

CREATING A WEBSITE TO MEASURE DIGITAL CITIZENSHIP SKILLS TO SUPPORT SUSTAINABLE DEVELOPMENT GOALS (SDGS)

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Abstract

This study designed a web-based assessment to measure students' digital citizenship skills and connect results to learning resources. Using a design-based research approach, we conducted a needs analysis, specified indicators, built a prototype, and obtained expert judgments to refine instruments and system flow. The platform includes a student dashboard, a scoring engine that profiles indicators, a recommendation module that maps scores to guidance, and a teacher dashboard for item management and reporting. It assesses four indicators: digital access, digital communication, digital etiquette, and digital rights and responsibilities. A performance-oriented, indicator-based design supports reliable, actionable feedback because profiles and recommendations are generated from item-level responses rather than perceptions alone. Teachers can evaluate skills objectively, efficiently, and in a structured manner, while students receive targeted suggestions and resources for self-development, supporting safer, ethical, and participatory digital engagement in secondary education. The design remains adaptable across classroom contexts. This study supports current issues in sustainable development goals (SDGs).

Keywords: Assessment, Digital citizenship skills, Design-based research, SmartCitizen, SDGs.

1. Introduction

Digital citizenship skills are becoming increasingly essential in school education as students navigate complex online environments. Developing safe, ethical, and responsible digital citizens requires a clear conceptual framework and reliable digital tools for assessment and guidance [1]. These skills encompass not only the ability to access and communicate through digital platforms but also the competence to engage respectfully and understand the responsibilities that accompany digital participation. As educational systems adopt more digital learning environments, the need for standardized, scalable measurement tools has intensified. Researchers and educators have called for technology-driven solutions that can evaluate and cultivate digital citizenship through meaningful engagement.

Table 1 outlines previous research findings linking digital skills to online participation, digital literacy among adolescents, attitudes toward e-learning, and the implementation of web-based learning models [2-6]. These studies emphasize the role of digital competency in shaping students' civic and academic engagement in online spaces. Moreover, digital skills development has been found to benefit from community-based learning and the use of diverse multimedia resources that reflect learners' social contexts [7-9]. However, while existing initiatives focus on pedagogy and awareness, there remains a gap in adaptive assessment systems that provide feedback and learning resources tailored to individual profiles. A scientifically grounded system is needed; one that integrates indicator-based evaluation, automated profiling, and feedback loops grounded in educational technology.

Table 1. Preview research.

No.	Title	Ref.
1.	Navigating the digital world: Development of an evidence-based digital literacy program and assessment tool for youth.	[2, 5].
2.	Digital literacy through digital citizenship: Online civic participation and public opinion evaluation of youth minorities in Southeast Asia.	[2].
3.	Examination of university students' attitudes towards e-learning during the covid-19 pandemic process and the relationship of digital citizenship.	[3].
4.	Digital skills and digital citizenship education: An analysis based on structural equation modelling.	[4].
5.	Pengembangan model pembelajaran berbasis web: Digizen learning untuk meningkatkan pemahaman kewarganegaraan digital di SD XYZ Bogor.	[6].

This study aims to design a web-based assessment platform using the design-based research (DBR) method to evaluate digital citizenship skills among high school students. The core indicators measured are Digital Access, Digital Communication, Digital Etiquette, and Digital Rights and Responsibilities [10]. The novelty of this study lies in three aspects: first, it proposes an interactive, digital environment for assessing digital citizenship; second, it applies a complete, validated instrument grounded in well-defined indicators; and third, it generates

output in the form of individual scores, skill profiles, and personalized self-development suggestions. This framework not only serves evaluative purposes but also supports targeted learning because the feedback system links results with relevant educational content. By embedding scientific measurement principles into an accessible web-based system, the study contributes to scalable and context-sensitive approaches for fostering digital competence in schools. This study supports current issues in sustainable development goals (SDGs).

