Exploring the Predictor of Pre-Service Teacher Intention Toward Environmental Education: Lesson from Adiwiyata School in Indonesia

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ABSTRACT

This study explores the factors influencing pre-service teachers' intentions to incorporate environmental education (EE) within Indonesia's Adiwiyata program, which promotes environmental awareness in schools. Drawing on the Theory of Planned Behavior (TPB), the Stimulus-Organism-Behavior-Accomplishment (SOBA) model, and the Unified Theory of Acceptance and Use of Technology (UTAUT), this research examines the roles of university support and self-efficacy in shaping these intentions. Data from 233 pre-service teachers were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings reveal that both university support and self-efficacy play significant roles in enhancing intentions toward EE, with university support fostering a supportive environment for pre-service teachers and self-efficacy strengthening their confidence in engaging with environmental content. Notably, attitude serves as a key mediator, translating self-efficacy into stronger intentions by positively influencing perceptions toward EE. The findings reveal that both university support and self-efficacy play significant roles in enhancing intentions toward EE, with university support fostering a supportive environment for pre-service teachers and self-efficacy strengthening their confidence in engaging with environmental content. Notably, attitude serves as a key mediator, translating self-efficacy into stronger intentions by positively influencing perceptions toward EE. This research not only enriches the academic discourse on environmental education but also offers practical insights for educational policymakers aiming to foster a more sustainable future.

1. INTRODUCTION

The integration of environmental education (EE) into educational curricula has gained increasing global attention, with a growing consensus that environmental awareness and sustainability should be embedded in learning from early education through higher education [1]. This integration is particularly relevant in economics education, where students learn to make decisions about resource allocation and economic sustainability, essential to addressing environmental issues. In Indonesia, the Adiwiyata program represents an important government-led initiative aimed at embedding environmental consciousness within schools through practices that promote eco-friendly behavior. Yet, the program remains largely focused on improving the physical environment of schools, with less emphasis on integrating EE into the pedagogical framework [2]. This lack of educational focus represents a critical gap, as pre-service teachers' intentions to implement EE in their future teaching are underdeveloped, limiting the program's effectiveness in fostering long-term environmental literacy.

Addressing this gap, the present study aims to explore the determinants of pre-service teachers' intentions to teach EE within the Adiwiyata framework. Specifically, this study examines how university support and self-efficacy influence these intentions, with a focus on the mediating role of attitude in shaping pre-service teachers' readiness to engage with EE. Prior research suggests that supportive institutional environments and strong self-efficacy are crucial for developing positive attitudes toward innovative teaching practices, yet their specific effects on EE intentions among economics pre-service teachers remain insufficiently examined [3, 4]. By investigating this underexplored area, this study seeks to clarify how these factors contribute to the successful integration of EE in teacher preparation programs.

Theoretical insights from the Theory of Planned Behavior (TPB), the Stimulus-Organism-Behavior-Accomplishment (SOBA) model, and the Unified Theory of Acceptance and Use of Technology (UTAUT) serve as the foundation for this research. TPB provides a framework for understanding how attitudes, subjective norms, and perceived behavioral control shape intentions, with attitude as a central predictor of behavioral intention [5]. The SOBA model emphasizes the influence of environmental stimuli—such as university support—on individuals' attitudes and intentions [6-9], while UTAUT addresses the role of self-efficacy in predicting technology acceptance, which in this context is analogous to readiness for EE [10]. Together, these frameworks support a comprehensive analysis of how external support and personal efficacy influence pre-service teachers' attitudes and

intentions toward EE.

This study addresses the following research questions: (1) To what extent do university support and self-efficacy influence pre-service teachers' intentions toward environmental education? (2) Does attitude mediate the relationship between university support, self-efficacy, and intentions toward environmental education? Answering these questions provides valuable insights into how teacher education programs can better prepare future educators for integrating environmental themes into their teaching. This research contributes to the field by offering a nuanced understanding of the conditions and psychological factors that support pre-service teachers' intentions to adopt EE, ultimately helping to advance sustainability efforts in educational settings.

2. LITERATURE REVIEW

This study explores five key constructs that predict pre-service teachers' intentions to teach environmental education (EE): Readiness for environmental education (REE), university support for environmental education (UEE), self-efficacy for environmental education (SEE), attitude toward environmental education (AEE), and intention toward environmental education (IEE). Each construct is grounded in three main theoretical frameworks: the Theory of Planned Behavior (TPB), the Stimulus-Organism-Behavior-Accomplishment (SOBA) model, the Stimulus-Organism-Behavior-Consequence (SOBC), and the Unified Theory of Acceptance and Use of Technology (UTAUT). These frameworks provide a foundation for understanding the constructs' relationships, which form the basis of this study's hypotheses.

