



## ECO-LITERACY MARKET DAY: AN INNOVATIVE PROJECT-BASED LEARNING APPROACH TO STRENGTHENING ENVIRONMENTAL CARE IN GRADE V AT ELEMENTARY SCHOOLS

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**Abstract.** Character education is not only a national challenge but also a global concern. In recent years, environmental awareness among elementary school students has shown a downward trend. The purpose of this study is to foster an environmentally conscious character in the in the IPS subject for fifth-grade elementary school students through the Market Day Project. In this context, Market Day, implemented through a Project-Based Learning (PjBL) approach, serves as an experience-based learning strategy. This study employed a quantitative approach with non-probability sampling techniques, and the data were analyzed using SmartPLS. Convergent validity tests indicated that all 20 instrument items were valid. Reliability testing using Cronbach's Alpha ( $\alpha$ ) yielded satisfactory results, with a score of 0.928 for the environmental care character variable and 0.931 for Market Day activities, confirming the reliability of these instruments. Furthermore, hypothesis testing revealed a t-value of  $118.256 > 1.96$  at a 5% significance level. Thus, it can be concluded that Market Day activities through PjBL have an effect on strengthening environmental awareness while supporting environmental literacy-based learning among fifth-grade elementary school students in the Social Studies subject.

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## INTRODUCTION

The strengthening of character education has become an important concern in educational management, particularly in elementary school curricula. In the current era, education is expected not only to develop students' cognitive competencies but also to shape attitudes, values, and character that are relevant to future challenges. One of the urgent issues today is the declining environmental awareness, responsibility, and social concern among children. Environmental problems such as waste accumulation, excessive consumption, and unsustainable habits increasingly require schools to integrate environmental education into meaningful learning experiences from an early age. Therefore, schools are encouraged to design contextual learning that supports students in developing environmental care character through authentic experiences.

Within Indonesia's Merdeka Curriculum, social studies concepts are incorporated into the integrated IPAS subject at the elementary school level. The learning process is active, contextual, reflective and directly tied to the issues in the students' immediate surrounds (Hasanah et al., 2026). The Market Day activity in Project-Based Learning significantly fosters the formation of environmentally concerned character. Activities such as environmental observation, recycling projects and waste into valuable products in Market Day can encourage learners to understand IPS concepts and develop habits of caring for the environment, working together, being responsible and communicating well (Fikri et al., 2022). This is in line with the deep learning concepts in the Merdeka Curriculum where project-based learning has been proved to be beneficial in inculcating character qualities through the direct involvement of students, supported by the school culture and ongoing process-based assessment (Hayunanda et al., 2025).

Through practical learning activities, schools can engage with parents and the local community to enhance students' environmental awareness (Azizah et al., 2023). One of the techniques that can be applied is eco-literacy integrated market day activities. Such activities provide students the opportunity to develop environmentally responsible behavior such as waste minimization, the use of environmentally-friendly materials, and the awareness of sustainable consumption patterns. Moreover, PjBL offers chances for students to actively participate in problem-solving, cooperation, creativity, communication, and decision-making processes. Previous research suggests that experiential learning and social interaction with social people are more effective for the development of character as students internalize values through practice rather than through theory (Bernardus et al., 2023). For example, schools could support the development of an environmentally conscious character by providing different types of trash bins, creating a waste-sorting program, assigning each class to take turns caring for plants, promoting posters on water conservation, encouraging students to conserve energy (e.g., turning off classroom lights when the room is empty), and requiring students to bring reusable water bottles that are refilled. This requires the development of habits, awareness, real-world experience, integration in the curriculum, and teachers setting a good example.

