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## Designing the future of pancasila education: A needs analysis for interactive Android-based digital learning materials in primary schools

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*Pancasila* education in primary schools is pivotal for early character formation, yet teachers face limited digital teaching media, low learner engagement, and weak technology integration, especially in resource-constrained settings. This study aimed to identify pedagogical, content, and technical requirements for an Android-based application, GO-PANCASILA, for Grade-4 learners. Using a Research and Development approach, the study combined the 4D model (Define, Design, Develop, Disseminate) with the Waterfall SDLC, focusing on the Define and Design phases as a needs analysis. Data were collected through literature review, classroom observations, and semi-structured interviews with teachers and students, then thematically analyzed and triangulated. Findings showed that teachers struggle to create contextual materials, choose relevant methods, and manage instructional time, while students prefer multimedia-based interactive learning. Key needs include engaging visual content, reflective quizzes, and integration of Pancasila values into daily experiences. These findings provide a foundation for developing GO-PANCASILA as an adaptive learning solution supporting character formation and civic literacy.

### Keywords

Android application, digital learning material, needs analysis, Pancasila education

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## Introduction

Pancasila education at the primary level plays a strategic role in shaping character, civic literacy, and twenty-first-century competencies. In Indonesia, national policy under the Kurikulum Merdeka emphasizes the six dimensions of the Pancasila Student Profile, namely faith and noble character, independence, cooperation, global diversity, critical thinking, and creativity, as cross-curricular targets, including within Pancasila Education. These dimensions are further operationalized through the *Projek Penguatan Profil Pelajar Pancasila (P5)*, which encourages contextual and project-based learning. Consequently, Pancasila learning at the primary level should not only transmit normative values but also provide meaningful and developmentally appropriate learning experiences for children (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2022; Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2025; Rachman et al., 2024).

Despite this policy direction, the implementation of Pancasila education in primary schools still faces substantial pedagogical and structural challenges. In many schools, teachers continue to rely on conventional instruction, worksheets, and verbal explanation, while opportunities for interactive, reflective, and technology-supported learning remain limited. Broader policy and research also show that the successful integration of ICT depends not only on device availability, but also on teacher competence, curriculum alignment, and institutional readiness (UNESCO, 2018; UNESCO, 2023; Wang et al., 2023). In the Indonesian context, studies have found that classroom teachers' digital literacy remains uneven, which affects the quality of technology use in learning activities (Atmojo et al., 2023). These conditions are particularly relevant in primary-level character education, where abstract values such as respect, responsibility, cooperation, and tolerance need to be connected to learners' everyday experiences.

From a pedagogical perspective, the development of digital learning media should be grounded in robust theoretical frameworks. The *TPACK* framework highlights that effective learning design requires the alignment of technology, pedagogy, and content knowledge (Mishra & Koehler, 2006). In addition, *Multimedia Learning* theory explains that appropriately designed combinations of words, images, and audio can improve understanding more effectively than text-only instruction, provided that cognitive load is carefully managed (Mayer, 2020; Mayer & Fiorella, 2021). Motivational aspects are also crucial, especially for younger learners. The *ARCS* model emphasizes that educational media should attract attention, establish relevance, build confidence, and provide satisfaction to support sustained engagement (Keller, 2010). Together, these frameworks suggest that digital materials for Pancasila education should not merely digitize textbook content, but should present value-based learning in interactive, contextual, and age-appropriate formats.

The growing availability of mobile devices in Indonesia further supports the feasibility of mobile learning for primary schools. Android remains the dominant mobile operating system in Indonesia, making it a practical platform for broad educational access, including in semi-urban and rural settings (StatCounter, 2025). Research has also shown that mobile device integration can produce positive effects on student learning performance when supported by meaningful instructional design (Sung et al., 2016). More recent evidence from primary

education similarly indicates that mobile learning can support literacy, numeracy, and engagement when activities are interactive rather than purely transmissive (Dorris et al., 2024; Garzón et al., 2023). This suggests that Android-based learning materials may provide a realistic and scalable solution for primary Pancasila education, especially if they are designed to function under constrained school conditions.

In Indonesia, the development of Android-based and other digital materials for Pancasila or civic education has grown in recent years. Prior studies have generally reported that such products are valid, practical, and effective in limited trials. For example, the “MESILA” application for Grade 2 students was found valid and effective in improving understanding of Pancasila symbols (Swandari & Paksi, 2025), while the “SI PANCA” application for Grade 4 also demonstrated high feasibility through expert validation and field trials (Qoidah & Paksi, 2021). Other studies have developed Android-based media for diversity topics (Arianto, 2021), Android teaching modules for Grade 1 learners (Efliriani & Wardhana, 2024), and broader interactive civic-education media for primary schools (Rachmadtullah et al., 2018). Research on digital teaching materials and gamified mobile learning in Indonesia also generally reports increased learner motivation and improved learning outcomes (Kurniyawati et al., 2021; Mustikasari, 2023; Waldi et al., 2025). However, much of this literature focuses on testing the feasibility or effectiveness of finished products, while relatively few studies begin with a detailed mapping of pedagogical, content, technical, and motivational needs for a specific grade level and topic.