2.1 Readiness for environmental education (REE)

Readiness for environmental education (REE) captures the preparedness and willingness of pre-service teachers to engage in EE. Within the TPB framework, readiness aligns with behavioral control beliefs, or the perception of ease or difficulty in performing the behavior. Behavioral beliefs have a direct impact on attitudes, suggesting that individuals with a high level of readiness are more likely to have a positive attitude toward EE [11-13]. Similarly, rooted in the UTAUT framework and adapted from technology readiness constructs, REE encompasses optimism and willingness to engage with EE [14, 15]. From this perspective, REE is hypothesized to positively influence AEE (H1), as increased readiness can enhance individuals' confidence and interest in teaching EE.

Further, within UTAUT, readiness for EE can be likened to technological readiness, which captures an individual's disposition to embrace new ideas or tools. Studies show that readiness is often a precursor to strong behavioral intentions [16]. This suggests that pre-service teachers who feel prepared for EE are likely to have stronger intentions to integrate it into their future teaching. Therefore, REE is expected to positively influence IEE (H4), based on the idea that preparation and confidence lead to action.

2.2 University support for environmental education (UEE)

University support (UEE) encompasses resources, encouragement, and infrastructure provided by universities to facilitate EE adoption [17-19]. Within the SOBA model, external support such as UEE acts as a stimulus, influencing the internal states of individuals—in this case, attitudes (AEE) toward EE. Studies indicate that social support, such as that from universities, positively influences individuals' attitudes toward innovative practices by creating a favorable environment [6, 9, 20]. This implies that when universities actively support EE, pre-service teachers are more likely to develop positive attitudes toward it. Similarly, the SOBA and SOBC models view external support as a stimulus that affects individual attitudes and behaviors [8]. Thus, we posit that UEE positively influences AEE (H2).

Additionally, UTAUT suggests that facilitating conditions—supportive resources and infrastructure—strengthen intentions to engage in specific behaviors by reinforcing perceived control and social support [10, 21]. When university support provides pre-service teachers with the necessary resources for EE, they may feel more empowered to incorporate it into their teaching. Consequently, we propose that UEE positively influences IEE (H5), as a strong institutional support system can make EE feel both feasible and socially validated.

2.3 Self-efficacy for environmental education (SEE)

Self-efficacy (SEE) is an individual's belief in their capacity to successfully perform EE tasks, encompassing classroom management, engagement, and instructional planning [22-24]. In the current context, self-efficacy (SEE) reflects an individual's confidence in their ability to carry out the actions necessary to teach EE effectively. Based on Self-Efficacy Theory and the TPB, self-efficacy plays a critical role in shaping attitudes, as it provides individuals with a sense of personal agency and reduces psychological barriers [25-28]. Within TPB, self-efficacy (akin to perceived behavioral control) is posited to enhance attitudes, implying that pre-service teachers who feel capable of teaching EE will likely develop more favorable attitudes toward it (H3).

Moreover, self-efficacy has a strong influence on intentions. According to the SOBA model, self-efficacy serves as an internal organism that reinforces positive attitudes and drives behavior. Individuals with higher self-efficacy are more likely to believe in their potential for successful outcomes, which strengthens their intentions [29, 30]. Therefore, we posit that SEE positively influences IEE, as pre-service teachers who feel capable of teaching EE are more likely to intend to implement it in their classrooms (H6).

2.4 Attitude toward environmental education (AEE)

Attitude toward EE (AEE) represents the pre-service teachers' overall evaluation of EE, encompassing both favorable and unfavorable perceptions. TPB emphasizes the importance of attitude in forming behavioral intentions; individuals with a positive attitude toward a behavior are more likely to perform it [5]. Thus, we posit that AEE positively influences IEE (H7), suggesting that pre-service teachers who hold favorable views of EE will be more inclined to teach it.

In addition to its direct effect on intention, AEE is expected to play a mediating role, channeling the influence of REE, UEE, and SEE on IEE. According to TPB, attitudes mediate the relationship between beliefs (e.g., self-efficacy or readiness) and intentions, as beliefs shape attitudes, which in turn influence behavior [31-33]. Similarly, the SOBA model

posits that attitudes mediate the relationship between external stimuli (e.g., UEE) and behavioral outcomes, suggesting that university support or personal efficacy first influences attitudes, which then affect intentions [34, 35]. Thus, hypotheses 8, 9, and 10 predict that AEE mediates the relationships of REE, UEE, and SEE with IEE.