The role of educators and parents is equally important in strengthening students' environmental care character. Some previous studies have shown that character education can be strengthened by role model, habituation, and collaboration between schools, families, and communities (Nazhira, 2022). Habituation is an important thing since the more often positive things are done it will slowly become the students' daily behaviour including responsibility, discipline, cooperation, and concern for the environment (Zidniyati, 2019). However, many youngsters in the digital era encounter changes in behavioural patterns due to excessive dependence on technology and instant lifestyles that can impair resilience and social responsibility (Darmiany et al., 2021). This condition indicates the importance of the application of creative learning approaches that can develop students' environmental awareness effectively and interestingly (Hartanto et al., 2024).

Another way of developing environmental awareness is to contextualise learning activities of ecological literacy based on PjBL in the IPS curriculum, for example, a "market day." The market day activities are successful in imparting environmental literacy ideals as well as fostering students' feeling of responsibility, creativity, cooperation and problem solving skills (Jiwanti Ainun, 2023). The Market Day activity is based on experience-based learning theory, which replicates a real market to teach 21st-century skills and entrepreneurial character from an early age (Fitriyani et al., 2025). This activity is a sort of project-based learning (PjBL) where students actively collaborate in creating, producing, and marketing items (Ninsiana et al., 2024). The adoption of Market Day in the PjBL framework enables students to examine the subject matter in a relevant way through hands-on experiences, from planning and implementation phases to presentation (Purwanti et al., 2025). This technique has been scientifically proved to boost students' collaboration and problem-solving skills as they have to adapt, manage resources, and make decisions while encountering real-world issues (Misbahudholam et al., 2023).

The development of environmentally focused initiatives can teach students how to develop and sell environmentally friendly products, minimize waste and the value of environmentally friendly procedures. Previous studies have proved that entrepreneurship-based education contributes favorably to character development since students are directly involved in meaningful activities that foster responsibility and initiative (Othman, 2020). In this regard, market day activities implemented through Project-Based Learning can support eco-literacy-oriented learning while promoting students' environmental care character (Hendratno et al., 2025).

Based on field observations at Muhammadiyah Islamic Elementary School, fifth-grade students still demonstrated limited environmental care character in daily school activities. This condition indicates the need for learning innovations that not only provide theoretical understanding but also offer direct learning experiences to develop environmentally responsible behaviors (Amalia, 2024). Therefore, implementing eco-literacy market day through Project-Based Learning is considered relevant for strengthening students' environmental care character



while preparing them to become responsible individuals who are aware of sustainability issues from an early age (Fazilla & Santi, 2026).

The novelty of this research lies in the integration of three domains that are typically studied separately: eco-literacy, market day, and project-based IPS learning among fifth-grade students at an Islamic elementary school; previous studies have generally focused on eco-literacy to foster environmental awareness (Melindawati et al., 2025), market day for entrepreneurship, communication, and responsibility (Oktaviani et al., 2026), or environmental education in Islamic schools through Islamic values and habit formation (Mukaromah & Maso, 2025). Thus, this study offers an innovation in the form of the Eco-Literacy Market Day model (Purwanti et al., 2025), which positions market day not only as a platform for entrepreneurship but also as a PjBL-IPS design that transforms waste management (Habiibah et al., 2025), 5R practices, reflection, and concrete action into a contextual learning experience that instills an environmentally conscious character within the framework of Islamic values (Sholihatul & Makruf, 2025).

## RESEARCH METHODS

This study employed a quantitative approach, which is considered an inductive research method emphasizing objectivity, where the collected data are represented in numerical form and analyzed statistically (Handayani et al., 2020). The research population consisted of 70 elementary school students. To determine the sample size, the Slovin formula was applied with a sampling error tolerance of 5%. To guaranty data validity, an instrument validity testing was conducted to see whether each questionnaire item was appropriate to measure the constructs to be measured (Arikunto, 2013). In this study, validity testing was performed using the outer loading strategy in the SEM-PLS model which includes convergent and discriminant validity testing (Ketchen, 2013). The convergent validity results were evaluated through the indicator outer loading values, where a loading factor of  $\geq 0.7$  is considered ideal, while values from 0.5 to 0.6 remain acceptable (Leguina, 2015). Reliability testing was carried out using Cronbach's Alpha ( $\alpha$ ) through the SEM-PLS application. An Alpha coefficient greater than 0.7 indicates that the instrument is reliable, whereas a value below 0.7 suggests otherwise (Hair et al., 2021).

