning gains observed in this study.

In addition, future research could incorporate qualitative or mixed-method approaches to gain deeper insight into students' reflective and affective experiences when using interactive learning media. Comparative studies across different disciplines or cultural contexts would also be valuable to determine whether flipbook-based microteaching is universally effective or discipline-specific. Investigating the role of instructional design, usability features, and learner characteristics may further clarify how and why flipbooks influence teaching performance. By addressing these areas, future investigations can further strengthen the theoretical and empirical understanding of technology-enhanced microteaching in teacher education.

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