2.5 Intention toward environmental education (IEE)

The ultimate outcome of interest, IEE, reflects pre-service teachers' likelihood to implement EE in their future teaching. Intention is the primary predictor of behavior in TPB and UTAUT, shaped by attitudes, social influences, and perceived control [10, 21]. By exploring the combined influence of readiness, university support, self-efficacy, and attitudes on intention, this study aims to provide a comprehensive understanding of the factors that promote EE in teacher education programs.

2.6 Hypotheses summary

According to the theoretical framework that has been explained, the discussed lead to the following hypotheses:

H1: *Readiness for EE (REE) positively influences attitudes toward EE (AEE).*
H2: *University support (UEE) positively influences attitudes toward EE (AEE).*
H3: *Self-efficacy (SEE) positively influences attitudes toward EE (AEE).*
H4: *Readiness (REE) positively influences intentions to teach EE (IEE).*
H5: *University support (UEE) positively influences intentions to teach EE (IEE).*
H6: *Self-efficacy (SEE) positively influences intentions to teach EE (IEE).*
H7: *Attitudes toward EE (AEE) positively influence intentions to teach EE (IEE).*
H8-H10: *Attitudes toward EE (AEE) mediate the relationships between REE, UEE, SEE, and IEE.*

The conceptual framework of this research was developed based on underpinning theories and relevant previous studies (see Figure 1).
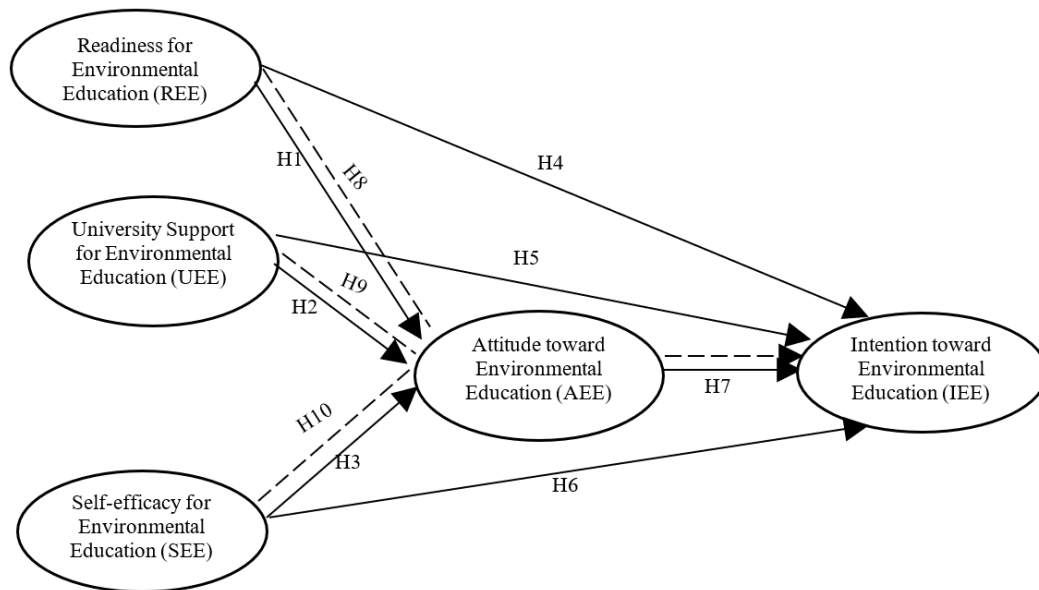

Figure 1. Conceptual model

3. RESEARCH METHODOLOGY

3.1 Respondent dan sampling technique

This research adopted a convenience sampling technique and obtained 233 respondents from economics students. The respondents were pre-service teachers of economic education in several public and private universities in Indonesia. The description of the characteristics of the respondents is presented in Table 1. As shown in Table 1, almost all respondents (85.84%) were female and the rest were male. Furthermore, some respondents (66.52%) are still studying for a bachelor's degree, and the remaining 33.48% have graduated (but are not yet working). Among 233 respondents, the majority of respondents, or 68.24% of respondents came from public state universities, while the remaining 31.76% came from private universities.

Table 1. Respondent characteristics

Characteristics	Total	Percentage
Gender		
- Female	200	85.84%
- Male	33	14.16%
Status		
- Bachelor students	78	33.48%
- Graduate students	155	66.52%
University		
- Public	159	68.24%
- Private	74	31.76%

3.2 Data collection procedure

The data were collected using an online questionnaire, which was distributed to students in WhatsApp groups at

several universities in Indonesia. The researcher explained the criteria for respondents in the questionnaire distribution, including final semester economics education students, students who had taken practical field experience (PPL), or economics education students who had graduated but were not working yet. PPL is a course in the form of teaching practice by students in schools. The survey participants were volunteers, and researchers also upheld research ethics by emphasizing to respondents that researchers guarantee the confidentiality of the data they provide.

