



ANALYSIS OF TEACHERS' PERCEPTIONS AND READINESS REGARDING A PROJECT-BASED LEARNING (PJBL) DIGITAL MODULE ON LOCAL ECOSYSTEMS FOR CHILDREN 6–7 YEARS

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Abstract

This study aimed to analyze teachers' perceptions and readiness for the implementation of a digital IPAS module based on Project Based Learning (PjBL) and oriented toward local ecosystems for children aged 6–7 years. The study employed a quantitative approach using a descriptive survey method. The participants consisted of 20 teachers selected through purposive sampling based on predetermined criteria, including experience in implementing the Merdeka Curriculum, teaching or integrating IPAS content, utilizing digital technology, and implementing project-based learning activities. Data were collected using a questionnaire developed based on the Technological Pedagogical Content Knowledge (TPACK) framework and measured using a five-point Likert scale. Data were analyzed descriptively using mean scores and percentages for each indicator. The findings showed that teachers' overall perceptions and readiness were categorized as good, with an average percentage of 77.00%. The highest score was obtained for digital module design (86.00%), followed by ease of module use (83.00%), suitability of IPAS content (82.00%), and local ecosystem integration (81.00%). Meanwhile, teachers' technological readiness obtained 75.00%, readiness to implement PjBL reached 68.00%, and facilities and time support obtained the lowest score of 64.00%. These findings indicate that teachers generally responded positively to the proposed digital IPAS module and perceived it as relevant, attractive, practical, and contextual. However, implementation readiness remains constrained by technological competence, the complexity of project-based learning, limited instructional time, and supporting facilities. Therefore, the development and implementation of digital IPAS modules should be accompanied by teacher capacity building, practical guidance for PjBL implementation, and adequate technological infrastructure. The findings provide an empirical foundation for developing digital learning resources that are interactive, contextual, and aligned with the learning needs of children aged 6–7 years.

Keywords: Digital Module; IPAS; Project Based Learning; Local Ecosystem; Teachers' Perceptions; Teachers' Readiness;

INTRODUCTION

Educational development for children aged 6–7 years is currently undergoing a transformation that increasingly emphasizes learning flexibility, teacher autonomy, and meaningful learning experiences that are appropriate to learners' characteristics (F. P. Rahmawati & Pamungkas, 2026). These changes encourage teachers to select and develop learning resources that can accommodate children's learning needs while utilizing advances in digital technology (Trinindi Eriswan Fitri et al., 2025). In the context of science and social learning, learners are not only expected to understand concepts but also to connect knowledge with natural and social phenomena encountered in everyday life (Amalia et al., 2022; Fitri & Prahastiwi, 2025). Therefore, learning for children aged 6–7 years needs to be designed contextually, interactively, and based on real experiences so that the concepts being learned can be understood more meaningfully.

One important aspect of learning is children's ability to understand their surrounding environment and ecosystems (Febiana, 2025; Prahastiwi et al., 2025). However, the learning process still faces various challenges, particularly when scientific concepts are presented abstractly and are not connected to learners' environmental realities. The use of textbooks and static images as primary learning resources does not always provide concrete experiences regarding the relationships among components within an ecosystem. Such conditions may result in learning that focuses more on verbal mastery of concepts than on understanding through direct experience. Innovative learning media are therefore

needed to help connect concepts with real-world environments while increasing learners' active engagement. Nurdyansyah states that innovative learning media can function as tools for delivering learning messages while also increasing active interaction between teachers and learners (Choiri et al., 2025).

Science and Social Studies (IPAS) learning has considerable potential to provide contextual learning experiences because the content is closely related to natural and social phenomena in learners' surroundings. IPAS learning that provides opportunities for children to engage in observation, exploration, and experience-based activities can help them construct knowledge more meaningfully. Rahmawati, Wening, Sukadari, and Rizbudiani (2023) explain that IPAS learning should provide direct learning experiences through various activities and projects so that learners can construct knowledge meaningfully (Hasanah & Surakarta, 2024; D. Y. Rahmawati et al., 2023). Sutimah and Tyas (2024) also explain that IPAS learning relevant to local contexts can support the development of critical thinking, creativity, motivation, and learner engagement. Therefore, IPAS learning for children aged 6–7 years needs to be supported by learning resources that can connect concepts with experiences and environments that are close to their daily lives (Kusumaningsih & Tyas, 2019).

