E-ISSN: 2502-3519 P-ISSN: 2798-3234
JGA, Vol. 11(1), March 2026 (139-152)
DOI: https://doi.org/10.14421/jga.2026.111-10

Golden Age
Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini

OPEN ACCESS

Development of an "I Love the Earth" E-Module to Support Mutual Cooperation in Early Childhood Education

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Keywords:
Early childhood education, E-module; Mutual cooperation, Project-based learning.

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Received 06 05 2025
Revised 13 03 2026
Accepted 22 03 2026
Published Online First 31 03 2026

Check for updates

Abstract

This study examined the development and initial evaluation of an e-module themed "I Love the Earth" designed to support mutual cooperation in early childhood education. The study was motivated by the need to strengthen young children's prosocial dispositions, particularly collaboration, caring, helping, and sharing, within the framework of the Pancasila Student Profile. It adopted a Research and Development approach using the ADDIE model, comprising analysis, design, development, implementation, and evaluation. The e-module was developed as a project-based digital resource that combined environmental themes with collaborative learning activities for children aged 5 to 6 years. The study involved expert validators, teachers, and children at TK Negeri Pembina Linggo Sari Baganti. The findings showed that the developed e-module obtained an average validity score of 94%, a practicality score of 93%, and an effectiveness score of 87%. Effectiveness was assessed through observational indicators related to children's mutual cooperation during project activities, including collaboration in groups, caring for peers, empathy, helping behavior, and sharing. These results suggest that the e-module was not only feasible for classroom use, but also showed potential to support the cultivation of mutual cooperation through contextual and developmentally appropriate learning experiences. Rather than implying that digital media are inherently effective for character formation, the study indicates that digital resources may become pedagogically meaningful when they are structured around social interaction, shared activity, and children's everyday experience. In broader terms, the study offers a contextually grounded example of how digital pedagogy, project-based learning, and value-oriented early childhood education may be brought into relation, with possible relevance for wider discussions on prosocial and environmentally situated learning in diverse educational settings.

To cite: Wilanda, N. S., Suryana, D., Rakimahwati, & Yaswinda. (2026). Development of an "I Love the Earth" e-module to support mutual cooperation in early childhood education. *Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini, 11*(1), 139–152. https://doi.org/10.14421/jga.2026.111-10

Introduction

Early childhood is a formative period in which cognitive, social, emotional, moral, and behavioral foundations develop rapidly and interactively. For that reason, early childhood education cannot be reduced to academic preparation alone, because it also shapes how children learn to relate to others, interpret shared norms, and participate in social life (Arifudin et al., 2021; Fatimah & Istikomah, 2021; Sulyandari, 2021). Within this broader developmental frame, character education becomes especially consequential. The values introduced during early childhood often become the basis of later dispositions toward cooperation, responsibility, empathy, and social participation (Mandala & Pujiati, 2020; Munafiah et al., 2023).

In Indonesia, this concern has been institutionalized through the Merdeka Curriculum and the Pancasila Student Profile, which positions character formation as a central educational aim rather than a peripheral complement to subject learning (Kresnawaty et al., 2024; Suprayitno & Fathurrohman, 2020; Umar et al., 2023). Among its six dimensions, mutual cooperation is particularly significant in early childhood education because it refers to observable prosocial capacities such as collaborating with peers, caring for others, helping voluntarily, and sharing resources in everyday interaction (Halwati & Mardiah, 2024; Sania et al., 2024). This dimension is

pedagogically important not only because it reflects a core national value, but also because it addresses a wider developmental need: young children must be supported to move from parallel or individual activity toward socially responsive participation.

Yet this transition does not occur automatically in classroom practice. Preliminary observations at TK Negeri Pembina Linggo Sari Baganti indicated that many children still preferred individual play, participated unevenly in group activities, and did not consistently demonstrate helping or sharing behaviors with peers. These conditions suggest that the cultivation of mutual cooperation remains more aspirational than fully enacted. Although the Pancasila Student Profile Strengthening Project (P5) is expected to provide meaningful opportunities for collaborative and value-based learning, its implementation in early childhood settings appears to remain uneven, particularly when teachers lack structured and developmentally appropriate materials for translating curricular ideals into daily practice.