3.3 Research instrument

The research instrument was designed to measure five key constructs: Readiness for environmental education (REE), university support for environmental education (UEE), self-efficacy for environmental education (SEE), attitude toward environmental education (AEE), and intention toward environmental education (IEE). Each construct was adapted from established scales in previous studies to ensure content validity and relevance to the study's context. Items were refined to align with the educational focus of pre-service teachers in Indonesia.

1. **Readiness for Environmental Education (REE):** This construct was measured using six items adapted from the optimism dimension of Goh and Blake [36]. Items focused on participants' perceived preparedness and openness to engage with EE. Minor modifications were made to contextualize the items within the teaching profession and the Indonesian educational context.

2. **University Support for Environmental Education (UEE):** Four items measuring UEE were adapted from Sh. Awal et al. [37]. These items assessed the perceived availability of resources, training, and institutional encouragement for EE. Adjustments were made to specify university-level support structures relevant to pre-service teachers.

3. **Self-Efficacy for Environmental Education (SEE):** The SEE construct was assessed through sixteen items covering four sub-dimensions: classroom management, teaching, student engagement, and learning planning. Items were adapted from the Teaching and Learning International Survey (TALIS) [38] and the Teacher Efficacy Inventory [39]. Some items were rephrased to reflect EE-specific teaching tasks, ensuring that the questions directly related to pre-service teachers' confidence in EE.

4. **Attitude toward Environmental Education (AEE):** Three items measuring AEE were adapted from Pérez-Rodríguez et al. [33], which focused on participants' overall evaluations and feelings toward integrating EE. Items were modified slightly to capture the context of pre-service economics teachers specifically.

5. **Intention toward Environmental Education (IEE):** Three items were adapted to measure participants' intention to implement EE in their future teaching practices, based on Ajzen's [2] TPB construct. These items were refined to emphasize participants' commitment to EE after graduation.

3.4 Pilot study

A pilot study was conducted with a sample of 30 pre-service teachers to ensure the reliability and clarity of the adapted items. Feedback from pilot participants led to minor wording adjustments to enhance clarity and contextual relevance. The pilot data were analyzed to assess internal consistency and reliability using Cronbach's alpha for each construct, which yielded satisfactory values above 0.7, indicating adequate reliability. Construct validity was further assessed through exploratory factor analysis (EFA), confirming that items loaded onto their intended factors.

3.5 Data analysis

PLS-SEM was conducted using SmartPLS 3.0 to analyze the model due to its suitability for complex, predictive models. Following a two-step process, we evaluated both the measurement and structural models to ensure validity and reliability. We evaluate the model through the two steps of PLS-SEM, consisting of measurement model and structural model evaluation.

In the measurement model evaluation, we examine the convergent validity and the reliability of the constructs. Convergent validity was assessed using Average Variance Extracted (AVE) and outer loadings. AVE values exceeded the threshold of 0.5, and all item loadings were above 0.5, confirming that items captured sufficient variance within their constructs [40, 41]. The reliability was assessed through composite reliability (CR) values were all above 0.7, confirming internal consistency across constructs.

In the structural model evaluation, we evaluate the research hypotheses through the significance of path coefficients. We deploy the bootstrapping (5,000 resamples) to assess path coefficients, with significant relationships identified at $p < 0.05$. This analysis determined the direction and strength of relationships between constructs. We also assess the predictive power and predictive accuracy of the research model through the Q^2, RMSE, and MAE. Model's Explanatory and Predictive Power.

4. RESULT AND DISCUSSION

4.1 Measurement model

The PLS algorithm calculation produces a measurement model that includes convergent validity, discriminant validity, and internal consistency reliability. The measurement model is considered to have convergent validity if the average variance extracted (AVE) is > 0.50 and the outer loading value is > 0.5 [42]. In addition, the discriminant validity is achieved if the outer loading value on a construct or variable is greater than the cross-loading with other constructs and the square root of AVE ($\sqrt{AVE}$) value for each construct is higher than its highest correlation with other constructs. Lastly, the model has internal consistency reliability when the composite reliability value (CR) > 0.7 [42]. The overall results of testing the measurement model are shown in Table 2.

Table 2 illustrates that the outer loading value and the AVE are > 0.5. This shows that the measurement instrument used in this research has convergent validity. Table 2 also informs that the instruments have accomplished discriminant validity criteria. Discriminant validity was further evaluated based on cross-loading and $\sqrt{AVE}$ values. In this research, the outer loading value of each construct is greater than the cross-loading and the $\sqrt{AVE}$ value of each construct is higher than its highest correlation with other constructs (see Appendix 2).

