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Validity of the E-Module Learning Cycle 5E Integrating Local Potential in Integrated Science Education for Equity Education

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Abstract: Education plays a strategic role in improving human resources and ensuring equal access to quality learning for all members of society, including learners in nonformal education settings. This study aims to develop an E-Module Learning Cycle 5E that integrates local potential into integrated science learning at the Nonformal Education Unit (SPNF) Sanggar Kegiatan Belajar (SKB) Boto, Sumbawa Barat. Recognizing that education is a fundamental right of every citizen and that the challenges in equitable education include the lack of teaching materials suitable for the characteristics of learners, this research employs the Research & Development (R&D) method to produce a valid and relevant product. The development process involves evaluation by experts on four main aspects: Learning, Quality, Function, and Appearance. The validation results indicate that this E-Module has good validity, with average ratings supporting its effectiveness in enhancing independent learning motivation and learners' understanding. However, there are several aspects that need improvement, including the addition of interactive activities and enhancement of visual design. With these improvements, it is hoped that the E-Module can contribute positively to equitable education and the development of local potential in the region.

Keywords: Equity Education; E-Module; Learning Cycle; Local Potential; Validity

Introduction

Education is a fundamental right of every citizen, as stipulated in Law No. 20 of 2003 concerning the National Education System (Limpo et al., 2017). This law establishes that education in Indonesia is organized through three main pathways: formal, non-formal, and informal education. Formal education is conducted in structured and tiered institutions, starting from primary, secondary, to higher education (Jihan et al., 2022; Magfiroh et al., 2023). Meanwhile, non-formal education, such as equivalency education programs, provides opportunities for individuals who cannot follow the formal pathway (Saleumsouk et al., 2020; Melania et al., 2024; Nongko et al., 2024). Equivalency education is a form of non-formal education that plays a significant role in maximizing human resource potential (Fakhruddin & Shofwan, 2019).

The Nonformal Education Unit (SPNF) Sanggar Kegiatan Belajar (SKB) Boto in Sumbawa Barat is one of the institutions that offers equivalency education programs. In its implementation, SPNF SKB Boto has adopted the principles of the Merdeka Learning Curriculum, aimed at providing flexibility for learners to explore various subjects through a more interactive and relevant approach to their needs. One important innovation developed by SPNF SKB Boto is the preparation of a learning device in the form of an E-Module Learning Cycle 5E (LC 5E) that incorporates local potential. This E-Module is expected to serve as an effective learning medium to enhance the quality of learning, especially in integrated science subjects (Rochintaniawati et al., 2019; Lestari & Parmiti, 2020; Linda et al., 2021).

In the context of equivalency education, the main challenges faced include the limited availability of teaching materials suitable for the characteristics of

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learners, as well as the lack of integration of local potential in the learning process. However, local potential plays an essential role in enriching the learning process as it makes the material more contextual and relevant for learners. Through the integration of local potential, learners can understand the application of the concepts learned in their daily lives and increase their awareness of the local environment and culture (Afkarina et al., 2024; Wilujeng et al., 2024; Kamila et al., 2024).

The use of the E-Module Learning Cycle 5E that integrates local potential is an innovative step to address these challenges. The Learning Cycle 5E model consists of five main stages, namely engage (building learner engagement), explore (exploration), explain (concept explanation), elaborate (concept application and deepening), and evaluate (learning outcome assessment) (Rizkia et al., 2017; Rahmita & Rosana, 2020); Nicol et al., 2020). This model encourages learners to actively construct knowledge through exploration and direct experience, thereby making the learning process more meaningful and contextual. However, to ensure that the E-Module functions optimally, validity testing is required to confirm that the developed teaching materials meet academic standards and are aligned with learners' needs (Ananda & Usmeldi, 2023; Halik et al., 2023; Firman et al., 2024).

The validity of teaching materials includes evaluating the alignment of content with the curriculum, the relevance of material to local contexts, and the effectiveness of the teaching methods used (Alfiyanti et al., 2023). Without validity testing, the risk of using inappropriate teaching materials can hinder the learning process and achievement of learning outcomes. Therefore, the development of valid, readable, and effective E-Modules is crucial to support integrated science learning in equivalency education (Hamdani & Rahmawati, 2021; Febriani & Kustiyono, 2022; Maulia et al., 2024). The novelty of this research lies in its comprehensive validation approach, which integrates curriculum alignment, local potential, and the Learning Cycle 5E model within an E-Module specifically designed for equivalency education, a context that has received limited attention in previous studies. By emphasizing local relevance and learner characteristics in nonformal education settings, this study offers a more contextual and adaptive framework for developing effective integrated science teaching materials (Usmeldi & Amini, 2020; Pieter et al., 2023).