An additional normality test was performed with Shapiro-Wilk test, where data are deemed as normally distributed if p-value is higher than 0.05. Hypothesis testing was carried out with a t-test within the context of a basic linear regression model, with a confidence level of 95% and a significance level of 5% ( $\alpha = 0.05$ ). Statistical analysis was performed using Partial Least Square Structural Equation Modelling (SEM-PLS) which supports both instrument validation and reliability testing through confirmatory factor analysis, interrelationship among variables through path analysis and predictive structural models to regression analysis simultaneously. In this study, the measurement model was applied to assess convergent and discriminant validity, while the structural model was used to explain the hypothesized relationship between the implementation of eco-literacy market day through Project-Based Learning (PjBL) and the strengthening of environmental care character among elementary school students (Sarstedt et al., 2023).

## RESULTS AND DISCUSSION

### Results

The purpose of this study was to examine the implementation of an eco-literacy market day through the Project-Based Learning (PjBL) approach in strengthening the environmental care character of fifth-grade elementary school students. The implementation of market day activities in this study emphasized experiential learning by integrating eco-literacy principles into school activities. The indicators used to assess students' environmental care character are presented in Table 1.



**Table 1.** Indicators and Percentage of Environmental Care Character

| No. | Indicator               | Percentage |
|-----|-------------------------|------------|
| 1.  | Responsibility          | 91         |
| 2.  | Collaboration           | 84         |
| 3.  | Environmental Awareness | 82         |
| 4.  | Leadership              | 86         |
| 5.  | Creativity              | 78         |
| 6.  | Future Orientation      | 82         |

The analysis showed that the implementation of activities of eco-literacy market day at school contributed positively to the strengthening of students' environmental care character, where responsibility was the greatest percentage of 91%. Meanwhile, the aspect which still needed to be improved was inventiveness which gained the lowest proportion (78%). This research implies that students still require guidance to generate unique ideas within the framework of environmentally friendly products and sustainable methods. Hence, the involvement of teachers, parents and students is a must in enhancing creativity and reinforcing ideals of eco-literacy through meaningful learning experiences. The research findings are described in more detail in the following section.

Character education remains one of the major priorities in educational development and has been integrated into elementary school curricula. In the context of environmental education, strengthening students' character requires meaningful learning experiences both inside and outside the classroom (Syahrial et al., 2022). Character is not formed in a day. It is formed little by little, day by day, habit by habit, and action by action. Studies have shown that it takes 21 days to develop consistent behavioural patterns, which emphasises the value of recurrent and contextual learning events (Salma Rozana et al., 2025). Environmental care character is of crucial importance because it will mould students' duty, discipline and awareness toward environmental sustainability in schools as well as in wider communities. Hence, schools must continually embed environmental values in learning processes to develop students' ecological consciousness at an early age (Cherani et al., 2024).

Market day was one of the important parts of Muhammadiyah Islamic Elementary School's eco-literacy and Project Based Learning program. The program urged pupils to employ eco-friendly resources, limit waste, and encourage sustainable consumption (Sa'diyah et al., 2023). The research suggests that the environmental awareness character can be developed through experiential and contextual education. Previous studies show that character qualities are built through prolonged early engagement and collaboration (Bernardus et al., 2023). Preparing future generations to address sustainability challenges has become increasingly important, particularly in response to global environmental concerns. Therefore, integrating eco-literacy into elementary education is expected to support Indonesia's vision of developing a responsible and adaptive golden generation by 2045 (Henderson & Loreau, 2023).

Based on the research conducted at Muhammadiyah Islamic Elementary School, the respondent characteristics are presented in Table 2.

