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The influence of blended learning models and internet self-efficacy on digital citizenship attitudes of elementary school students in Indonesia

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Abstract

Context and relevance. The integration of technology in elementary education is essential in developing students' digital citizenship attitudes, as Indonesian children need to learn responsible technology use within Pancasila education to become competent digital citizens in an increasingly connected world. **Hypothesis.** The study hypothesized that there would be significant differences in digital citizenship attitudes between students taught using blended learning versus direct instruction models, between students with high versus low internet self-efficacy, and that there would be an interaction effect between learning models and internet self-efficacy on students' digital citizenship attitudes. **Methods and materials.** Utilizing a quasi-experimental study with a 2×2 factorial format, the research involves 288 fourth-grade students from both public and private schools in Bangkalan, East Java. Data collection includes pre- and post-tests, questionnaires measuring internet self-efficacy and digital citizenship attitudes. **Results.** Statistical analysis revealed that students in the blended learning group demonstrated better digital citizenship attitudes compared to those in the direct instruction group (F = 8,856), students with higher internet self-efficacy showed more positive digital citizenship attitudes than those with lower self-efficacy (F = 21,983), and a significant interaction effect existed between learning models and internet self-efficacy (F = 6,938), indicating that the effectiveness of learning models varies depending on students' internet self-efficacy levels. **Conclusions.** Blended learning improves elementary students' digital citizenship attitudes more effectively than direct instruction, with internet self-efficacy levels significantly influencing these outcomes and interacting with teaching methods, suggesting educators should adopt tailored approaches based on students' technological confidence.

Keywords: blended learning, internet self-efficacy, digital citizenship, elementary education

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Влияние моделей смешанного обучения и интернет-самоэффективности на цифровое гражданское поведение учеников начальных классов в Индонезии

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Резюме

Контекст и актуальность. Интеграция современных технологий в систему начального образования играет ключевую роль в формировании у учеников позитивного отношения к цифровому гражданству. В условиях, когда индонезийские дети должны осваивать ответственное использование технологий в рамках концепции Панчасила[1], важно подготовить их к жизни в мире, в котором все становится более взаимосвязанным. Обучение цифровой грамотности является необходимым условием для формирования компетентных и ответственных цифровых граждан. **Гипотеза.** В рамках исследования предполагалось, что между группами учеников, обучающихся по моделям смешанного обучения и традиционного обучения, существуют значительные различия в отношении к цифровому гражданству. Также предполагается, что уровень интернет-самоэффективности, то есть вера учеников в свои способности использовать интернет, влияет на эти отношения. Более того, предполагалось наличие взаимодействия между выбранной моделью обучения и уровнем интернет-самоэффективности, что может усиливать или ослаблять влияние каждого из факторов на отношение к цифровому гражданству. **Методы и материалы.** В исследовании использовался квазиэксперимент с факторной структурой 2×2, в котором приняли участие 288 четвероклассников из государственных и частных школ округа Бангкаланга, Восточная Ява. Для получения данных применялись предварительные и итоговые тесты, а также анкеты для оценки уровня интернет-самоэффективности и отношения к цифровому гражданству. **Результаты.** Анализ показал, что ученики, обучающиеся по модели смешанного обучения, демонстрируют более позитивное отношение к цифровому гражданству по сравнению с теми, кто учится по традиционной модели ($F = 8{,}856$). Также было выявлено, что ученики с высоким уровнем интернет-самоэффективности проявляют более положительное отношение к цифровому гражданству по сравнению с теми, у кого уровень ниже ($F = 21{,}983$). Кроме того, обнаружено значимое взаимодействие между

[1] Официальная философская, политическая, идеологическая доктрина Индонезии «Панчасила» («Пять принципов») была выдвинута в 1945 г. первым президентом Индонезии Сукарно в качестве основных постулатов устройства страны. К этим принципам относится следующее:

- вера в единого Бога;
- справедливая и цивилизованная гуманность;
- единство страны;
- демократия, направляемая разумной политикой консультаций и народного представительства;
- социальная справедливость.