Existing scholarship offers useful starting points but also reveals a clear limitation. Studies on digital learning media, including e-modules and interactive multimedia, show that technology-supported instruction can improve engagement and make learning more contextual and meaningful (Fransiska et al., 2025; Laksana et al., 2021). Related work also indicates that Project Based Learning and environment-related themes can encourage children's participation and social involvement because such themes are close to children's lived experience and allow them to learn through shared activity (Permatasari et al., 2024). However, much of this literature remains concentrated on cognitive achievement, creativity, or learning interest. Far less attention has been given to how a digitally mediated learning resource can be intentionally designed to strengthen mutual cooperation as a social-character outcome in early childhood, especially within the curricular framework of the Pancasila Student Profile. The unresolved issue, therefore, is not simply the absence of digital media, but the limited availability of digital media that are pedagogically organized to cultivate prosocial behavior through collaborative experience.

This study addresses that issue by drawing on Vygotsky's social constructivism and Bandura's social learning theory. From a Vygotskian perspective, children develop understanding through social interaction, guided participation, and shared activity. From Bandura's perspective, social behavior is learned through observation, imitation, and reinforcement (Dilfuza, 2025; Laksana et al., 2021). Together, these perspectives provide a strong rationale for a project-based e-module in which children do not merely receive information, but participate in structured collective tasks that require cooperation, attention to others, helping, and sharing. In this sense, the pedagogical value of the e-module lies not only in its digital format, but in its capacity to mediate social experience and make mutual cooperation visible, practiced, and repeatable in classroom interaction.

Based on this rationale, the present study developed a flipbook-based e-module integrating Project Based Learning through the theme "I Love the Earth". The environmental theme was selected because it is close to children's everyday surroundings and can anchor collaborative activities in concrete responsibilities, shared tasks, and collective care. The novelty of this study lies in the integration of three elements that are often treated separately in prior research: digital learning media, environment-based project activity, and the explicit strengthening of the mutual cooperation dimension in early childhood education. Rather than treating technology as an end in itself, this study positions the e-module as a pedagogical tool for organizing collaborative character learning. Accordingly, this study aims to develop an e-module entitled "I Love the Earth" to strengthen the dimension of mutual cooperation in early childhood education. Its contribution is twofold: it extends discussion on character-oriented digital pedagogy in early childhood education, and it offers a contextually grounded model that may inform wider conversations on how digital media can support prosocial and environmentally situated learning in settings beyond Indonesia.

Methods

Research Design

This study employed a Research and Development (R&D) method using the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Branch, 2009). T he purpose of this study was to develop and evaluate the effectiveness of a product designed to strengthen the mutual cooperation dimension in early childhood children. This research was conducted at an early childhood education institution, namely TK Negeri Pembina. The main target users of the "I Love the Earth" e-module developed to strengthen the mutual cooperation dimension in early childhood education were PAUD teachers and parents.

The development procedure followed the five stages of the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation. In this study, the ADDIE model functioned as a product development paradigm, rather than merely a procedural framework (Branch, 2009). The ADDIE model was selected because it has systematic, flexible, and appropriate stages for the development of digital learning media. In addition, this model allows for formative evaluation at each stage, enabling the product to be revised gradually according to user needs. Compared with the 4D model, ADDIE is considered more comprehensive and rational, making it applicable to various product development processes, including instructional strategies, learning media, and teaching materials.

Research Procedure

The five phases of the ADDIE model are illustrated in Figure 1 below.

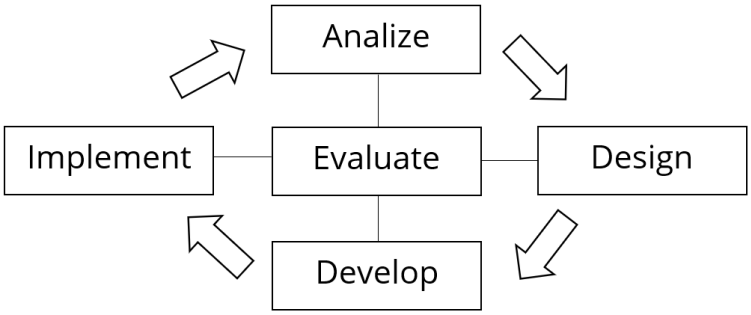

Figure1. ADDIE model adapted from Branch (2009)