With the development of a valid Learning Cycle 5E E-Module that integrates local potential, learners will not only gain more contextual and relevant learning experiences but also be trained to think critically and creatively, as well as to be more aware of their surrounding environment and society. This is in line with the principle of curriculum diversification that adapts to local potential and learner characteristics, as stipulated in Law No. 20 of 2003. Thus, the development of this E-Module is expected to enhance learners' motivation for independent learning and contribute positively to regional development, particularly in West Sumbawa Regency. **Based on this rationale, the objective of this study is to develop and examine the validity of a Learning Cycle 5E E-Module integrated with local potential as integrated science teaching material for equivalency education.

Method

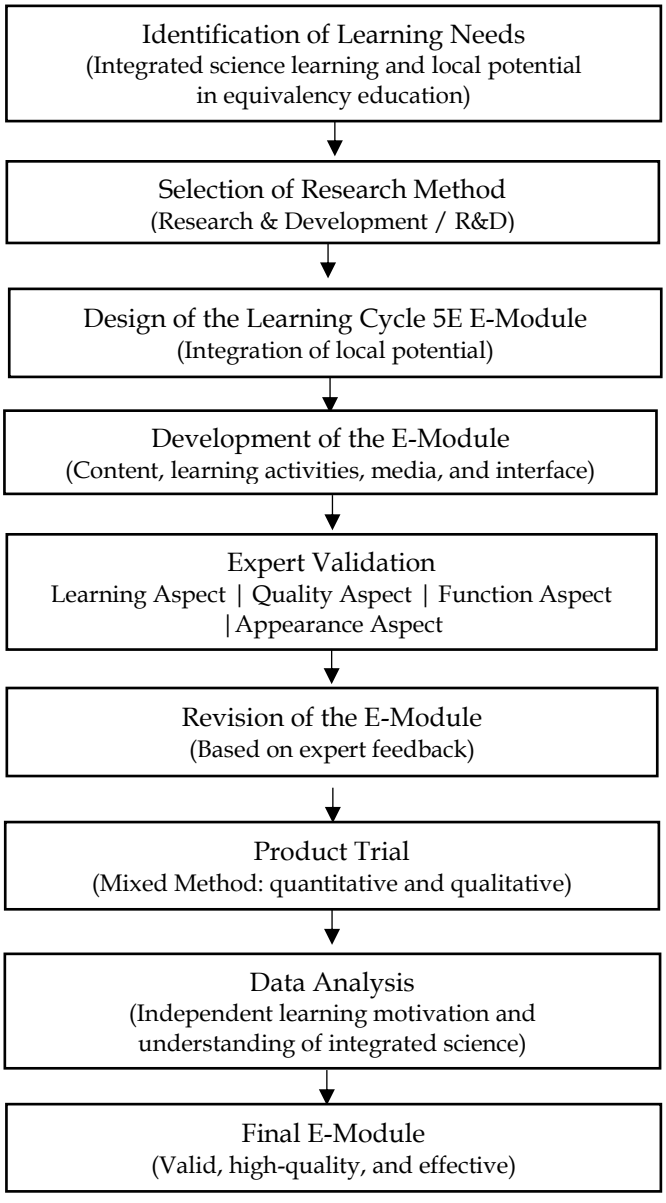

Figure 1. Research Flow

This study applies the Research & Development (R&D) method (Rofi'i et al., 2022). To develop an E-Module Learning Cycle 5E that incorporates local

potential into integrated science education. The module development process is conducted systematically, with a primary focus on validity testing by experts, encompassing evaluations of four key aspects: Learning, Quality, Function, and Appearance (Afian & Saputra, 2021).

In the Learning aspect, expert assessment focuses on how well the E-Module supports the teaching and learning process, encourages active student engagement, and aligns with learning objectives and the curriculum. The module is expected to facilitate conceptual understanding, motivate students to learn independently, and be relevant to the context of local potential (Dewi & Primayana, 2019).