моделями обучения и уровнем интернет-самоэффективности (F = 6,938), что свидетельствует о том, что эффективность методов обучения зависит от уровня технологической уверенности учеников. **Выводы.** Модель смешанного обучения оказывается более эффективной в формировании у начальных школьников положительного отношения к цифровому гражданству по сравнению с традиционным формой обучения. Важную роль при этом играет уровень интернет-самоэффективности, так как он существенно влияет на результаты и взаимодействует с выбранными педагогическими подходами. Эти выводы подчеркивают необходимость адаптации методов преподавания с учетом технологической уверенности каждого ученика для достижения максимальной эффективности формирования ответственного цифрового поведения.

Ключевые слова: смешанное обучение, интернет-самоэффективность, цифровое гражданское поведение, начальное образование

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Introduction

The rapid development of information and communication technology has transformed education globally (An et al., 2021), expanding learning beyond traditional time and place constraints through widespread online platforms (Kumar et al., 2021) that offer accessibility and flexibility (Alshawish et al., 2021) despite implementation challenges (Abdillah et al., 2020). Technical resource limitations and teacher capabilities remain significant obstacles (Anjelin, Purnomo, 2021), with online learning during COVID-19 causing learning loss in Indonesia (Anggraena et al., 2021) and worldwide (Tahir et al., 2022; Wahyuni, 2021). Blended learning models effectively integrate technology with face-to-face instruction (Abdillah et al., 2020; Lapitan et al., 2021), with countries like India, Oman, Laos, and Vietnam prioritizing this approach (UNESCO, 2021) to help students utilize technology for improved academic outcomes and create educational environments for the common good in global society. Research indicates blended learning is particularly valuable for elementary education (Jiang et al., 2021), enhancing independent learning abilities and providing innovative content (Ashraf et al., 2022; Berga et al., 2021), with studies by Assylzhanova (2022) and Jiang (2021) confirming positive impacts on achievement. Additionally, 21st-century education must address cybersecurity through digital citizenship, defined as appropriate and responsible technology use (Öztürk, 2021), characterized by digital responsibility, safe practices, critical thinking, and productive social engagement (Pangrazio & Sefton-Green, 2021). Digital citizens regularly use technology for information, civic obligations, and economic purposes (Öztürk, 2021), with key issues including digital ethics, online safety, and responsible social media use, requiring attitudes that demonstrate technological behavior intelligence and appropriate choices when using technology (Jaeger, 2021).

The integration of blended learning in Pancasila education at the elementary level enhances student flexibility and control, promoting collaboration and the spirit of mutual cooperation. This educational approach, supported by digital tools, allows students to apply these values in practical contexts such as community service

and social activities (Dewi et al., 2020). As digital natives, elementary students' frequent interaction with technology makes the integration of these tools into traditional learning essential for improving both academic outcomes and digital citizenship. Pancasila's core values, particularly "The Unity of Indonesia," emphasize unity, solidarity, and social cohesion, which are vital aspects of Indonesian culture. Pancasila education teaches students their civic rights and responsibilities while fostering responsible online behaviour, thereby enhancing their digital citizenship (Mufid et al., 2021). By instilling digital ethics and a sense of responsibility, students develop essential skills for effectively addressing social issues in their everyday lives. This approach supports findings that highlight the importance of nurturing digital citizenship from an early age, preparing students to be responsible, engaged members of their communities (Mulia, 2023).