One approach that is relevant to achieving such learning is *Project Based Learning* (PjBL). PjBL provides learners with opportunities to learn through processes of investigation, problem-solving, and the creation of works or products. Nasrun, Syarifuddin, and Amran (2022) state that the implementation of PjBL can develop critical thinking, creativity, and independence through systematic project stages (Amin et al., 2024; Saragih, 2025). In the context of local ecosystems, PjBL enables children to observe their surrounding environment, identify various environmental components, and understand the relationships among humans, living organisms, and the environment through authentic activities. Pangestu, Malagola, Robbaniyah, and Rahajeng (2024) found that PjBL has a positive influence on learning outcomes, creativity, and learner motivation because it provides opportunities to complete projects related to real-life situations. Therefore, PjBL can serve as an appropriate approach for developing active, contextual, and meaningful IPAS learning experiences.

Along with developments in educational technology, the need for digital learning resources has also increased. A digital module is one form of learning resource that can integrate text, images, audio, video, and interactive activities into a single learning platform. The use of digital learning resources can provide more flexible and engaging learning experiences while enabling learners to interact with learning materials through various forms of representation. Adventyana, Salsabila, Sati, Galand, and Istiqomah (2023) explain that the use of digital media and learning resources can increase learning interest and reduce learner boredom. Khoiriyah and Mawardi (2023) also found that systematically and interactively presented digital learning modules can support learners' critical thinking skills. Furthermore, Haryanti, Wulandari, Trisiantari, and Rosidah (2025) emphasize that e-modules designed to support project-based learning can broaden learning experiences, increase learner engagement, and support the development of 21st-century skills (Khoirudin & Astuti, 2023; Kirschner et al., 2006).

Integrating local ecosystems into a digital module based on PjBL is increasingly relevant because the surrounding environment is a learning resource that is close to children and easily observable. Learning that utilizes the local environment enables learners to connect the concepts they learn with their everyday experiences. The integration of the environment and local wisdom into learning also has the potential to develop ecological awareness and environmental concern. Ramadhani, Aufa, Adzkia, Ramadhan, Suriansyah, and Maimunah (2025) explain that integrating local wisdom and environmental values into IPAS learning can improve environmental awareness because learners engage with phenomena that they encounter directly. Azhary, Suharini, and Widiatmoko (2025) also found that environment- and local-wisdom-based learning can improve learners' understanding while strengthening character and cultural identity (Suharini & Atmaja, 2024). Thus, a local ecosystem orientation in a PjBL-based digital module can serve as a strategy for providing learning that is more closely connected to the lives of children aged 6–7 years.

Nevertheless, the use of digital modules that specifically integrate IPAS, PjBL, and local ecosystems still faces various challenges. The availability of digital devices is not always accompanied by teachers' readiness to select, use, and integrate digital learning resources into the learning process. Teachers may experience challenges related to limited time, technological understanding, and difficulties in adapting digital resources to learners' characteristics. Previous studies have shown that teacher readiness is an important factor in the successful implementation of learning innovations.

Syofyan, Rosyid, Fadli, and Yusuff (2024) reported that teachers still face difficulties in integrating the demands of educational change with existing classroom practices. Sutinah, Riyadi, Muftianti, and Wulandari (2024) also identified challenges related to technology utilization and the implementation of innovative learning strategies. In addition, Fauziyah, Dewi, and Rufiana (2025) emphasized that teachers' digital literacy and the gap between planning and actual learning practices remain challenges in implementing learning innovations (Cita et al., 2016; Fauziyah & Wahyunita, 2025).