This gap is important because not all forms of educational technology automatically improve learning. Research has warned that technology may even contribute to disengagement when used in overly didactic or poorly designed ways, and classroom distraction remains a concern if interactivity is not pedagogically purposeful (Bergdahl et al., 2020; Bergdahl et al., 2022; UNESCO, 2023). In addition, studies on children’s screen exposure point to ethical and developmental considerations that require designers to ensure that digital experiences remain balanced, reflective, and socially meaningful (Domingues-Montanari, 2017; Lissak, 2018; Sun et al., 2025). In the context of Pancasila education, this means that digital materials should not merely entertain students, but should facilitate reflection, value internalization, and transfer to everyday behavior.

Accordingly, there is a clear need for a systematic needs analysis to identify what kind of Android-based interactive digital materials are pedagogically relevant, technically feasible, and contextually meaningful for Grade-4 Pancasila learning. Such an analysis is necessary to inform not only content selection, but also activity types, interface simplicity, assessment features, and implementation supports appropriate for primary schools, especially those in resource-constrained settings. The present study therefore, asks: What pedagogical, content, and technical requirements are needed to develop Android-based interactive digital materials for Grade-4 Pancasila learning? This question includes teachers’ needs for contextual materials and developmentally appropriate strategies, students’ needs for engaging and meaningful learning experiences, and the application’s functional and technical needs, including content flow, activity types, feedback, and links to everyday life.

Based on this problem formulation, the study aims to conduct a comprehensive needs analysis to inform the pedagogical, content, and technical design specifications for the Android application GO-PANCASILA for Grade-4 primary pupils. The study contributes by providing

an evidence-based foundation for prototyping and formative evaluation, offering a model of digital learning materials aligned with national policy and evidence-based multimedia design, and expanding understanding of how interactive Pancasila learning can be made more accessible and meaningful in Indonesia's primary-school context, including in rural and semi-rural settings.

## **Methodology**

This study employed a Research and Development approach using the 4D model consisting of Define, Design, Develop, and Disseminate. This paper reports the Define and Design phases, which focused on needs analysis and its translation into initial design specifications. Software-engineering documentation followed a Waterfall sequence covering requirements, design, implementation, and testing to ensure clear traceability from the identified needs to GO-PANCASILA's prospective features.

The research was conducted in partner primary schools located in rural and semi-rural areas. Participants included Grade-4 teachers, school leaders, especially principals or vice principals for curriculum, and Grade-4 pupils. Purposive sampling was used to capture contextual variation related to device availability, parental support, and class size. Recruitment was carried out through schools with institutional approval, parental consent, and pupil assent.

The instruments included a classroom observation checklist for Pancasila lessons, semi-structured interview guides for teachers and school leaders, student focus group discussion guides on learning experiences and multimedia preferences, a teacher needs questionnaire using a four-point Likert scale, and a usability checklist based on Nielsen's heuristics to review early interface concepts. Content validity was reviewed by experts in PPKn, educational technology, and primary curriculum using the Content Validity Index. A small pilot test was also conducted to ensure item clarity. Questionnaire reliability was estimated using Cronbach's alpha with a target of at least 0.70, while inter-rater reliability for classroom observations was examined using Cohen's kappa.

Data collection involved curriculum and literature review, classroom observations of one to two Pancasila sessions in each school, interviews with teachers and school leaders lasting approximately thirty to sixty minutes, student focus group discussions lasting around forty-five to sixty minutes with teacher facilitation, and teacher questionnaires administered either online or offline. Qualitative data were analyzed thematically through initial coding, theme generation, theme review, and theme naming, with triangulation across sources and methods. Quantitative data were analyzed descriptively using means, standard deviations, and percentages, then used to prioritize needs based on feasibility and impact. The qualitative and quantitative findings were subsequently synthesized into a requirements log, user stories, and design constraints as the blueprint for GO-PANCASILA. All procedures followed ethical standards for research involving children, including parental consent, pupil assent, anonymization, and the right to withdraw without penalty.