**Table 2.** Respondent Characteristics by Gender

| Gender | Characteristics | Respondents | Percentage    |
|--------|-----------------|-------------|---------------|
|        | Male            | 18          | 30.0%         |
|        | Female          | 42          | 70.0%         |
|        | <b>Total</b>    | <b>60</b>   | <b>100.0%</b> |

Based on Table 2, most respondents who completed the questionnaire were female students, totaling 42 respondents (70.0%), while male students accounted for 18 respondents (30.0%), with a total sample of 60 students. Furthermore, a normality test was conducted using Jeffrey's Amazing Statistics Program (JASP), and the results are presented in Table 3.

**Table 3.** Descriptive Statistics and Normality Test Results

| Descriptive Statistics  | X      | Y      |
|-------------------------|--------|--------|
| Valid                   | 60     | 60     |
| Missing                 | 0      | 0      |
| Mean                    | 44.100 | 44.067 |
| Std. Deviation          | 4.682  | 4.686  |
| Shapiro-Wilk            | 0.927  | 0.932  |
| P-value of Shapiro-Wilk | 0.001  | 0.003  |
| Minimum                 | 31.000 | 31.000 |
| Maximum                 | 50.000 | 50.000 |

Based on Table 3, the normality test was conducted using the Shapiro–Wilk test. The Shapiro–Wilk values for variable X and variable Y were 0.927 ( $p = 0.001$ ) and 0.932 ( $p = 0.003$ ), respectively. Since both p-values are below 0.05, the data for both variables are not normally distributed. However, this does not hinder further analysis, because PLS-SEM is a nonparametric method that does not require normally distributed data and determines significance through a bootstrapping procedure (Sarstedt et al., 2023). In addition, the Q–Q plot of standardized residuals (Figure 1) shows that most data points lie close to the diagonal line, with only minor deviations at both tails. The graph was generated using Jeffrey’s Amazing Statistics Program (JASP).

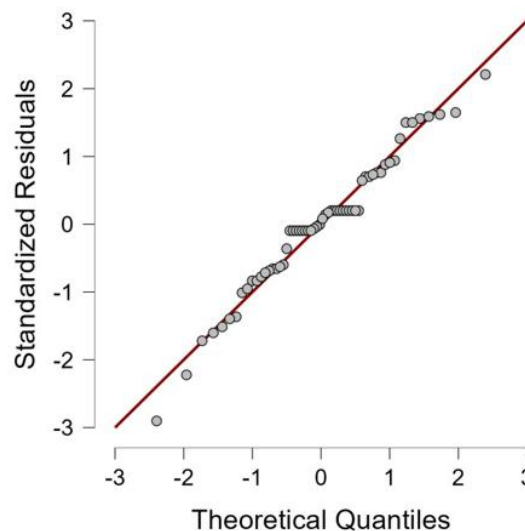


**Figure 1.** Q–Q Plot of Standardized Residuals

The next step was to conduct a t-test. The regression analysis was performed with a confidence level of 95% or a significance level of 5% ( $\alpha = 0.05$ ) (Ketchen, 2013). The interpretation of the t-test significance value follows specific criteria. When the significance value exceeds 0.05,  $H_0$  is accepted while  $H_a$  is rejected, indicating that the independent variable does not significantly affect the dependent variable. Meanwhile, if the significance value is less than 0.05 then  $H_0$  is rejected and  $H_a$  is accepted. This means that there is a substantial influence of the implementation of eco-literacy market day activities through Project-Based Learning (PjBL) to build character of environmental care for primary school pupils (Fransiska et al., 2025; Akbar et al., 2025).

Multivariate PLS analysis Dependent, Independent variables. Sarstedt et al. (2023) prefer this method to multiple regression and principal component regression to investigate the relationship between variables. The outer model analysis of this study was used to test the Convergent Validity, Discriminant Validity, and Internal Consistency Reliability to ensure the accuracy and consistency of the research instrument (Permata et al., 2023). Slovin evaluated 60 primary school children. 60 replies from participants were used in SmartPLS using PLS Algorithm Max (Saftari & Sinta, 2022).