On the other hand, teachers' perceptions of a learning resource are also an important aspect that needs to be considered before its development and implementation. Positive perceptions regarding usefulness, ease of use, content suitability, and media attractiveness can serve as an initial foundation for the acceptance of a learning innovation. However, positive perceptions do not necessarily indicate that teachers have sufficient readiness to implement the innovation. Rahmi, Caska, and Trisnawati (2024) found that teachers may have positive perceptions of changes in learning, but such perceptions are not necessarily accompanied by optimal readiness in practice. Therefore, examining teachers' perceptions and readiness simultaneously is necessary to obtain a more comprehensive understanding of the potential implementation of digital modules.

Research on PjBL, digital modules, and environment-based learning has developed considerably in recent years. However, most previous studies have examined these aspects separately, such as the effectiveness of PjBL on learning outcomes, the development of digital modules as learning resources, or the use of the environment as a learning resource. Pangestu et al. (2024) demonstrated the positive contribution of PjBL to learning outcomes, creativity, and learner motivation, while Astuti and Zabit (2024) reported teachers' need for project-based learning modules. Meanwhile, studies on teacher readiness have primarily focused on curriculum change implementation and the use of technology in general. Thus, there remains a research gap concerning the specific examination of teachers' perceptions and readiness toward the implementation of a digital IPAS module based on PjBL and oriented toward local ecosystems for children aged 6–7 years.

Based on this research gap, this study was conducted to analyze teachers' perceptions and readiness toward the implementation of a digital IPAS module based on *Project Based Learning* (PjBL) and oriented toward local ecosystems for children aged 6–7 years. Teachers' perceptions were analyzed based on their views regarding the usefulness, ease of use, content suitability, and design characteristics of the module, while teachers' readiness was examined based on their ability and willingness to implement the module in the learning process. The findings are expected to provide an empirical foundation for the development of digital modules that are not only technologically innovative but also aligned with teachers' needs, the characteristics of children aged 6–7 years, and the local environmental context. Thus, this study is expected to contribute to the development of IPAS learning that is more contextual, interactive, meaningful, and oriented toward learners' real-life experiences.

RESEARCH METHODS

This study employed a quantitative approach using a descriptive survey method aimed at analyzing teachers' perceptions and readiness for the implementation of a digital IPAS module based on *Project Based Learning* (PjBL) and oriented toward local ecosystems for children aged 6–7 years. A quantitative approach was selected because the study focused on measuring the level of teachers' perceptions and readiness based on numerical data obtained through questionnaire responses (Sugiono, 2015).

The research subjects consisted of 20 teachers who facilitate learning for children aged 6–7 years in Laweyan District, Surakarta City. The respondents were selected using *purposive sampling*, which is a sampling technique based on specific considerations relevant to the objectives of the study (Sugiyono, 2023). The respondents were selected based on characteristics relevant to the research focus so that the data obtained could provide an accurate description of teachers' perceptions and readiness to implement a digital IPAS module based on PjBL.

The inclusion criteria for respondents were as follows: (1) teachers who facilitate learning for children aged 6–7 years and have implemented learning principles in accordance with the Merdeka Curriculum; (2) teachers who have experience teaching or integrating IPAS content into learning activities; (3) teachers who have knowledge or experience in using digital technology as a learning medium or resource; (4) teachers who were willing to participate as respondents and complete the

research questionnaire; and (5) teachers who actively conduct project-based learning activities or have experience implementing the *Project Based Learning* (PjBL) model. These considerations were applied to ensure that the data were obtained from respondents who understood the characteristics of children aged 6–7 years and had relevant experience in using technology and implementing project-based learning (Creswell, 2016).

Data were collected using a questionnaire measuring teachers' perceptions and readiness, which was developed based on the *Technological Pedagogical Content Knowledge* (TPACK) framework. The instrument consisted of seven main components: *Technological Knowledge* (TK), *Pedagogical Knowledge* (PK), *Content Knowledge* (CK), *Technological Content Knowledge* (TCK), *Pedagogical Content Knowledge* (PCK), *Technological Pedagogical Knowledge* (TPK), and *Technological Pedagogical Content Knowledge* (TPACK). These seven components were used to obtain an overview of teachers' ability to integrate technological, pedagogical, and content aspects in the use of the digital IPAS module based on PjBL (Sugiyono, 2017).