In this context, Pancasila education needs to be designed to encourage and provide opportunities for students to explore widely and discover knowledge from various learning sources. At the elementary level, Pancasila education should prepare students with a comprehensive set of knowledge, attitudes, and skills necessary to exercise their rights and responsibilities as good citizens (Maisyaroh et al., 2023), establishing a strong foundation in preparing Indonesia's golden generation in accordance with increasingly complex contemporary demands (Law of the Republic of Indonesia Number 20 of 2003 Concerning the National Education System, 2003). These competencies are crucial for every citizen to adapt to the demands of changing times and to solve personal and social problems in everyday life. Utilizing internet-based digital learning resources in Pancasila education can support student learning outcomes by providing access to various relevant information and learning sources (Krisnawati et al., 2023). This study addresses the gap in digital citizenship research by providing empirical data on elementary school students in Indonesia, a perspective often underrepresented in Western-dominated literature. While blended learning research typically focuses on secondary or higher education, this investigation uniquely examines its effectiveness at the elementary level, particularly regarding digital citizenship attitudes in Indonesian contexts. "Learning that uses the internet as a medium requires students to have adequate skills in using and accessing internet-based information (Kumar et al., 2021)." Internet self-efficacy emerges as a crucial characteristic affecting learning performance in online environments, as "internet self-efficacy is one characteristic of students that can influence learning outcomes in internet-based learning (Dinh & Nguyen, 2022)," referring to students' confidence in their ability to leverage internet resources for educational purposes, which significantly impacts their learning outcomes in developing countries.

Internet self-efficacy, founded on Bandura's social cognitive theory (1978), refers to individuals' beliefs about their ability to complete tasks using specific skills, generating internal motivation and confidence to overcome learning obstacles (Bandura, 1977). In internet-based learning, this concept significantly influences students' abilities to search for relevant information and achieve success, as demonstrated by Panigrahi's (2022) research showing its impact on finding accurate information from reliable sources, and Chuang's research (2015) revealing that students with high internet self-efficacy have greater learning success potential. Based on Bandura's self-efficacy theory (Bandura, 1978), student characteristics related to internet self-efficacy can directly or indirectly affect their willingness to use technology according to their potential, making it a suspected behavioral control factor influencing learning outcomes and digital citizenship attitudes in internet-based learning (Chuang et al., 2015; Guazzini et al., 2022). This study examines the interaction effect between blended learning models and internet self-efficacy to provide empirical evidence on how these factors collaboratively influence learning outcomes and digital citizenship attitudes, comparing blended learning with direct instruction models to gain valuable insights into optimal technology implementation in elementary education, particularly considering internet self-efficacy (high and low) as a moderator variable affecting students' digital citizenship attitudes.

This research examines the relationship between blended learning and direct instruction models in relation to students' diverse internet self-efficacy levels, providing an empirical framework for optimizing educational approaches in the digital era. The study investigates how different learning models affect students with varying internet capabilities, acknowledging that these differences significantly impact learning outcomes and digital citizenship attitudes (Al-Zahrani, 2015). While blended learning integrates online and face-to-face instruction to provide flexibility (Sari, 2021), direct instruction offers a structured approach beneficial for elementary students requiring additional guidance, particularly those with lower internet self-efficacy (de Jong et al., 2023). The research makes theoretical contributions by introducing a framework that integrates technology factors with blended learning in elementary education, while offering practical insights for teachers to enhance education quality through technology integration, especially for Pancasila teachers seeking to instill mutual cooperation values through collaborative learning in the digital age. Both models can be adapted to students' technological proficiency levels, though further validation is needed to determine specific effects on elementary students' digital citizenship attitudes, with the ultimate goal of supporting educational approaches that address today's students' diverse internet self-efficacy levels.

Materials and methods

This quasi-experimental study employed a 2×2 factorial design to investigate the influence of blended learning versus direct instruction on digital citizenship attitudes among elementary school students in Indonesia, while accounting for varying levels of internet self-efficacy. The research utilized «a factorialized version of the non-equivalent control group design» with two independent variables: the learning model (blended learning or direct instruction) and internet self-efficacy (high or low), with digital citizenship attitudes as the dependent variable. The population comprised elementary school students in Bangkalan District, East Java Province, from which 288 fourth-grade students were selected through random sampling from six schools (three public and three private). Fourth-grade students were chosen as they «are part of Generation Alpha, who started first grade in 2019 (currently aged 11 years), and are already familiar with interacting with the internet in their daily lives» and «are at an ideal age to promote active citizenship through technology use and can thus use technology wisely (Amelia & Santoso, 2022)."