At this point the analysis was aimed at explaining the relationship between latent variables based on the theoretical framework of the study, especially the implementation of eco-literacy

market day through Project-Based Learning (PjBL) in elementary schools (Setyowati et al., 2024). The measuring technique was done by using the structural model which contained R Square, Q Square and Path Coefficient values to see the prediction strength and relationship among variables (Arya Pering, 2020). Furthermore, all measurements were analyzed using SmartPLS, and the model estimation results are presented in Figure 2.

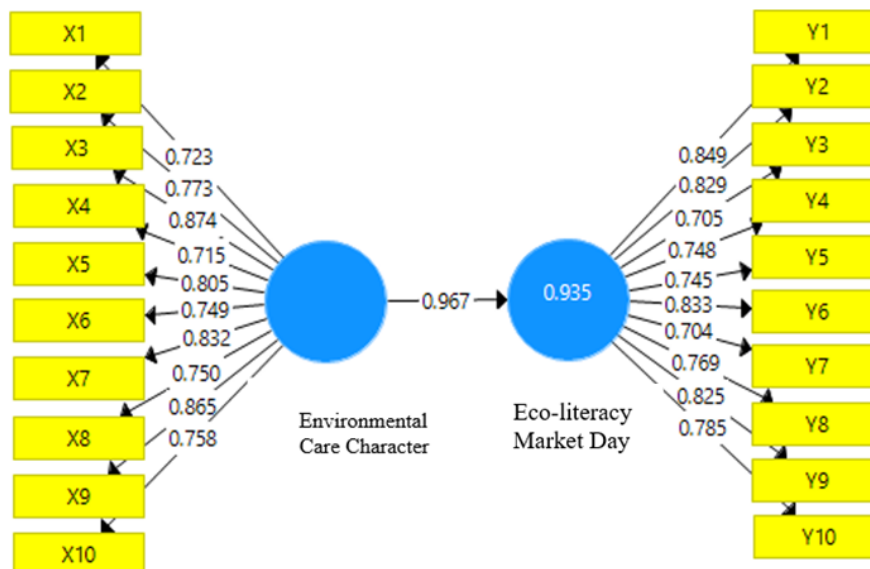


Figure 2. Outer Model

Based on Figure 2, it can be identified that this study involved 60 elementary school student participants with a total of 300 iterations in the analysis process (Harahap, 2018). The subsequent stage involved evaluating the R Square ( $R^2$ ) value to assess the *goodness of fit* of the model. The test measures the amount of the endogenous variable (Y) explained by the exogenous variable (X) using the model tested (Sarstedt et al., 2023). In R Square ( $R^2$ ) test, the number close to 1 implies a better model. The value of R Square  $\geq 0.5$  is seen as acceptable usually. The R Square ( $R^2$ ) value of environmental care character based on the findings was 0.935. The result shows that the implementation of eco-literacy market day activities through Project-Based Learning (PjBL) can explain  $0.935 \times 100\% = 93.5\%$  of the variance in students' environmental care character, while  $100\% - 93.5\% = 6.5\%$  (0.065) is influenced by variables outside this study. The results show that the adoption of eco-literacy market day activities has a significant effect on the character of environmental care for primary school kids (Hiola et al., 2026).

The Indicator Outer Loading values, where the loading factor  $\geq 0.7$  is considered optimal, were also used to measure the findings of convergent validity. However, the loading factor of  $> 0.5-0.6$  is still acceptable or appropriate (Sarstedt et al., 2023). Evaluation of the outer model or measuring model in this study was undertaken by testing the outer loading or loading factor values processed by the application SmartPLS 3.0 (Arya Pering, 2020). The results indicated that the variable character of environmental care and the implementation of eco-literacy market day through Project-Based Learning (PjBL) activities had a loading factor value of more than 0.70, which met the minimum limit and met the validity requirements according to SmartPLS assumptions. The present result supports the validity of the measuring indicators used in this study (Saftari & Sinta, 2022), considering that the minimum permissible loading factor is between 0.50 and 0.60. Then the next step was to estimate the value of Average Variance Extracted (AVE). The AVE score is acceptable if equal to or more than 0.50 (Sarstedt et al., 2023).