Each statement item was measured using a five-point Likert scale: Strongly Disagree (SD) with a score of 1, Disagree (D) with a score of 2, Undecided (U) with a score of 3, Agree (A) with a score of 4, and Strongly Agree (SA) with a score of 5. Before being used in the study, the instrument underwent content validity testing through *expert judgment*. Subsequently, the reliability of the instrument was tested using Cronbach's Alpha coefficient to ensure its internal consistency in measuring teachers' perceptions and readiness. The collected data were analyzed using descriptive statistics, including mean scores, percentages, and interpretation categories.

The percentage level of teachers' perceptions and readiness was subsequently calculated using the formula above, where (P) represents the percentage of teachers' perceptions and readiness, ($\sum X$) represents the total score obtained from the respondents, and (SMI) represents the Ideal Maximum Score. The resulting percentages were then interpreted into five categories: very low, low, moderate, high, and very high.

RESULTS AND FINDINGS

The findings of this study indicate that teachers' perceptions of the digital IPAS module based on Project Based Learning (PjBL) and oriented toward local ecosystems were categorized as good, with an overall average percentage of 77.00%. This finding demonstrates that teachers generally responded positively to the proposed design and development of the digital module. The high scores obtained for digital module design (86.00%), ease of module use (83.00%), suitability of IPAS content (82.00%), and local ecosystem integration (81.00%) indicate that teachers perceived the digital module as a relevant learning resource for the demands of 21st-century learning and the implementation of the Merdeka Curriculum. The module was considered capable of presenting learning materials in a more engaging manner through the integration of text, images, videos, and interactive learning activities, thereby providing greater opportunities for student engagement.

The high appreciation given by teachers to the digital module design suggests that visual quality, systematic organization of learning materials, and ease of navigation are important factors in the acceptance of digital learning resources. Teachers perceived that the developed module had a clear and comprehensible structure that could facilitate students' independent learning. The availability of digital features also provided teachers with greater flexibility in managing learning activities and offered learning experiences that may not be readily available through conventional textbooks. This finding suggests that digital transformation in learning has been relatively well received by teachers and provides opportunities for the development of digital learning resources that are more engaging and responsive to students' learning needs.

The high score for the suitability of IPAS content, reaching 82.00%, indicates that teachers perceived the materials presented in the module as relevant to the expected learning outcomes of the Merdeka Curriculum. The module was not viewed merely as a source of conceptual information but also as a learning resource that could encourage students to engage in observation, investigation, exploration, and problem-solving activities related to phenomena in their surrounding environment. This characteristic is consistent with the nature of IPAS learning, which integrates conceptual knowledge with process skills and the development of scientific attitudes. Therefore, the digital module

has the potential to function not only as a source of information but also as a medium for creating meaningful learning experiences.

The integration of local ecosystems also received a positive response, with a percentage score of 81.00%. This finding indicates that teachers recognized the importance of connecting learning materials with environmental conditions that are familiar and accessible to students. The use of local ecosystem contexts can make IPAS concepts more concrete because students are able to relate learning materials to phenomena that they encounter in their everyday lives. Through this contextual approach, students have opportunities to move beyond abstract conceptual understanding and observe environmental phenomena directly. Furthermore, learning oriented toward local ecosystems may contribute to the development of environmental awareness, concern for nature, and responsibility for environmental sustainability.

Despite the positive perceptions of the digital module, the findings reveal that teachers' readiness for implementation was relatively lower than their perceptions of the module. This can be seen from the scores for technological readiness (75.00%), PjBL implementation readiness (68.00%), and facilities and time support (64.00%). The difference between these indicators suggests a gap between teachers' acceptance of learning innovation and the practical conditions required for its implementation. In other words, teachers may recognize the value and potential of a digital module based on PjBL, while still experiencing practical constraints that affect its implementation.

The technological readiness score of 75.00% indicates that teachers generally possess basic competencies in using digital technology, but some still require additional support to utilize digital devices and learning applications more effectively. This finding highlights that the availability of a well-designed digital module alone may not be sufficient to ensure successful implementation. Teachers' technological competence and confidence are also important factors because they determine how effectively digital features can be integrated into classroom activities.