The Quality aspect is evaluated through the accuracy of the content, clarity of presentation, and relevance to local potential and students' needs. Experts ensure that the presented material is scientifically sound and understandable for learners within the context of equivalency education. For the Function aspect, testing is conducted to ensure that the module can be used optimally, including ease of navigation and interactive features that support understanding, as well as being free from technical barriers that could disrupt the learning process.

Finally, in the Appearance aspect, experts assess the visual design of the module, including layout, color usage, typography, and other graphic elements, to ensure the module has an attractive appearance, is easy to understand, and supports user comfort during the learning process. After the validation stage, the research proceeds with trials using the Mixed Method, which combines quantitative and qualitative approaches. This study aims to ensure that the developed module has high quality and is effective in enhancing students' independent learning motivation and understanding of integrated science based on local potential (Dewi & Primayana, 2019).

Result and Discussion

The Learning Cycle 5E E-Module developed in this study focuses on the systematic development of learning media that integrates local potential within the context of equivalency education. The development process followed the Research and Development (R&D) model, which emphasizes the production of valid and relevant instructional products through iterative design and evaluation stages (Gustiani, 2019). These stages included content design, the structuring of learning activities based on the Learning Cycle 5E model, and expert validation to ensure the quality, functionality, and effectiveness of the developed E-Module.

Expert validation was conducted by three validators consisting of education experts, practitioners, and science teachers, who assessed the E-Module based on four main aspects: Learning, Quality, Function, and Appearance (Dewi & Primayana, 2019). The validation results indicate that the E-Module demonstrates good overall validity across all assessed aspects, reflecting its feasibility for use in integrated science learning in equivalency education.

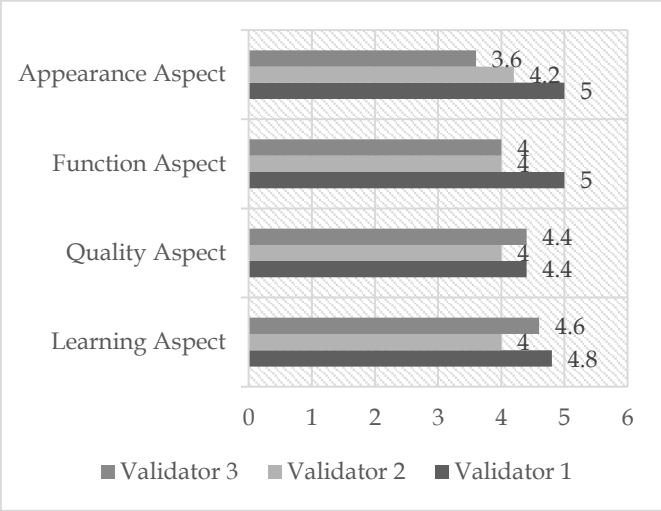

Figure 2. Comparison of Expert Validation Assessment Aspects

In the Learning aspect, the E-Module received high validation scores, with Validator 1 assigning the highest score (4.8), followed by Validator 3 (4.6) and Validator 2 (4.0). These scores indicate that the engage–explore–explain stages are coherently and systematically designed to support active and meaningful learning. The engage stage effectively stimulates learners' prior knowledge through contextual phenomena grounded in local potential, while the explore stage facilitates inquiry-based and independent learning activities that encourage learner autonomy. The explain stage then consolidates conceptual understanding through clear and structured explanations aligned with curriculum demands and learning objectives. These findings are consistent with constructivist learning theory, which emphasizes active participation and contextual experiences as fundamental elements in knowledge construction (Dewi & Primayana, 2019; Nicol *et al.*, 2020). The slightly lower score from Validator 2 suggests the need for further enhancement of interactive instructional strategies to maximize learner engagement.

Regarding the Quality aspect, validation scores ranged from 4.0 to 4.4, indicating that the content presented in the E-Module is of good quality, scientifically accurate, and relevant to learners' needs.

The integration of local potential was found to enhance contextual relevance without compromising conceptual rigor. This suggests that contextualization functions not merely as supplementary content but as a conceptual bridge connecting abstract scientific concepts with learners' real-life experiences. These findings align with previous studies reporting that contextual science learning improves conceptual understanding and learning relevance, particularly in nonformal and equivalency education settings (Rahmawati & Hamdani, 2021; Kamila et al., 2024).