Phase 1: Analysis

The analysis stage aims to identify media needs, learning conditions, and the mutual cooperation character of children. Data were collected through observations, teacher interviews, and needs analysis. Observations were conducted in several early childhood education institutions in Linggo Sari Baganti District, and interviews were carried out with teachers to identify media needs and the condition of children's mutual cooperation character. The findings showed that: (1) children's mutual cooperation was still relatively low, (2) learning activities were still conventional and had not yet integrated digital media, (3) 86.7% of teachers had not used project modules, and 80% of teachers needed an e-module. Although the Merdeka Curriculum already includes mutual cooperation indicators, its implementation has not yet been optimal.

Phase 2: Design

The design phase aimed to develop the initial structure of the e-module in accordance with user needs and the characteristics of early childhood learners. The e-module was designed using Canva and Flip PDF Professional as the main platforms. In addition, the layout, illustrations, interactive elements, and navigation system were developed to suit the developmental characteristics of young children. The output of this stage was the initial prototype of the e-module, along with the validation instruments for expert review. The storyboard consisted of: Menus 1–3 (Introduction: background, rationale, and learning objectives), Menu 4 (Introduction

to the I Love the Earth theme), Menus 5–7 (P5 implementation: general information, core components, and project flow), Menus 8–11 (Learning activities: recognize, investigate, do, and share stages), Menu 12 (Assessment of mutual cooperation indicators), Menu 13 (Conclusion), and Menu 14 (References).

Phase 3: Development

The e-module product was validated by three experts (material expert, media expert, and instrument expert) using a Likert-scale questionnaire, with a feasibility criterion of ≥81%, categorized as very valid. Validation was conducted in two stages for the material expert and one stage each for the media and instrument expert. Revisions were made based on expert suggestions, including improvements to the learning sequence, the addition of project stages, refinement of language, completion of references, and the inclusion of learning videos. The validation results showed that the material expert gave a score of 93.75%, the media expert 92%, and the instrument expert 91%, all of which fell into the very valid category. Therefore, the e-module was considered feasible for the trial stage.

Phase 4: Implementation

The implementation of the e-module was carried out over a period of two weeks at TK Negeri Pembina Linggo Sari Baganti, involving 15 children in Group B2. The implementation began with a Training of Trainers (TOT) session for four teachers to provide training on the use of the e-module. Learning activities were conducted through project-based activities under the theme "I Love the Earth", following the stages of recognize, investigate, do, and share, which were integrated into children's collaborative learning experiences. During implementation, observations were conducted on children's mutual cooperation behavior using seven assessment indicators. The effectiveness test results showed a percentage of 87%, categorized as very effective. This indicates that the e-module was able to improve children's cooperation, empathy, helping behavior, and sharing. During this stage, teachers act as facilitators as well as collaborators in the observation process, assisting with project implementation and monitoring the development of children's mutual cooperative behavior.

Phase 5: Evaluation

Evaluation was conducted both formatively and summatively. Formative evaluation was carried out throughout the development process through expert feedback and trial results to improve the e-module, such as refining quizzes to make them more interactive by adding visual elements (eg, stars/rewards). Summative evaluation was conducted after implementation through practicality and effectiveness testing involving 15 children, which showed that the e-module fell into the very practical and very effective categories. These evaluation results were used to refine the product so that the e-module was considered suitable for use in learning activities to strengthen the mutual cooperation dimension in early childhood education.

Participants and Sampling Technique

The research participants consisted of children aged 5–6 years at TK Negeri Pembina Linggo Sari Baganti, namely 10 children in the small-group trial and 15 children in the large-group trial, as well as expert validators (material, media, and instrument experts). The number of participants in this trial stage was considered adequate because the study focused on the initial testing of the product's feasibility, practicality, and effectiveness before wider implementation. The sampling technique used was purposive sampling, with inclusion criteria including: children aged 5–6 years, a minimum attendance rate of 80%, no cognitive or sensory impairments, and parental consent. The exclusion criteria included children who did not meet these requirements. During the implementation stage, teachers act as facilitators and collaborators in observation, helping to carry out project activities and observing the development of children's mutual cooperative behavior.