Finally, Table 2 illustrates that the composite reliability value for each construct is > 0.7, which ensures that the research instrument used has achieved internal consistency reliability.

Table 2. Instrument validity and reliability

Item	Outer Loading	AVE	Discriminant Validity	Composite Reliability
AEE1	0.887			
AEE2	0.906	0.802	Valid	0.924
AEE3	0.893			
IEE1	0.862			
IEE2	0.900	0.769	Valid	0.909
IEE3	0.867			
REE1	0.794			
REE2	0.829			
REE3	0.869			
REE4	0.829	0.700	Valid	0.933
REE5	0.841			
REE6	0.858			
SEE1	0.839			
SEE2	0.891			
SEE3	0.897	0.757	Valid	0.925
SEE4	0.850			
UEE1	0.813			
UEE2	0.843			
UEE3	0.832	0.683	Valid	0.896
UEE4	0.817			

Note. AEE= attitude toward environmental education, IEE= intention toward environmental education, REE=Readiness for environmental education, SEE=self-efficacy for environmental education, UEE=university support for environmental education

4.2 Structural model

Evaluation of the structural model [43] includes evaluation of collinearity, path coefficients and their significance, R^2, f^2, and Q^2 values. Collinearity is a relationship between independent variables [44] and becomes a problem if the relationship includes multicollinearity, including the presence of a high correlation between one independent variable and one or more other independent variables in a multiple regression equation which can weaken the statistical significance of the independent variables [45]. Multicollinearity does not occur between independent variables if the Variance Inflation Factor (VIF) value is between 0.20 - 5.00 [42] The PLS algorithm calculation informs that the VIF values for AEE (1.803), REE (1.626), SEE (2.058), and UEE (1.557). This indicates that there is no multicollinearity problem in the structural model.

The path coefficients in Table 3 indicate the strength and direction of relationships between key variables. Each coefficient provides insight into how strongly one variable influences another, with practical implications for understanding the dynamics of pre-service teachers' intentions toward environmental education (EE). The direct path (H1-H7) is explained as follows.

- **H1 (REE → AEE, β = 0.255, p < 0.05):** The path coefficient of 0.255 suggests a moderate, positive relationship between readiness for EE (REE) and attitude toward EE (AEE). This indicates that as pre-service teachers feel more prepared and confident in their ability to teach EE, their attitudes toward EE become more favorable. Practically, this emphasizes the importance of fostering readiness in teacher training programs to cultivate positive attitudes toward EE.

- **H2 (UEE → AEE, β = 0.030, p > 0.05):** The non-significant path from university support (UEE) to attitude (AEE) indicates that direct university support may not independently influence pre-service teachers' attitudes toward EE. This suggests that while institutional resources are beneficial, they may need to be coupled with other factors, such as self-efficacy or practical training, to effectively shape attitudes.

- **H3 (SEE → AEE, β = 0.476, p < 0.05):** The coefficient of 0.476 shows a strong positive effect of self-efficacy for EE (SEE) on attitude (AEE), suggesting that self-efficacy is a key driver of positive attitudes. This finding highlights the practical significance of building self-confidence in pre-service teachers regarding EE, as it directly contributes to their willingness to embrace EE as part of their teaching approach.

- **H5 (UEE → IEE, β = 0.275, p < 0.05):** This coefficient indicates a moderate positive relationship between university support (UEE) and intention toward EE (IEE). It implies that supportive university environments can encourage pre-service teachers to adopt EE in their classrooms. Practically, universities that invest in EE-focused resources, guidance, and curriculum integration create an enabling environment that positively impacts teaching intentions.

- **H6 (SEE → IEE, β = 0.287, p < 0.05):** A path coefficient of 0.287 highlights a moderate positive impact of self-efficacy on intention to teach EE, reinforcing the role of self-efficacy in motivating behavior. Pre-service teachers who feel capable of teaching EE are more likely to intend to incorporate it into their future practice, underscoring the need for training that builds both knowledge and confidence.

- **H7 (AEE → IEE, β = 0.226, p < 0.05):** The positive path between attitude toward EE (AEE) and intention (IEE) indicates that favorable attitudes significantly drive intentions, albeit to a moderate degree (β = 0.226). This finding aligns with TPB's core premise and suggests that developing positive attitudes toward EE is essential for fostering intentions. Practically, this could involve shaping positive perceptions of EE through exposure to its benefits, training, and pedagogical relevance.