Table 4. Average Variance Extracted (AVE) Results

| Variable                     | Average Variance Extracted (AVE) | Description |
|------------------------------|----------------------------------|-------------|
| Environmental Care Character | 0.610                            | Valid       |
| Eco-literacy Market Day      | 0.618                            | Valid       |

Based on Table 4, the AVE values indicate that the scores for the Environmental Care

Character and Eco-literacy Market Day through Project-Based Learning (PjBL) variables are above 0.50. Therefore, it can be stated that the measurement of each variable has good and valid AVE values in the convergent validity test. The next stage in this research is testing the reliability of the measured instruments, which assesses their level of consistency. This is conducted through Reliability Testing, including methods such as Composite Reliability and Cronbach's Alpha (Juliandi, 2018). This test examines the accuracy, precision, and consistency of the instruments in measuring the research variables. The results are presented in Table 5.

**Table 5.** Composite Reliability and Cronbach's Alpha Results

| Variable                     | Composite Reliability | Cronbach's Alpha | Description |
|------------------------------|-----------------------|------------------|-------------|
| Environmental Care Character | 0.940                 | 0.928            | Reliable    |
| Eco-literacy Market Day      | 0.934                 | 0.931            | Reliable    |

Based on Table 5, the calculation results for Composite Reliability and Cronbach's Alpha values are presented. The findings indicate that all examined variables obtained values exceeding the minimum assessment criterion of 0.7 (Dewy et al., 2022; Permata et al., 2023). These results suggest that each variable demonstrates adequate reliability, consistency, accuracy, and precision in measuring the intended constructs. Therefore, it can be concluded that all variables used in this study possess a satisfactory level of reliability in assessing the implementation of eco-literacy market day through Project-Based Learning (PjBL) and its relationship with students' environmental care character in elementary schools (Fawziah et al., 2023).

The subsequent stage involved conducting Path Coefficient testing and hypothesis testing based on the Inner Model evaluation. This analysis includes outputs such as R-square, parameter coefficients, and T-statistics to determine whether the proposed hypothesis should be accepted or rejected by considering the significance values among constructs, T-statistics, and P-values. The rules of thumb applied in this study followed the criteria of a T-statistic  $> 1.96$  and a P-value  $< 0.05$  (5%), while the beta coefficient was expected to be positive and statistically significant (Siregar et al., 2020).

**Table 6.** Path Coefficient and Hypothesis Testing Results

| Variable                                               | Original Sample (O) | Standard Deviation (STDEV) | T Statistics ( O/STDEV ) | P Values |
|--------------------------------------------------------|---------------------|----------------------------|--------------------------|----------|
| Eco-literacy Market Day → Environmental Care Character | 0.967               | 0.008                      | 118.256                  | 0.000    |

Table 6 shows that the implementation of eco-literacy market day by using Project-Based Learning (PjBL) has a significant positive effect of 0.967 in developing students' environmental concern character, with the T-statistic value of  $118.256 > 1.96$ . The results imply that the more primary school market day events are held with eco-literacy, the more environmentally responsible the students' character will be. Experiential learning activities immerse students in practicing ecologically responsible behaviours, collaboration, discipline, and sustainability awareness in meaningful circumstances.

The next stage was the testing of hypotheses. The critical t-values for a two-tailed test are 1.65 (10% significance level), 1.96 (5% significance level), and 2.58 (1% significant level) (Sarstedt et al., 2023). The researcher in this study used the alpha level of 5%, therefore, the t-table value of 1.96 was used as a criterion to make decisions. The results of the SmartPLS analysis for the direct association among variables validated all the hypotheses. The results show that the implementation of eco-literacy market day activities through Project-Based Learning has a direct and significant effect on improving environmental concern character in primary school children.