Instrument Validity

The research instruments were developed based on theoretical studies and previous research, and were then validated by a material expert, media expert, and instrument expert using a Likert scale (1–5). The material validation instrument consisted of 16 items covering aspects of content feasibility, language, and presentation, while the media validation instrument consisted of 13 items covering aspects of interface design (graphics) and usability. The effectiveness instrument included 7 indicators reflecting the mutual cooperation dimension, namely collaboration, caring, and sharing.

Data Analysis

Data analysis used descriptive statistics in the form of percentages, calculated using the formula (obtained score / maximum score) × 100%. Validity and practicality were assessed using a Likert scale (1–5), with validity criteria ranging from 81–100% (very valid) to 1–20% (invalid), and practicality criteria ranging from 76–100% (very practical) to 0–25% (impractical). Effectiveness analysis was conducted by calculating the achievement scores of children's mutual cooperation indicators during the learning process, which were then converted into percentages and interpreted from 76–100% (very effective) to 1–25% (ineffective). All analysis results were used consistently to determine the feasibility, practicality, and effectiveness of the product.

Result

This study produced an e-module entitled "I Love the Earth" aimed at strengthening the mutual cooperation dimension in early childhood education. The development process followed the ADDIE model, which consists of the analysis, design, development, implementation, and evaluation stages. The presentation of findings in this section focuses on the key results at each stage to demonstrate how the e-module was developed, validated, and implemented in the learning process.

Analysis Stage

The analysis stage was conducted to identify the needs for developing the e-module, its alignment with the curriculum, and the initial conditions of both children and teachers as the foundation for product development. The results of the needs analysis indicated that teachers required project-based teaching materials that were more engaging, systematic, and relevant to support the strengthening of the mutual cooperation dimension in children aged 5–6 years. The data were collected through observations, interviews, Google Form questionnaires, and documentation. The needs questionnaire was distributed to 15 kindergarten teachers in Linggo Sari Baganti District, and the results showed that 80% of teachers needed a Pancasila project guide or e-module based on the theme "I Love the Earth" to support the development of mutual cooperation character in children. These findings indicate that teachers' need for project-based digital teaching materials is relatively high and relevant to the demands of contextual learning in early childhood education.

In addition, the interview results revealed that teachers needed teaching materials that were not only visually attractive, but could also serve as practical guidance for implementing project activities that stimulate collaboration, caring, and sharing. Several teachers stated that the teaching materials currently available had not fully supported them in designing structured project activities aimed at fostering the character of mutual cooperation. Therefore, the results of the needs analysis highlight a gap between the demands of project-based learning and the availability of appropriate instructional media.

The results of the initial observation of children showed that mutual cooperation behavior had not yet developed optimally. Children still tended to play individually, were less involved in group activities, did not spontaneously help peers who were experiencing difficulties, and were not yet accustomed to sharing play materials. This condition indicates that the children's social-emotional development, particularly prosocial behaviors such as cooperating, helping, caring, and sharing, still requires more focused stimulation. Therefore, the

analysis stage confirms that the development of an e-module with the theme I Love the Earth is needed as a learning medium to strengthen the mutual cooperation dimension through meaningful project-based activities.

Design Stage

The design stage was conducted to develop the structure, content, and visual appearance of the e-module so that it would align with teachers' developmental needs and the characteristics of early childhood learners. Based on the findings from the analysis stage, the e-module was designed using child-centered, visually simple, contextual, and collaborative learning principles. In addition, the design also reflects constructivist learning principles, which provide children with opportunities to build knowledge through direct experience, exploration, interaction, and active involvement in project-based activities.

The theme "I Love the Earth" was chosen because it is closely related to children's daily lives and allows the integration of environment-based project activities that are relevant to strengthening the character of mutual cooperation. This theme was considered meaningful because it enables children not only to become familiar with their surrounding environment, but also to participate in shared activities that foster collaboration, caring, and sharing.