## Results and Discussion

### *Teachers' pedagogical needs and the demand for usable technology integration*

The needs analysis revealed that teachers still relied heavily on lecture-based explanation and worksheets, particularly when class time was limited or student numbers were large. In the observed classrooms, interactivity remained minimal, and technology use was either absent or incidental. Interviews further showed that teachers experienced difficulty designing lesson sequences that were concise yet meaningful, especially when they needed to connect Pancasila values to familiar real-life situations such as sharing, queueing, helping peers, and respecting differences. Differentiation also emerged as an important concern because pupils displayed varying reading abilities and attention spans.

These findings reinforce the argument that the challenge in technology integration is not simply technological access, but pedagogical usability. This pattern is consistent with the TPACK perspective, which emphasizes that technology becomes educationally meaningful only when it is aligned with pedagogy and content goals (Mishra & Koehler, 2006). It also supports broader international and national evidence showing that ICT effectiveness depends on teacher competence and instructional design rather than device presence alone (UNESCO, 2018; UNESCO, 2023; Wang et al, 2023; Atmojo et al., 2023). In practical terms, the teachers' request for short and clearly sequenced lesson flows, including contextual hooks, brief experiential cores, and reflective closures, indicates that GO-PANCASILA should function as a teacher-support tool rather than merely a student-facing application. The application therefore, needs to provide lesson cards, time allocation suggestions, short prompts, and options for differentiated difficulty so that teachers can integrate digital learning into real classroom constraints.

### *Contextual content as the core of meaningful Pancasila learning*

A strong pattern across interviews and student discussions was the need for content that is directly connected to children's daily lives. Pupils were more responsive to stories, familiar characters, and simple dilemmas rooted in common situations such as playing versus finishing homework, queueing in the canteen, or responding to peer teasing. Teachers similarly emphasized that values such as gotong royong, discipline, responsibility, and respect for diversity become easier to understand when they are linked to observable behaviors in the classroom, at home, or in the community.

This finding supports the policy orientation of the Kurikulum Merdeka and the Pancasila Student Profile, both of which call for contextual, meaningful, and project-based learning (Qoidah & Paksi, 2021; Arianto, 2021; Efliriani & Wardhana, 2024; Swandari & Paksi, 2025). It also clarifies a limitation in much of the previous product-development literature. Although earlier studies on Android-based and interactive media for Pancasila education have shown positive validity and feasibility results, fewer studies have begun with a detailed mapping of how values should be translated into lived experiences for specific grade levels (Qoidah, 2021; Arianto, 2021; Efliriani, 2024; Swandari et al., 2025). The present findings, therefore, suggest that the strength of GO-PANCASILA should lie not only in digital format,

but in the design of short contextual narratives, psychologically safe dilemmas, and reflective prompts that ask pupils to connect values with their own actions. This also explains why teachers requested parent-bridge materials, since the continuity of value reinforcement between school and home is essential in character education.

### ***Multimedia simplicity, motivation, and cognitive accessibility***

Student discussions indicated strong preferences for visually appealing but simple multimedia. Pupils favored soft colors, clear icons, brief texts, and Indonesian voice-over support, especially because some learners were still developing reading fluency. They enjoyed limited animation and lively elements, yet excessive motion was reported as distracting. Teachers likewise stressed the need for lightweight applications that could run on mid-range or low-spec Android devices and remain usable under unstable connectivity conditions.

These findings align closely with the principles of Multimedia Learning, which hold that words, images, and audio can improve comprehension only when cognitive load is carefully managed and unnecessary elements are minimized (Mayer, 2020; Mayer & Fiorella, 2021). They also resonate with the ARCS model, particularly the dimensions of attention and relevance, because pupils need attractive features to sustain interest. Still, those features must serve learning goals rather than compete with them (Keller, 2010). In addition, the findings support evidence from mobile learning research showing that positive outcomes depend on purposeful design rather than on the mere presence of devices (Sung et al., 2016; Dorris et al., 2024; Garzón et al., 2023). As a result, the design implications for GO-PANCASILA are clear. The interface should follow a simplicity-first principle, with one learning purpose per screen, limited text, consistent navigation, voice-over options, progress indicators, and modular lesson packs that can function offline. The finding that students appreciated animation but were distracted by excessive movement also justifies the use of restrained multimedia rather than elaborate gamified spectacle.

### ***Reflective assessment and feedback for value internalization***

Both teachers and pupils emphasized that assessment in Pancasila learning should not stop at identifying correct or incorrect answers. Instead, they favored short reflective quizzes that ask learners to consider reasons, choices, and consequences. Teachers requested varied formats, including multiple choice, sequencing activities, and class polling, but they were particularly interested in explanatory feedback that could guide discussion rather than simply signal performance. They also wanted concise summaries of misconceptions and suggested follow-up activities, which would reduce dependence on paper worksheets and strengthen subsequent classroom reflection.