The Function aspect highlights the operational reliability of the E-Module in supporting the Learning Cycle 5E implementation. Validator 1 awarded the highest score (5.0), reflecting the module's effectiveness in facilitating the learning process through clear navigation and accessible features. However, the slightly lower scores from Validators 2 and 3 (both 4.0) indicate the need for further evaluation and refinement of interactive features to ensure optimal functionality. These findings support earlier research emphasizing that functional, user-friendly digital learning materials play a crucial role in fostering learner autonomy, especially in equivalency education contexts where instructional support is often limited (Febriani & Kustiyono, 2022; Vaičiūnienė & Kazlauskienė, 2023).

Variations were also observed in the Appearance aspect, with Validators 1 and 2 providing relatively high scores (5.0 and 4.2, respectively), while Validator 3 assigned a lower score (3.6). This variation indicates that, although the visual design is generally acceptable, improvements are needed in terms of layout, visual consistency, and user interface design. A well-designed visual appearance is essential for sustaining learner engagement and enhancing the overall learning experience, particularly in self-paced digital learning environments (Kamaruddin & Sulaiman, 2017; Afian & Saputra, 2021).

Overall, the average validation scores indicate good validity of the developed E-Module, with the highest average score provided by Validator 1 (4.8), followed by Validator 3 (4.15) and Validator 2 (4.05). Feedback from validators offers valuable directions for further refinement, including the addition of interactive activities, improvement of visual elements, and enhancement of functional features to optimize learning effectiveness.

The explicit novelty of this study lies in the systematic integration of the Learning Cycle 5E model with local potential within an E-Module specifically designed for equivalency education, a context that remains underexplored in previous e-module development research. Unlike prior studies that predominantly focused on formal education settings, this research addresses the distinctive characteristics of equivalency learners, such as heterogeneous backgrounds, flexible learning schedules, and a strong need for independent learning resources (Febriani & Kustiyono, 2022; Sudadio et al., 2022; Makleat *et al*., 2022). The integration of local potential is intentionally embedded within the engage and explore stages, ensuring that contextual relevance is structurally integrated into the learning process rather than treated as an additional component.

From a theoretical perspective, this study extends the application of constructivist learning theory by demonstrating that the Learning Cycle 5E model can be effectively adapted to nonformal and equivalency education contexts. Empirically, the findings confirm that contextualized learning approaches can enhance conceptual understanding while maintaining scientific rigor (Nicol *et al*., 2020; Dewi & Primayana, 2019). Practically, the developed E-Module provides an effective instructional alternative for integrated science learning in SPNF/SKB settings by emphasizing usability, accessibility, and learner autonomy. Moreover, the validation results serve as a foundation for continuous improvement, particularly in strengthening visual design and interactive features to maximize learner engagement. Overall, this study contributes both theoretically and practically by presenting a validated, contextual, and learner-centered E-Module framework that supports equitable and meaningful integrated science learning in equivalency education.

Conclusion

This study successfully developed a Learning Cycle 5E–based E-Module that integrates local potential for use in integrated science learning within equivalency education. The development process, conducted using the Research and Development (R&D) model, produced an instructional product that demonstrated good overall validity across four assessed aspects: Learning, Quality, Function, and Appearance. Expert validation results indicate that the *engage–explore–explain* stages are systematically designed to support active, meaningful, and independent learning, while the integration of local potential enhances contextual relevance without compromising scientific accuracy.

The findings confirm that the Learning Cycle 5E model can be effectively adapted to the unique characteristics of equivalency education, particularly learners' heterogeneity, flexible learning conditions, an d need for autonomous learning resources. Although improvements are still needed in visual design and interactive features, the developed E-Module is considered feasible and effective as a contextual and learner-centered learning medium. Overall, this study

contributes theoretically by extending constructivist learning applications to nonformal education contexts and practically by providing a validated E-Module framework that supports equitable and meaningful integrated science learning in equivalency education.

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Author Contributions

In this research article, each author has a distinct role. The conceptualization and methodology of the study were conducted by Hamdani. Rizka Donny Agung Saputra was responsible for data processing, while data validation was carried out by Sahratullah, Sopan Hidayat, and Fitri Rahmawati. All authors collaborated to ensure the quality of the research and have read and approved the final version of the manuscript for publication. Authorship is limited to individuals who made substantial contributions to this research.

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Conflicts of Interest

The authors declare that there are no relevant conflicts of interest concerning this research. All authors have no financial, personal, or professional relationships that could influence the outcomes or interpretations of the study. A commitment to academic integrity and transparency has been upheld throughout the research process, ensuring that the results presented in this article are an objective and unbiased representation of the findings obtained.

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