The structure of the e-module was regularly organized into several components, including a cover page, introduction, project relevance, project objectives, project flow, and learning content. These components were designed to help teachers understand and implement the project in a gradual and structured manner, beginning with the introduction of environmental issues, followed by material exploration, group activities, and the creation of simple products from recycled materials. With this structure, the e-module functions not only as a medium for delivering learning content, but also as a practical guide for structured project-based learning. These findings indicate that the design stage emphasizes not only the preparation of instructional content, but also the usability, pedagogical relevance, and meaningfulness of the learning experience for both teachers and children.

Development Stage

The development stage aimed to produce the initial version of the e-module, refine it based on feedback, and examine its feasibility through expert validation.

The initial e-module product was developed based on the design that had been prepared in the previous stage and was subsequently revised according to suggestions from the supervisor and validators. The validation process involved three experts, namely a material expert, a media expert, and an instrument expert for the mutual cooperation dimension. The validation results indicated that the developed e-module had a very high level of feasibility. The results of expert validation of the developed e-module are presented in Table 1 .

Table 1. Expert Validation Results

Aspect	Score	Category
Media	93%	Very valid
Material	92.5%	Very valid
Mutual cooperation instrument	95%	Very valid
Average	**94%**	**Very valid**

Source: Field data, 2025.

The validity criteria used in this study were as follows: 81–100% = very valid, 61–80% = valid, 41–60% = fairly valid, 21–40% = less valid, and 1–20% = invalid.

These findings indicate that the e-module met the feasibility criteria in terms of content, visual presentation, and assessment instrument. Qualitatively, the validators also provided several important suggestions for improvement, including separating the learning description from the learning objectives, organizing activities into opening, core, and closing sessions, adding clearer project stages, completing the references, and incorporating learning videos. These revisions contributed to improving the clarity, structure, and instructional quality of the e-module. The visual appearance of the developed e-module is presented in Figure 1.

Figure 2. Developed E-Module Product
Source: Adapted from the researcher's design, 2025

Implementation Stage

The implementation process is carried out by preparing a product in the form of a revised learning e-module according to the direction of experts and declared valid by experts. Then tested by educators in learning activities.

Practicality test

The practicality test aims to determine the extent to which the e-module is easy to use, easy to understand, and relevant for implementation in early childhood learning. The practicality test was conducted through a Focus Group Discussion (FGD) involving seven teachers, as well as direct assessments by teachers during classroom implementation.

The results of the practicality test showed that the e-module obtained a percentage score of 93%, which falls into the "very practical" category. To provide a more detailed overview of each indicator, the results of the practicality test are presented in Table 3.

Table 3. Practicality test by educators

No	Rated aspect	Score	Percentage
1	I love the earth theme e-module is easy to use	5	100%
2	The material contained in the e-module can be understood well	5	100%
3	The material in the e-module is presented regularly.	5	100%
4	The material presented makes it easy to stimulate children's mutual cooperation character.	5	100%
5	The language used in the e-module is easy to understand	4	80%
6	The font size used in the learning e-module is easy to read	4	80%
7	The type of font used in the learning e-module is easy to read	5	100%
8	E-modules can be accessed quickly	5	100%
9	E-modules can be accessed easily	5	100%
10	Learning activities using e-modules help educators use time effectively.	4	80%
11	The learning objectives in the e-module are in accordance with the activity material.	5	100%
12	The activities presented in the e-module are in accordance with early childhood development.	4	80%
13	The activities presented can stimulate the character of mutual cooperation in children.	5	100%
14	Images and illustrations are in accordance with the material in the e-module.	4	80%

No	Rated aspect	Score	Percentage
15	In general, e-modules are suitable for use by early childhood educators.	5	100%
Amount			**70**
Average score			**4.6**
Percentage			**93%**

Source: Field data, 2025

Based on Table 3, it can be seen that the aspects contributing most to the practicality of the e-module include ease of use, clarity of the material, systematic presentation, accessibility, and the relevance of activities in stimulating children's cooperation (mutual cooperation) character. This is indicated by the high scores on indicators such as ease of use, material comprehensibility, alignment with learning objectives, and the e-module's ability to assist teachers in fostering cooperative behavior among children.