The study employed three primary instruments: an Implementation Observation Sheet, Teacher Activity Assessment, and Student Response Questionnaire, all using a 5-point Likert scale to evaluate various aspects of the learning process. Internet self-efficacy was measured using an adapted Internet Self-Efficacy Survey (ISS) developed by Chuang (2015), while digital citizenship attitudes were assessed through a revalidated version of the Digital Citizenship Scale (DCS) adapted from Al-Zahrani (2015). All instruments underwent validation by three education experts and reliability testing using Cronbach's alpha (minimum acceptable value of 0.70). The research procedure followed a systematic approach beginning with administrative and technical preparations, followed by implementation which included measuring students' internet self-efficacy, administering pre-tests, implementing the designated learning models, collecting student responses, and conducting post-tests. After implementation of both learning models, all participants completed a digital citizenship attitude questionnaire, providing data for comparative analysis of the models' effectiveness.

Results

Research Participants and Initial Equivalence Assessment

This study, conducted across six elementary schools in the Bangkalan district, East Java province, involved 288 students aged 9–10 years divided into two instructional groups: 145 students in the blended learning model and 143 students in the direct instruction model, with participants further categorized by internet self-efficacy levels (high/low) based on their responses to a 5-point scale questionnaire as-

sessing their internet confidence and competence. Analysis revealed balanced distributions across both models: the blended learning model included 81 students with high internet self-efficacy (40 males, 41 females) and 64 with low internet self-efficacy (25 males, 39 females), while the direct instruction model comprised 80 students with high internet self-efficacy (43 males, 37 females) and 63 with low internet self-efficacy (26 males, 37 females) (Mujtahidin et al., 2025). Initial equivalence was confirmed through ANOVA testing of pre-test scores, with Kolmogorov-Smirnov normality tests indicating normal distributions across all groups (direct instruction: 0,200; blended learning: 0,080; low internet self-efficacy: 0,083; high internet self-efficacy: 0,066), all exceeding the 0,05 threshold, while Levene's Test results demonstrated homogeneous variance (learning model: 0,048, sig. 0,827; internet self-efficacy: 0,726, sig. 0,395). Subsequent independent T-tests revealed no significant differences between direct instruction and blended learning models (sig. 0,548, mean difference 1,014) or internet self-efficacy levels (sig. 0,461, mean difference –1,253) (Mujtahidin et al., 2025), indicating comparable initial conditions and ensuring research validity by confirming that any observed effects could be attributed to experimental treatment rather than pre-existing differences.

Prerequisite Analysis Test

The prerequisite analysis test in this study examined both normality and homogeneity of data distribution, essential conditions for applying parametric statistical methods. Using the Kolmogorov-Smirnov test for normality assessment, results revealed significance values of 0,064 for the direct instruction model and 0,200 for the blended learning model, both exceeding the 0,05 threshold indicating normal distribution across learning models and internet self-efficacy levels (low: 0,084; high: 0,200). Concurrently, homogeneity analysis using the Levene statistic test yielded a value of 0,178 with a significance of 0,673, confirming "homogeneous variances across groups based on both learning models and internet self-efficacy levels" (Mujtahidin et al., 2025). These comprehensive findings validate data collection integrity and fulfill the fundamental assumptions required for parametric statistical analysis, thereby ensuring the reliability of subsequent statistical analyses examining the influence of learning models and internet self-efficacy on digital citizenship attitudes without bias from non-homogeneous variances.

Research Hypothesis Test

The research hypothesis testing, conducted to statistically validate the proposed hypotheses, utilized MANOVA analysis techniques at a 0,005 significance level through SPSS (Mujtahidin et al., 2025). This comprehensive analysis yielded three significant findings: first, the learning model demonstrated a significant impact on digital citizenship attitudes ($F = 8,856$, $p < 0,05$), with blended learning producing more positive outcomes than direct instruction; second, internet self-efficacy (ISE) levels showed a significant influence on digital citizenship attitudes ($F = 21,983$, $p < 0,05$), with higher ISE correlating to better attitudes; and third, a significant interaction effect emerged between learning models and ISE ($F = 6,938$, $p < 0,05$), indicating that the effectiveness of learning models varies depending on students' ISE levels. The simultaneous testing of these hypotheses revealed that digital citizenship attitudes were generally better in the group taught with the blended learning model compared to direct instruction (Sig. 0,003 < 0,05), students with high internet self-efficacy demonstrated better digital citizenship attitudes than those with low self-efficacy (Sig. 0,000 < 0,05), and the impact of the blended learning model on digital citizenship attitudes was dependent on the students' level of internet self-efficacy (Sig. 0,009 < 0,05).