2.Literature Review

Figure 1 illustrates the conceptual design of a website as an educational technology that plays a strategic, effective, and adaptive role in contemporary learning environments. Web-based platforms facilitate instructional interactions beyond the constraints of time and space, supporting flexible and continuous learning processes [11]. As integrated information systems, websites are capable of managing user data efficiently while enabling access to multimodal content in various formats, such as text, images, and videos [12-14]. The implementation of web technology in education supports not only content delivery but also user-centred interaction, allowing learning to be customized based on student needs and behaviour. Within school settings, this integration aligns with the broader trend of digital transformation and prepares students to operate in digitally mediated academic and social contexts [15-20].

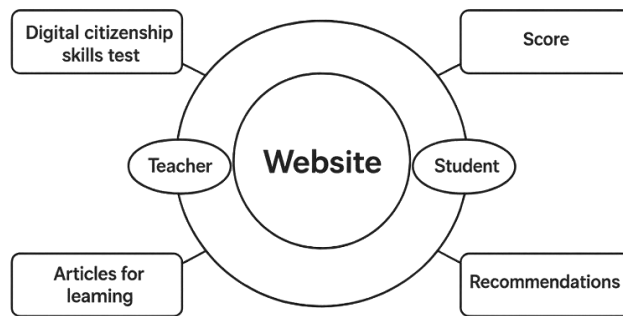


Fig. 1. Visualization of the website concept.

Digital citizenship, meanwhile, has become a focal point in educational discourse due to the increasing digital engagement of students and the ethical challenges it presents. It is defined as a set of competencies, values, and attitudes that enable individuals to engage with technology safely, responsibly, ethically, and participatively within the digital society [21]. This concept encompasses not only technical proficiency but also social and civic engagement through digital platforms. Widely adopted framework identifies four key indicators of digital citizenship: digital access, digital communication, digital etiquette, and digital rights and responsibilities [10]. These indicators collectively address issues such as equitable access to technology, responsible communication, respectful behaviour, and awareness of rights and obligations in digital environments.

In educational practice, websites are increasingly utilized not only as instructional tools but also as instruments for assessing digital citizenship competencies. Through adaptive design, platforms can collect item-level data,

generate skill profiles, and offer targeted feedback that helps learners understand their digital behaviour and areas for improvement [11, 22]. By embedding validated indicators into assessment systems, educators can foster meaningful learning experiences that go beyond traditional testing, integrating feedback loops and multimedia resources to reinforce concepts. This convergence of educational technology and civic digital competence enhances both teaching efficiency and student digital readiness, making it possible to design scalable and inclusive learning models that address 21st-century demands.

3. Method

This study used the design-based research (DBR) method, focusing on the development of a digital assessment platform. The process began with a literature review and needs analysis to identify gaps in measuring digital citizenship skills in high schools. Based on this, a website prototype was designed, including system workflows, assessment features, and instruments aligned with the indicators of digital access, communication, etiquette, and rights and responsibilities. The prototype underwent expert validation involving specialists in Pancasila Education, educational technology, and assessment. Feedback from these experts guided revisions to ensure clarity and feasibility. After refinement, the design was implemented into a functional web platform with dedicated interfaces for students and teachers. The final product reflects a contextually relevant and technically grounded outcome of the DBR design phase.

4. Result and Discussion

Figure 2 shows the prototype of the WordPress-based website designed to assess digital citizenship skills. The platform features a Student Dashboard for accessing tests, a Scoring Engine to generate scores and profiles, and a Recommendation Engine that offers tailored guidance. It also includes a linked Article Library. Teachers access a separate dashboard to upload questions and materials and to manage reports. The user journey begins with registration, role selection (student or teacher), and continues with specific functional flows based on user roles.