On the other hand, several aspects such as language use, font size and type, illustrations, and time efficiency received slightly lower scores, although they still fall within the practical category. These findings suggest that while the e-module performs very well in terms of pedagogical function and implementation, there is still room for improvement in its visual and technical aspects.

Overall, the e-module is considered capable of helping teachers organize project-based learning activities in a more structured, efficient, and contextual manner. Therefore, the e-module is not only conceptually appropriate but also practical for use in early childhood education settings.

Effectiveness Test

The effectiveness test was conducted to determine the extent to which the use of the e-module could strengthen the dimension of mutual cooperation (gotong royong) in children. The assessment was carried out using an observation sheet based on seven indicators: working collaboratively in groups, engaging in positive competition, guiding peers, showing sympathy, demonstrating empathy, helping others, and sharing.

In the limited product trial stage, the e-module achieved an effectiveness percentage of 84%, which falls into the "very effective" category. Meanwhile, during the classroom implementation involving 15 children, the effectiveness percentage increased to 87%, also categorized as "very effective." A comparison of the effectiveness results at both stages is presented in Table 4.

Table 4. Results of the E-Module Effectiveness Test

Test Stage	Number of Participants	Total Score	Percentage (%)	Category
Limited trial	10	236	84%	Very effective
Classroom implementation	15	364	87%	Very effective

Source: Authors' field data, 2025

The effectiveness criteria used in this study were arranged hierarchically and without overlap: 76–100% = very effective, 51–75% = effective, 26–50% = less effective, and 1–25% = ineffective. These criteria were used to ensure consistent and clear interpretation of the results.

The increase from 84% to 87% indicates a positive impact of the e-module on strengthening children's cooperative behavior, particularly in aspects such as collaboration, helping peers, and sharing.

Observationally, before using the e-module, children tended to play individually and were less accustomed to helping and sharing. After implementation, children showed more active participation in group work, were more willing to help peers spontaneously, and became more accustomed to sharing materials and tools during learning activities.

Evaluation Stage

The evaluation stage was conducted to assess the overall results of the development process and to refine the product based on the findings of validity, practicality, effectiveness, and user feedback. This stage served as the final phase to ensure that the developed e-module was fully aligned with the research objective, namely strengthening the dimension of mutual cooperation in early childhood through project-based learning.

The evaluation results indicated that the "I Love the Earth" e-module met the criteria of being valid, practical, and effective for use in kindergarten learning activities. In terms of content and visual presentation, the module was considered appropriate for the learning needs of early childhood education. From the implementation perspective, teachers perceive the e-module as easy to use, engaging, and relevant to the learning context. In terms of learning outcomes, children showed positive responses and demonstrated improvements in mutual cooperation behaviors during the project activities.

User feedback also revealed that the e-module provided a more structured and enjoyable learning experience. One teacher stated that *"the children became more enthusiastic about working together and were easier to guide during the project activities."* In addition, the evaluators suggested that interactive elements, such as quizzes and visual reward reinforcement, should be further developed to increase children's engagement while using the module.

Overall, the evaluation findings confirmed that each stage of the ADDIE model contributed to the development of a feasible and meaningful e-module. The analysis stage ensured that the product was developed based on actual needs, the design and development stages produced a module that was pedagogically and visually appropriate, and the implementation stage demonstrated that the module could be used effectively in classroom practice. Therefore, the "I Love the Earth" e-module was proven to support the strengthening of the mutual cooperation dimension in early childhood, particularly in the aspects of collaboration, caring, and sharing.

Discussion

The findings indicate that the e-module themed "I Love the Earth" was not only feasible as a digital product, but also broadly aligned with the pedagogical demands of character learning in early childhood education. Its reported validity and practicality suggest a degree of correspondence between instructional content, classroom use, and developmental relevance. What is noteworthy here is less the claim that the module was inherently effective than the indication that it provided a structured way of translating the value of mutual cooperation into concrete learning activity. In this sense, validity points to the relevance of the content to the aims of character education, whereas practicality suggests that the module could be used in classroom settings without creating substantial instructional barriers. Considered together, these dimensions help account for why the module appears to have had potential to support children's mutual cooperation.