This pattern is important because values education requires more than factual recall. It requires opportunities for interpretation, judgment, and internalization. The emphasis on reflective feedback is consistent with the theoretical foundations presented in the introduction, especially the motivational dimension of satisfaction in ARCS and the meaning-making orientation in Multimedia Learning (Keller, 2010; Mayer, 2020). It also addresses concerns raised in the literature that digital media may become superficial or disengaging if interaction

is reduced to clicking and scoring without genuine reflection (Bergdahl et al., 2020; Bergdahl et al., 2022; UNESCO, 2023). The present findings, therefore indicate that GO-PANCASILA should not position quizzes as end-of-lesson tests only, but as reflective spaces accompanied by value-based feedback and off-screen missions. In this way, digital interaction can be linked to observable real-world behavior, which is central to the goals of primary Pancasila education.

### ***Implementation readiness in rural and semi-rural contexts***

The study also found that ecosystem readiness remains a decisive condition for implementation. Teachers expressed interest in digital media but often lacked confidence in using them efficiently, particularly when dealing with time limitations, device constraints, and activity management. They requested short practical tutorials, offline guidance, and troubleshooting support. School leaders emphasized the importance of alignment with the Pancasila Student Profile and P5, while also pointing out that devices are often shared in rotation, especially in rural settings. Under these conditions, features such as multi-user access on one device, class-session codes, and lightweight preloaded content become important.

These findings strengthen the argument made in international policy reports that ICT benefits depend on readiness at the ecosystem level, including teacher preparation, school support, and infrastructure compatibility (UNESCO, 2018; UNESCO, 2023). They also reflect Indonesia's broader educational reality, where technological potential is moderated by uneven access and operational conditions. The preference for offline-first design, low file size, and fast loading is therefore not simply technical convenience, but a requirement for equity and continuity. Given Android's dominant market share in Indonesia, designing for this platform is a rational access strategy (StatCounter, 2025). At the same time, the current findings extend prior research by showing that implementation support should be embedded into the product design itself, for example through micro-tutorials, lesson scripts, and simple take-home sheets for parents, rather than treated as a separate training issue.

### ***Design priorities derived from the integrated needs analysis***

When the thematic findings are considered together, the core need that emerges is not more sophisticated technology, but more usable, relevant, and time-efficient learning experiences. The must-have priorities include modular lesson packs combining interactive stories, short activities, and reflective quizzes; a simple interface with one learning purpose per screen; voice-over support; offline-first access; visible progress indicators; teacher lesson cards with time allocations; and basic progress summaries. Additional desirable features include differentiated difficulty levels, functional badges or stars, off-screen missions, and short teacher micro-tutorials. More advanced functions such as large-scale synchronization across schools or full integration with school data systems are less urgent at this stage.

This prioritization confirms that the most meaningful contribution of GO-PANCASILA lies in translating classroom realities into an evidence-based design blueprint. In contrast with some earlier product-oriented studies that foreground feasibility results, the present study emphasizes the value of beginning with systematic needs identification before development proceeds (Qoidah & Paksi, 2021; Efliriani & Wardhana, 2024; Swandari & Paksi,

2025; Waldi et al., 2025). From a design rationale perspective, these priorities are also coherent with TPACK, ARCS, and Multimedia Learning because they balance content relevance, pedagogical structure, technological feasibility, motivation, and cognitive manageability (Mishra & Koehler, 2006; Keller, 2010; Mayer, 2020; Mayer & Fiorella, 2021). Thus, the findings do not merely describe classroom conditions; they directly generate actionable design specifications for a Grade-4 Android-based Pancasila learning application.

## **Conclusion**

The development of Android-based interactive digital learning materials for Grade-4 Pancasila education should be grounded in the actual pedagogical, content, and technical needs identified in primary-school contexts. The findings show that teachers need concise and manageable lesson flows, contextual materials that connect Pancasila values to pupils' everyday experiences, and simple digital support that can be implemented within limited time and infrastructure conditions. Pupils, meanwhile, need visually engaging yet cognitively accessible learning experiences supported by clear navigation, voice-over, and reflective activities. The study also indicates that formative assessment should emphasize reflective feedback rather than merely correct or incorrect answers, while implementation requires offline-friendly features, modular content, and practical support for teachers and parents. These results confirm that the meaningful use of technology in Pancasila education depends less on technological sophistication than on its relevance, usability, and alignment with character-learning goals. Therefore, the needs analysis provides an important foundation for the development of GO-PANCASILA as an adaptive and context-sensitive learning application. Future studies are recommended to continue with prototype development, usability testing, and classroom-based evaluation to examine the effectiveness of the application in strengthening pupils' civic literacy and character formation.

## **Disclosure Statement**

No potential conflicts of interest were reported by the authors.

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