## Discussion

The results of this study indicate that the implementation of an eco-literacy market day through PjBL has a very strong positive relationship with students' environmentally conscious character, and this pattern is consistent with many previous studies that have similarly found that contextual, project-based environmental learning involving real-world action enhances students'



environmental awareness, responsibility, and pro-environmental behavior (Damayanti et al., 2025; López et al., 2024; Hikamah et al., 2025). Compared to previous studies, which generally used experimental designs, classroom interventions, or case studies to demonstrate improvements before and after the intervention, this study reinforces these findings through SmartPLS modeling, which shows that the constructs of “eco-literacy market day implementation” and “environmentally conscious character” are valid, reliable, and have very high explanatory power (Ekantini & Damayanti, 2022; Handayani & Ramadhani, 2025).

The findings of the outer model in this study—with factor loadings for all indicators above the acceptability threshold and AVE values above 0.50—indicate that the indicators used are sufficiently representative to explain the constructs of “eco-literacy market day” and “environmentally conscious character.” This is consistent with research on the development of PjBL tools, which also confirms that project-based instruments and modules can be adequately validated to measure the development of an environmentally conscious character (Prahmana et al., 2021; Hartanto et al., 2024).

Substantively, the positive relationship found in this study is consistent with previous studies showing that ecoliteracy goes beyond mere knowledge and is linked to attitudes, empathy, actions, and habits that protect the environment in everyday life (Najib et al., 2024). This alignment is important because the Market Day activity, in the context of eco-literacy, is not merely a school entrepreneurship activity but rather a platform for applying ecological knowledge to concrete actions such as waste management, material reuse, and fostering more responsible consumption habits (Damayanti et al., 2025).

The high  $R^2$  value of the study shows that eco-literacy market day is a strong predictor of environmentally conscious activities among the sample. These results are better than several previous study that examined the change by pretest-posttest score differences, cycle gains, or eco-literacy profiles, not by latent variable contributions (Mukaromah & Maso, 2025).

This influence is strengthened by the practical experience, cooperation and concrete products of the intervention. Active learning encourages children to recycle, plant, manage garbage, and solve environmental problems (Fazilla & Santi, 2026). Passive learning doesn't. Market Day incorporates ecological perspectives with social responsibility and consumption decisions to support learners to comprehend environmental challenges and to practise sustainability (Najib et al., 2024).

The results support the premise that good environmental education should contain the cognitive, emotive, active and spiritual parts to build a more enduring character formation (Fadjarajani & As'ari, 2021). The results are also consistent with the research in madrasahs or Islamic schools which indicates that project-based contextual activities along with moral reflection, responsibility, and action lead to a deeper internalisation of the character characteristics of environmental awareness (Mukaromah & Maso, 2025). But even these impressive results should be viewed cautiously. It has been shown in several studies that increases in knowledge and attitudes do not necessarily immediately lead to long-term autonomous action, therefore habit development, school support, and program sustainability are still important (Fazilla & Santi, 2026). Therefore, the findings of this study confirm the effectiveness of eco-literacy-based PjBL in strengthening the character of environmental consciousness based on the comparison with previous research. Moreover, the findings also show that the eco-literacy market day format provides a very strong explanatory power when compared to elementary school students (Damayanti et al., 2025).

## CONCLUSIONS AND SUGGESTIONS

Based on an analysis using SmartPLS 3.0, the implementation of Eco-literacy Market Day through Project-Based Learning (PjBL) significantly contributed to strengthening elementary school students' environmentally conscious character. Contextual and experience-based learning encouraged students to develop awareness, responsibility, cooperation, discipline, and creativity through concrete actions. The program's success was supported by collaboration among schools, teachers, students, parents, and the community. For future research, there is a need for more



contextual, creative, and real-world experience-oriented innovations in fifth-grade IPS learning based on eco-literacy to sustainably strengthen students' environmentally conscious character.

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