One important reading of the findings is that the e-module may have supported the development of mutual cooperation through activities organized around collaboration, caring, and sharing. This matters because early childhood is a period in which socio-emotional dispositions are shaped through repetition, participation, and guided interaction. Character formation at this stage cannot be separated from everyday classroom life, since values such as empathy, responsibility, and cooperation are more likely to develop through lived practice than through verbal instruction alone (Afipah & Imamah, 2023; Prameswari, 2020). This interpretation is consistent with the view that empathy, responsibility, and cooperation are foundational to children's social development and therefore need to be nurtured through meaningful interaction and direct experience (Aslan, 2024). It is also compatible with earlier studies suggesting that the Pancasila Student Profile Strengthening Project (P5) can contribute to character formation, including through environment-based activities and collaborative projects

(Farhana & Cholimah, 2024; Alipah et al., 2024).

This pattern becomes more intelligible when read through Vygotsky's social constructivism and Bandura's social learning theory. From a Vygotskian perspective, children develop understanding through shared activity and guided interaction, whereas Bandura emphasizes observation, imitation, and reinforcement as key processes in social learning (Dilfuza, 2025; Laksana et al., 2021). The collaborative tasks embedded in the e-module appear to have created opportunities for children to work with peers, exchange ideas, assist one another, and experience cooperation as part of the activity itself rather than as a formal moral message. Mutual cooperation, therefore, seems to have been introduced not only as a value to be named, but also as a practice to be enacted. Environmental project work required children to negotiate roles, attend to peers' needs, and solve simple problems together. Under such conditions, cooperation may become more socially meaningful because it is embedded in participation itself.

The environmental theme appears to have strengthened this process by connecting social learning to familiar and concrete experience. In early childhood education, hands-on activity remains especially important because abstract values tend to become more intelligible when anchored in observable action and situated experience (Irmansyah et al., 2020; Vartiainen & Kumpulainen, 2020). Within this study, the theme "I Love the Earth" functioned as more than a topical label. It offered a context in which collaboration could emerge through shared tasks, collective responsibility, and simple forms of environmental care. Previous studies have likewise shown that environment-related learning can build children's awareness of sustainability while also encouraging collaborative engagement and problem-solving (Krisnawati & Parmiti, 2023; Rochmah et al., 2024). The present findings are therefore in line with evidence that project-based learning can enable children to participate in activities directly connected to their surroundings and, through that connection, may support the development of empathy, responsibility, and sharing (Sriwahyuni & Eliza, 2024; Sarah et al., 2024).

The study also suggests that the e-module may have helped create a learning environment that was engaging, interactive, and manageable for classroom use. This point is not trivial. In early childhood settings, children's willingness to participate is shaped to a considerable extent by the emotional and sensory qualities of the learning environment. The P5 framework emphasizes contextual and flexible learning linked to children's surroundings (Julaidar et al., 2024), and the present study indicates that an e-module can make that principle more pedagogically workable. Earlier work has similarly found that e-modules can support more conducive learning environments and encourage active participation among children (Priyono et al., 2022). The relevance of the module, then, lies not only in its digital format, but in the way it sequences learning activity into a structure that teachers can implement and children can follow.

Its multimodal features also merit attention. By combining images, videos, and animation, digital modules may make learning more accessible to young children, whose engagement often depends on visual clarity, repetition, and interactive stimulation (Winatha et al., 2018). These features can support flexible and iterative learning processes, allowing children to revisit content and remain involved. The interactive character of digital media may also contribute to the internalization of social values when it is embedded in collaborative tasks rather than reduced to isolated screen-based activity (Suryana, 2021; Sutama et al., 2021). From this perspective, practicality should not be read narrowly as technical ease of use. In this study, practicality more plausibly refers to the module's capacity to sustain meaningful learning interaction and to help teachers organize character-oriented activity in ways that remain accessible to young learners.