The path coefficients collectively highlight that self-efficacy and university support are strong contributors to both attitudes and intentions. Building pre-service teachers' confidence and creating a supportive academic environment are therefore crucial for enhancing intentions to teach EE.

The indirect paths in Table 3 highlight the mediating role of attitude toward environmental education (AEE) in the relationships between Readiness for environmental education (REE), university support for environmental education (UEE), self-efficacy for environmental education (SEE), and intention to teach environmental education (IEE). The indirect effects help clarify how each predictor influences intention not only directly but also indirectly by shaping attitudes.

- **H8 (REE → AEE → IEE, β = 0.058, p < 0.05):** The indirect effect of REE on IEE through AEE shows that attitude serves as a significant mediator between readiness and intention, with a path coefficient of 0.058. This indicates that while readiness itself may not have a direct influence on intention (as shown by the non-significant direct path, β = 0.069), it contributes indirectly by first fostering positive attitudes toward EE, which subsequently drive intention. Practically, this suggests that enhancing pre-service teachers' readiness for EE can

effectively shape their intentions if it successfully leads to more favorable attitudes. Training programs that build readiness by developing both knowledge and comfort with EE may thus yield stronger intentions by shaping attitudes.

- **H9 (UEE → AEE → IEE, β = 0.007, p > 0.05):** The non-significant indirect path from university support to intention through attitude (β = 0.007) suggests that, contrary to expectations, attitude does not play a mediating role between university support and intention. This result, along with the significant direct path from UEE to IEE (β = 0.275), implies that university support has a direct impact on pre-service teachers' intentions to engage in EE without necessarily affecting their attitudes toward EE. In practice, this may indicate that institutional support for EE—such as resources, policies, or environmental curriculum—directly empowers teachers to consider EE, regardless of their attitudinal stance. This finding underscores the unique role of structural or environmental support, which may act independently of personal attitudes.

- **H10 (SEE → AEE → IEE, β = 0.108, p < 0.05):** The significant indirect path from self-efficacy to intention through attitude (β = 0.108) demonstrates that attitude is an essential mediator in the relationship between self-efficacy and intention. This positive path coefficient indicates that self-efficacy strengthens positive attitudes toward EE, which then increase the likelihood of intention to teach EE. Practically, this finding reinforces the importance of building self-efficacy to foster both positive attitudes and subsequent intentions. Teacher preparation programs should thus focus on activities that enhance self-efficacy—such as EE-specific teaching skills or confidence-building exercises—since these can positively shape attitudes and, in turn, motivate pre-service teachers to incorporate EE in their practice.

Table 3. Hypothesis testing

Hypothesis	Path	Path Coefficient	p-Value	Decision
	Direct Path			
H1	REE → AEE	0.255	0.000	Accepted
H2	UEE → AEE	0.030	0.665	Rejected
H3	SEE → AEE	0.476	0.000	Accepted
H4	REE → IEE	0.069	0.263	Rejected
H5	UEE → IEE	0.275	0.000	Accepted
H6	SEE → IEE	0.287	0.000	Accepted
H7	AEE → IEE	0.226	0.001	Accepted
	Indirect Path			
H8	REE → AEE → IEE	0.058	0.014	Accepted
H9	UEE → AEE → IEE	0.007	0.743	Rejected
H10	SEE → AEE → IEE	0.108	0.002	Accepted

Note. *p < 0.05 (Significant); p > 0.05 (non-significant)
AEE= attitude toward environmental education, IEE= intention toward environmental education, REE=Readiness for environmental education, SEE=self-efficacy for environmental education, UEE=university support for environmental education

The predictive power analysis in Table 4 offers insight into how well the model predicts the outcomes of interest—specifically, attitudes (AEE) and intentions (IEE) toward EE. RMSE measures the average magnitude of error in predictions, where lower values indicate greater predictive accuracy. In this model, RMSE values for AEE range from 0.498 to 0.513, and for IEE from 0.548 to 0.600, suggesting that the model achieves moderate predictive accuracy for both attitudes and

intentions. These RMSE values show that while the model can reasonably estimate attitudes and intentions, there is room for improvement in predictive precision. Meanwhile, MAE reflects the average absolute differences between observed and predicted values, providing a straightforward indication of prediction error. The MAE values for AEE (ranging from 0.381 to 0.406) and IEE (ranging from 0.426 to 0.468) align with RMSE findings, reinforcing the model's moderate predictive power. Lower MAE values relative to RMSE indicate that the model generally performs well but may sometimes produce larger prediction errors.