Discussion

The Influence of Blended Learning Models on Digital Citizenship Attitudes

Analysis of digital citizenship attitudes revealed meaningful differences between instructional approaches, with students using the blended learning model showing a mean score of 68,49 compared to 65,62 for those using

direct instruction. Statistical analysis yielded an F value of 8,856 with a significance level of 0,003 ($p < 0,05$), confirming that students taught through blended learning demonstrated significantly higher digital citizenship attitudes than their counterparts in the direct instruction model. These findings align with constructivist learning theory, which addresses learning needs in today's "competitive, complex, and ever-changing world" (Slavin, 2005). Cognitive constructivism theory emphasizes that learning must actively involve students in applying their knowledge to solve real-world problems (Fajri et al., 2021). The implementation of blended learning in Pancasila Education through digital media and internet-based resources successfully guides students toward responsible internet use, helping them understand their rights and responsibilities as digital citizens (Jaeger, 2021).

This research validates blended learning's significant influence on digital citizenship attitudes, responding to contemporary educational needs in the digital era. Digital citizenship encompasses understanding responsible technology use and appropriate behaviors for participation in digital society, aiming to educate students on effective technology utilization in both personal and social contexts (Amelia & Santoso, 2022; Lapitan et al., 2021). These findings corroborate Jaeger's (2021) research, which provides deeper insights into digital citizenship's importance within online learning environments by examining factors including digital literacy, risk perception, and social support. The results also correspond with Novianti's (2020) research, which established a correlation between online learning media use and digital citizenship attitudes in Civics Education, particularly regarding digital access, communication, and etiquette. Furthermore, as Pangrazio (2021) notes, incorporating digital technology in education promotes good digital citizenship by fostering three key attitudes: respect (observing etiquette, rules, and legal frameworks for other digital users), educate (teaching digital literacy and communication methods), and protect (developing awareness of digital responsibility regarding rights, responsibilities, and safety). These findings collectively emphasize the importance of developing Pancasila Education that focuses on students' active and responsible participation in digital environments, with teachers needing to identify elements that influence students' digital engagement to effectively foster digital citizenship attitudes through blended learning.

The Influence of Internet Self-Efficacy on Digital Citizenship Attitudes

Analysis of digital citizenship attitudes revealed significant differences based on internet self-efficacy levels, with students possessing high internet self-efficacy demonstrating a mean score of 69,47 compared to 67,25 for those with low internet self-efficacy. Statistical analysis yielded an F value of 21,983 with a significance level of 0,000 ($p < 0,05$), confirming that students with high internet self-efficacy exhibit significantly stronger digital citizenship attitudes than their counterparts with low internet self-efficacy. These findings confirm that internet self-efficacy significantly influences students' digital citizenship attitudes, supporting Nawangsih's (2020) research indicating that individuals prioritizing digital identity security show greater willingness to share their digital identity online. Students with high internet self-efficacy demonstrate enhanced understanding of others' perspectives in online communication, practicing greater empathy, attentive listening, and thoughtful responses in digital interactions. These results underscore the importance of adapting Pancasila Education's pedagogical approaches in elementary schools through differentiated learning that accounts for students' internet self-efficacy characteristics—specifically, their confidence in utilizing internet resources for learning (Guazzini et al., 2022). Educators must consider students' psychological conditions and previous experiences with internet use when selecting appropriate learning models that incorporate online resources (Chuang et al., 2015).