The relationship among validity, practicality, and effectiveness also warrants attention. These dimensions are often presented as separate technical indicators, yet the present findings suggest a closer connection. Content validity indicates that the module addressed the intended goals of character education, while practicality shows that those goals could be implemented

in classroom conditions without undue difficulty. When both conditions are present, effectiveness becomes more plausible because children encounter material that is not only relevant but also pedagogically usable. This interpretation is consistent with earlier work suggesting that well-designed and practical e-modules are more likely to support learning outcomes effectively (Rananda & Nurhafizah, 2022). What this study adds is a more focused account of how that relationship may operate in the domain of social-character learning in early childhood education.

A further contribution of this study lies in the integration of the values of the Pancasila Student Profile, particularly mutual cooperation, into a project-based e-module organized around an environmental theme. Even so, that contribution needs to be stated carefully. The study does not resolve the broader challenge of character education in early childhood, nor does it suggest that digital media alone can transform children's social behavior. Its contribution is more limited but also more defensible: it illustrates how digital media, collaborative project work, and value-oriented pedagogy can be brought into a coherent instructional design. Although this model is rooted in the Indonesian curricular context, its relevance may extend beyond that setting. At minimum, it offers a case through which broader discussions can consider how early childhood pedagogy might connect prosocial learning, environmental awareness, and digital mediation without losing developmental appropriateness.

These findings still need to be read within the limits of the study. The implementation of e-modules depends heavily on teacher preparedness, especially in terms of digital literacy and the ability to manage technology-supported learning. Differences in infrastructure, institutional resources, and classroom conditions may also shape how effectively such a module can be used. Children's social and cultural backgrounds may further influence how cooperation, helping, and sharing are expressed in practice. For that reason, the effectiveness of the module should not be assumed to transfer unchanged across contexts. Further research is therefore needed to examine its use in more diverse settings and to explore what forms of teacher support or mentoring are necessary for more sustainable implementation.

The relevance of the "I Love the Earth" e-module lies less in the fact that it is digital than in the way it organizes collaborative, contextual, and value-oriented learning experiences for young children. The study suggests that digital innovation in early childhood education becomes more pedagogically meaningful when it is tied to developmental needs, social interaction, and structured opportunities for children to practice prosocial behavior. Seen from that angle, the e-module may be read as one possible contribution to ongoing efforts to design early childhood learning models that remain responsive to contemporary educational demands without losing sight of children's social formation.

Conclusion

This study suggests that the project-based e-module themed "I Love the Earth," developed through the ADDIE model, has potential as a pedagogical resource for early childhood education, particularly in supporting the cultivation of mutual cooperation through contextual and collaborative learning activities. Rather than demonstrating that digital media are inherently effective for character formation, the findings point to a more specific conclusion: digital resources may become educationally meaningful when they are carefully structured around children's developmental characteristics, grounded in social interaction, and connected to everyday experience. Read in this way, the value of the e-module lies not simply in its format, but in its attempt to mediate how young children encounter sharing, caring, helping, and cooperation as part of lived classroom practice.

The contribution of this study therefore lies in offering an empirically grounded example of how digital pedagogy, project-based learning, and value-oriented early childhood education can be brought into relation within a specific curricular context. Although the study is rooted in the Indonesian framework of the Pancasila Student Profile, its broader relevance lies in ongoing international discussions on how early childhood education might respond to the intersecting

demands of digital innovation, prosocial development, and environmental awareness without losing developmental appropriateness. At the same time, these conclusions should be read within the limits of a context-specific implementation. Further research is needed to examine how similar approaches function across more diverse educational settings, institutional conditions, and sociocultural contexts.

Declarations

Author Contribution Statement

Novia Sri Wilanda: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing - original draft, Writing - review & editing. Dadan Suryana: Conceptualization, Methodology, Supervision, Validation, Writing - review & editing. Rakimahwati: Validation, Formal analysis, Resources, Writing - review & editing. Yaswinda: Supervision, Project administration, Validation, Writing - review & editing.

Funding statement

This research did not receive funding or grants from any public, commercial, or nonprofit funding agencies.

Data Availability Statement

The dataset generated and analyzed during the research is available from the corresponding author upon reasonable request.

Declaration of Interests Statement

The author declares that there are no competing interests, financial or personal, that could have influenced the work reported in this manuscript.

Additional Information

No additional information is available for this paper.

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