Together, the RMSE and MAE values suggest that the model has moderate predictive ability for both attitudes and intentions, which is practically significant for understanding how reliably the model can be applied in real-world settings. The results imply that interventions focused on enhancing self-efficacy and providing university support could be effective in shaping EE intentions among pre-service teachers. However, further refinements in the model—such as including additional predictors or refining measurement scales—could enhance predictive accuracy, offering a more precise tool for guiding policy and educational practice in EE.

Table 4. Predictive power of PLS

	Q²_Predict	PLS-SEM		LM	
		RMSE	MAE	RMSE	MAE
AEE1	0.295	0.506	0.406	0.525	0.414
AEE2	0.308	0.498	0.381	0.508	0.388
AEE3	0.394	0.513	0.389	0.512	0.383
IEE1	0.353	0.572	0.436	0.595	0.446
IEE2	0.394	0.548	0.426	0.573	0.444
IEE3	0.255	0.600	0.468	0.636	0.497

4.3 Discussion

This study aimed to explore the factors influencing pre-service teachers' intentions to teach environmental education (EE) within the framework of the Adiwiyata program in Indonesia. Drawing from the Theory of Planned Behavior (TPB), the Stimulus-Organism-Behavior-Accomplishment (SOBA) model, and the Unified Theory of Acceptance and Use of Technology (UTAUT), we examined the roles of readiness, university support, self-efficacy, and attitude in shaping these intentions. The findings offer both expected and novel insights into the complex factors driving EE intentions.

The results of the structural model are shown in Figure 2, that illustrated the structural model evaluating the relationships between readiness for environmental education (REE), university support for environmental education (UEE), self-efficacy for environmental education (SEE), attitude toward environmental education (AEE), and intention to teach environmental education (IEE). The direct paths indicate that SEE and UEE significantly influence IEE, with path coefficients of β = 0.287 and β = 0.275, respectively. These findings highlight that both individual confidence and institutional support are pivotal in shaping pre-service teachers' intentions. Moreover, SEE also demonstrates a substantial indirect effect on IEE through AEE (β = 0.108), reinforcing the mediating role of attitude. Interestingly, UEE did not significantly influence AEE (β = 0.030, p > 0.05), suggesting that university-level support impacts intentions directly rather than through attitudinal changes. This emphasizes the unique dual role of self-efficacy in fostering both positive attitudes and stronger intentions, while

institutional support functions as an independent driver of behavioral intentions. Overall, the model underscores the interconnected influence of personal and external factors in promoting environmental education. The detailed discussion will be explained as follows.
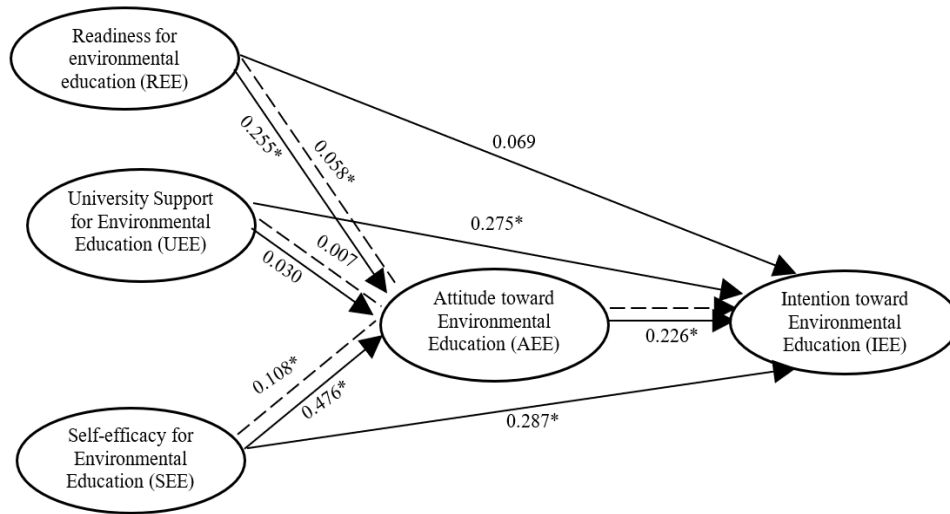

Figure 2. Model structural IEE
— = direct path, ---- = indirect path, * p < 0.05

4.4 Influence of readiness for EE on attitude and intention

The positive relationship between Readiness for environmental education (REE) and attitude toward EE (AEE) aligns with the TPB framework, which posits that individuals' perceptions of control and preparedness enhance favorable attitudes toward a behavior [12, 13]. In this study, readiness indirectly influenced intention through attitude (H8), highlighting the mediating role of attitude as proposed in TPB and confirming that readiness alone is insufficient without a positive attitudinal shift. This finding resonates with studies by Ayanwale et al. [5] who identified readiness as a precursor to intention, provided there is an attitudinal alignment. Therefore, to foster EE intentions, teacher training programs should prioritize both readiness and attitude-building strategies.