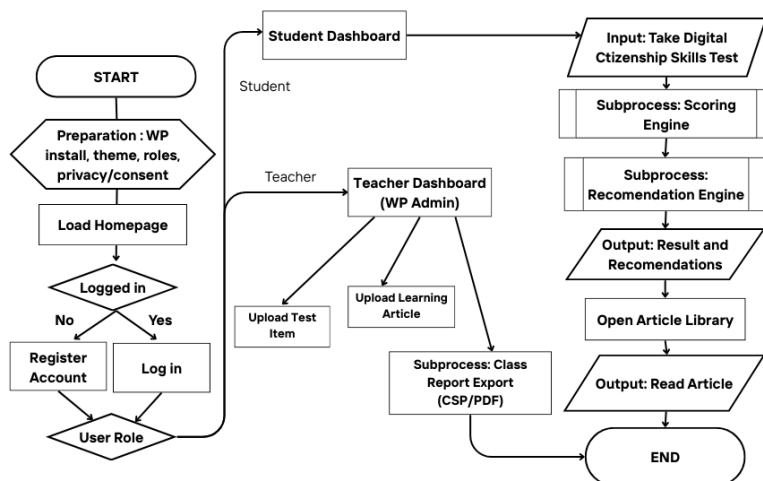


Fig. 2. Website development flow.

Figure 3 illustrates the assessment process. Users select one of the digital citizenship domains (Digital Access, Communication, Etiquette, or Rights and Responsibilities) and complete Likert-scale items via a responsive interface. After submission, the Scoring Engine analyses responses, generates scores and visual profiles, and classifies results into interpretive categories. Users then receive actionable feedback and are directed to relevant learning resources in the Article Library. They may retake the test later to track progress.

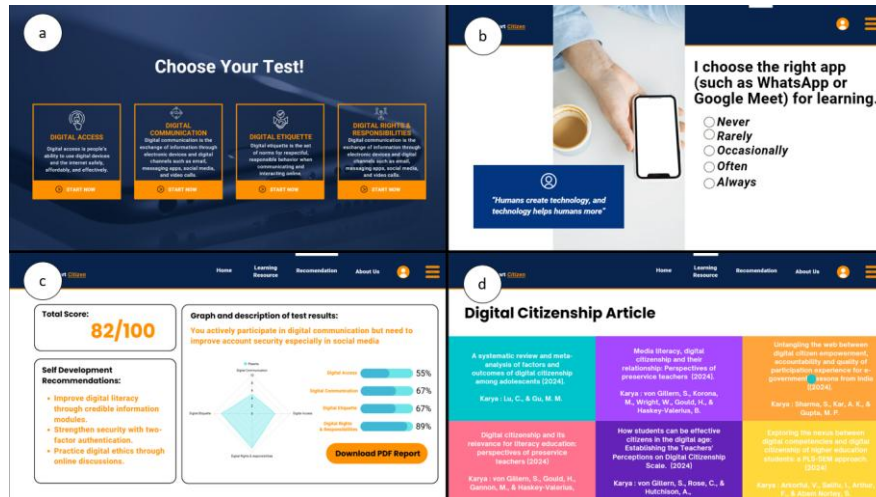


Fig. 3. Smartcitizen interface. (a) Test selection; (b) Test interface; (c) Results and recommendations; (d) Learning resource library.

The system was built on principles of digital inclusivity, ensuring accessibility, clarity, and relevance to learners' contexts [23]. Instrument development followed systematic steps (construct definition, item design, expert validation, and pilot testing) to ensure validity and reliability [24]. By generating results from item-level responses, the scoring engine provides more accurate feedback than self-perception tools, especially for students with limited strategic awareness [25]. Integration with a curated Article Library further supports students in developing media literacy and critical information assessment [26]. At the system level, the platform emphasizes transparency and user empowerment in navigating digital information flows [27]. Altogether, the website offers a comprehensive ecosystem for assessment, feedback, and continuous digital skills development. This study supports current issues in SDGs, as reported elsewhere [28-32].

5. Conclusion

This study successfully designed a digital assessment platform for measuring digital citizenship skills using the Design-Based Research approach. The system integrates key indicators (digital access, communication, etiquette, and rights) into a functional website that provides students with scores, profiles, and development recommendations. The platform enables teachers to assess skills more objectively and efficiently. As a result, it supports structured, evidence-based digital education. A pilot implementation is recommended to evaluate its practicality, effectiveness,

and long-term integration in Pancasila Education. This study supports current issues in sustainable development goals (SDGs).

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