The research further reveals that individuals with high internet self-efficacy demonstrate superior understanding of the balance between digital technology utilization and responsibility, evidenced through increased caution with per-

sonal information sharing, more active participation in quality information exchange, positive social media engagement, enhanced ability to identify and counter cyberbullying and misinformation, and stronger commitment to ethical online conduct. The significant correlation between internet self-efficacy and digital citizenship attitudes underscores the essential need for educational programs designed to enhance students' internet skills and confidence. The study has profound implications for elementary educators, who should focus on developing students' digital citizenship attitudes through diverse activities while implementing a holistic educational approach that emphasizes both technical skills and the development of responsible digital values (Öztürk, 2021). Pancasila Education specifically should integrate internet self-efficacy development with technical and attitudinal training to enhance digital citizenship engagement. Critically, individuals must assess and improve their internet self-efficacy (Panigrahi et al., 2022), with differentiated approaches required—those with high internet self-efficacy may excel with complex, independent material, while those with lower self-efficacy need additional support to develop positive digital citizenship attitudes, ultimately ensuring students become not only technologically proficient but also ethically responsible digital citizens.

The Interaction of Blended Learning Models and Internet Self-Efficacy on Digital Citizenship Attitudes

The interaction between blended learning models and internet self-efficacy on digital citizenship attitudes has been empirically validated through comprehensive statistical analysis, with MANOVA procedures (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) all yielding significant values (Sig. 0,000 < 0,05), while two-way MANOVA analysis demonstrated an F value of 6,938 with significance at 0,009 < 0,05, confirming the acceptance of the research hypothesis that these factors interact to influence students' digital citizenship attitudes. This finding underscores the critical importance of leveraging internet resources as effective learning tools that enhance students' capacity for independent learning across various digital platforms, aligning with Bandura's self-efficacy theory which posits that individuals' beliefs in their capabilities directly influence their behaviors in pursuit of specific goals — a principle that extends to digital citizenship development. The theoretical framework is further substantiated by research indicating that students with high internet self-efficacy demonstrate superior abilities in searching, evaluating, and productively utilizing online information, a correlation confirmed by previous studies showing that "students' ability to find accurate and useful information from relevant sources correlates with their confidence in using the internet" (Chuang et al., 2015).

This study's findings align with previous research demonstrating the significant relationship between internet self-efficacy and digital citizenship attitudes. Multiple studies, including those by Panigrahi (2022) and Jaeger (2021), have established that students with higher internet self-efficacy and daily technology usage demonstrate more positive digital citizenship behaviors, particularly in protecting themselves and others in digital environments. The research reveals that students who exhibit confidence in their technological abilities and internet usage tend to develop stronger digital citizenship attitudes, characterized by enhanced self-respect, respect for others, and responsible online engagement. These findings are further supported by Amelia's (2022) research, which identified a direct correlation between students' technological attitudes and digital citizenship, ultimately suggesting that students with high internet self-efficacy are more likely to engage responsibly in online learning environments, demonstrate greater motivation for sharing information, and maintain a more positive digital identity compared to those with lower internet self-efficacy levels.

Conclusions

This study reveals several important findings regarding digital citizenship attitudes among elementary school students. First, the statistical analysis shows that students in the blended

learning group demonstrated different patterns of digital citizenship attitudes compared to those in the direct instruction group. The data indicates a significant difference ($F = 8,856$, $p < 0,05$) between these two learning approaches, suggesting potential benefits of blended learning in the context of digital citizenship education. Second, our analysis of internet self-efficacy levels revealed varying associations with digital citizenship attitudes. Students with higher reported internet self-efficacy showed different patterns of digital citizenship attitudes compared to those with lower self-efficacy ($F = 21,983$, $p < 0,05$). However, it is important to note that this correlation does not necessarily indicate a causal relationship, as other factors may influence both internet self-efficacy and digital citizenship attitudes. The study also found a statistical interaction between learning models and internet self-efficacy ($F = 6,938$, $p < 0,05$).

Limitations. This study is limited by its cross-sectional design, reliance on self-reported data, lack of control for potential confounding variables, and implementation of only one blended learning configuration, suggesting the need for longitudinal research with diverse samples and experimental designs to establish causality and enhance generalizability.

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