However, the direct relationship between REE and intention (H4) was not significant, which contrasts with some previous studies where readiness alone was a strong predictor of intention [16]. This discrepancy could reflect the unique context of pre-service teachers, who may perceive EE as challenging or unfamiliar, thus requiring additional attitudinal support to translate readiness into intention. This suggests that while readiness is foundational, it may not be sufficient for pre-service teachers without reinforcing attitudinal influences.

4.5 University support and its direct impact on intention

University support (UEE) emerged as a significant predictor of intention (H5) but did not significantly affect attitudes (H2). This result diverges from the SOBA model's assumption that external support impacts internal states, such as attitudes, before influencing behavior [6, 9]. Instead, our findings suggest that university support may provide a structural and normative environment that directly motivates pre-service teachers to adopt EE practices, independent of personal attitudes.

This aligns with findings the previous studies which indicate that structural support directly enhances behavioral intentions by making resources, infrastructure, and training readily available [10, 21, 46]. In this context, university support for EE, such as curriculum integration, resources, and practical opportunities, may serve as an external motivator that bypasses attitudinal processes. This implies that strengthening institutional support structures could be an effective, immediate approach for universities to foster EE intentions, even when personal attitudes are neutral or underdeveloped.

4.6 The central role of self-efficacy in shaping attitudes and intentions

The relationship between self-efficacy for environmental education (SEE) and both attitude (H3) and intention (H6) was strong and positive, reinforcing the TPB and UTAUT frameworks, which posit self-efficacy as a key determinant of intention [22, 26]. High self-efficacy appeared to not only enhance attitudes but also directly shape intentions, supporting findings by Opoku et al. [32] that individuals with higher self-efficacy in a domain are more motivated to act. The significant indirect path from SEE to intention through attitude (H10) further highlights the importance of attitude as a mediator, indicating that self-efficacy strengthens intention by fostering a more positive outlook toward EE.

This finding is consistent with Tsai et al. [40] and Sh. Ahmad et al. [37], who observed that self-efficacy impacts intentions indirectly through attitude in educational contexts. The strong role of self-efficacy suggests that training programs should emphasize skill development and confidence-building in EE to foster both attitudinal and intentional outcomes. This dual influence underscores self-efficacy as a cornerstone of intention formation, with both direct and indirect pathways.

4.7 The importance of attitude as a mediator

The mediating role of attitude was particularly evident in the relationships between readiness, self-efficacy, and intention (H8, H10). This supports TPB's assertion that attitudes are a primary driver of intention [5]. The mediating effect of attitude suggests that even if pre-service teachers possess readiness and self-efficacy, they are more likely to intend to teach EE if they hold a positive view of it. This aligns

with prior research by Tsai et al. [40], which found that attitude mediates the impact of self-efficacy on intention, reinforcing the idea that positive attitudes are essential for translating confidence into action.

Contrary to expectations, attitude did not mediate the relationship between university support and intention (H9). This suggests that institutional support may function independently of individual attitudes, providing an external motivation that directly influences intention. This unique finding expands the SOBA model by showing that certain forms of environmental support may directly drive behavior without necessarily altering personal attitudes. In practical terms, it indicates that while positive attitudes are important, they are not always necessary when strong institutional support exists, thus offering universities an alternative path to influence EE intentions.

5. CONCLUSION

Overall, this study contributes to our understanding of the factors shaping pre-service teachers' intentions toward EE. The findings underscore the central roles of self-efficacy and university support while highlighting the mediating effect of attitude. Practical implications include prioritizing readiness and self-efficacy in teacher training, along with strengthening university-level support structures. By addressing these areas, educational institutions can better prepare future educators to promote environmental awareness and sustainability in their teaching practices, advancing the broader goals of the Adiwiyata program and environmental education.

6. LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. First, the cross-sectional design limits causal interpretations of the relationships. Future research could employ longitudinal or experimental designs to better understand the causal dynamics between readiness, support, self-efficacy, and intentions. Second, the study's focus on pre-service economics teachers in Indonesia limits generalizability to other educational contexts. Replicating the study across different subject areas or countries could provide a more comprehensive understanding of the factors influencing EE intentions.

Additionally, the measurement of predictive accuracy, indicated by RMSE and MAE values, suggests moderate predictive power. While the model was effective in capturing the key relationships, future research could explore additional predictors or refine the constructs to improve prediction. Lastly, this study focused solely on intentions without examining actual behavior. Future studies could track pre-service teachers' implementation of EE in their practice to evaluate the translation of intentions into actions.

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