The lower score for PjBL implementation readiness, which reached 68.00%, suggests that project-based learning presents additional demands for teachers. Although teachers generally understand the basic principles of PjBL, its implementation requires more comprehensive planning, including designing project activities, managing collaborative work, guiding students throughout the project process, and assessing both the learning process and the resulting products. Consequently, professional development and practical guidance may be needed to strengthen teachers' capacity to integrate PjBL with digital learning resources.

The lowest score was found for facilities and time support, at 64.00%. This result suggests that infrastructure and instructional time represent the most significant practical challenges to implementation. Limited access to technological devices, unstable internet connectivity, and restricted instructional time may reduce the extent to which teachers can implement digital and project-based learning activities as intended. Thus, successful implementation requires not only teacher readiness but also adequate institutional support in terms of technological facilities, internet access, and flexible learning time.

Overall, the findings demonstrate a clear distinction between teachers' positive perceptions of the digital module and their practical readiness to implement it. Teachers showed strong acceptance of the module's design, usability, content relevance, and local ecosystem orientation, while their readiness was comparatively constrained by technological competence, PjBL implementation demands, and supporting facilities and time. This finding implies that the development of a digital IPAS module should be accompanied by appropriate implementation support, including teacher training, practical guidance on PjBL, and adequate technological infrastructure. Such support is essential to ensure that the potential benefits of a digital, project-based, and locally contextualized learning resource can be translated into effective learning practices.

CONCLUSIONS AND SUGGESTIONS

Conclusion

This study concludes that teachers demonstrated positive perceptions and relatively good readiness toward the implementation of a digital IPAS module based on Project Based Learning (PjBL) and oriented toward local ecosystems. The overall percentage of 77.00% indicates that the proposed module was generally perceived positively and considered relevant to learning needs.

Among the assessed indicators, digital module design obtained the highest score of 86.00%, followed by ease of module use at 83.00%, suitability of IPAS content at 82.00%, and local ecosystem integration at 81.00%. These findings indicate that teachers perceived the module as attractive, practical, relevant, and capable of connecting learning materials with students' surrounding environments.

However, the findings also reveal that teachers' practical readiness for implementation was relatively lower. Technological readiness obtained 75.00%, readiness to implement PjBL reached 68.00%, while facilities and time support obtained the lowest score of 64.00%. These results indicate that although teachers showed positive acceptance of the digital module, its effective implementation may still be constrained by teachers' technological competencies, the complexity of project-based learning, limited instructional time, and the availability of supporting facilities.

Therefore, the implementation of a digital IPAS module based on PjBL and oriented toward local ecosystems should not focus solely on the quality of the digital product. It should also be accompanied by teacher capacity development, adequate technological infrastructure, and sufficient instructional support. The findings provide an empirical foundation for further development and implementation of digital learning resources that are contextual, interactive, and responsive to the learning characteristics of children aged 6–7 years.

Suggestions

Based on the findings of this study, several suggestions can be proposed. First, teachers are encouraged to strengthen their technological competencies and practical skills in implementing Project Based Learning so that digital learning resources can be utilized more effectively. Training and practical workshops focusing on digital module utilization, project design, classroom management, and project assessment may support teachers in overcoming implementation challenges.

Second, educational institutions and relevant stakeholders are encouraged to provide adequate technological facilities, stable internet access, and sufficient instructional time to support the implementation of digital and project-based learning. Institutional support is particularly important because facilities and time support represented the lowest-scoring indicator in this study.

Third, developers of digital learning resources should consider teachers' implementation conditions when designing future modules. Digital modules should not only emphasize attractive visual design and interactive features but also provide clear instructions, manageable project activities, flexible learning scenarios, and assessment guidance that can be adapted to available facilities and instructional time.

Finally, future research is recommended to involve a larger number of participants and broader research settings. Further studies may also examine the actual implementation and effectiveness of the digital IPAS module through experimental or development research designs. Such studies could provide stronger evidence regarding the module's effects on children's conceptual understanding, engagement, creativity, problem-solving skills, and environmental awareness.

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