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ORIGINAL

Environmental Education and its Role in Enhancing Intention to Separate Waste: Evidence from Higher Education in Vietnam

La educación ambiental y su papel en la promoción de la separación de residuos: evidencias de la educación superior en Vietnam

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ABSTRACT

Objective: environmental education fosters awareness, behaviors, and actions towards environmental sustainability. This research used the Theory of Planned Behavior to investigate the determinants of intention for waste separation at Vietnamese universities toward enhancing awareness related to environmental activities.
Method: the study collected data from 490 responses from students from higher education institutions in Vietnam and employed quantitative methods to analyze factors affecting the intention to separate waste at higher education campuses
Results: the finding indicates that higher education institutions have formal activities in their training programs and extracurricular activities to raise awareness of environmental issues. The findings also reveal that attitude toward environmental issues, subjective norms, perceived behavior control, and environmental education positively affect the intention to separate the campus waste.
Conclusions: this study contributes to the growing body of evidence reinforcing environmental education's role in improving the intention to address environmental issues. The results imply that promoting environmental education activities will help increase environmental intentions, helping higher education institutions green their training programs.

Keywords: Environmental Education; Higher Education; TPB; Vietnam; Waste Separation.

RESUMEN

Objetivo: la educación ambiental fomenta la conciencia, los comportamientos y las acciones en pro de la sostenibilidad ambiental. Esta investigación utilizó la teoría del comportamiento planificado para investigar los determinantes de la intención de separar los residuos en las universidades vietnamitas con el fin de mejorar la conciencia relacionada con las actividades ambientales.
Método: el estudio recopiló datos de 490 respuestas de estudiantes de instituciones de educación superior en Vietnam y empleó métodos cuantitativos para analizar los factores que afectan la intención de separar los residuos en los campus de educación superior.
Resultados: el hallazgo indica que las instituciones de educación superior tienen actividades formales en sus programas de capacitación y actividades extracurriculares para generar conciencia sobre los problemas ambientales. Los hallazgos también revelan que la actitud hacia los problemas ambientales, las normas subjetivas, el control del comportamiento percibido y la educación ambiental afectan positivamente la intención de separar los residuos del campus.

Conclusiones: este estudio contribuye al creciente conjunto de evidencia que refuerza el papel de la educación ambiental en la mejora de la intención de abordar los problemas ambientales. Los resultados implican que la promoción de actividades de educación ambiental ayudará a aumentar las intenciones ambientales, ayudando a las instituciones de educación superior a hacer más ecológicos sus programas de capacitación.

Palabras clave: Educación Ambiental; Educación Superior; TPB; Vietnam; Separación de Residuos.

INTRODUCTION

Environmental education (EE) and sustainable education are crucial in promoting environmental sustainability in contemporary times. The provision of EE by higher education institutions (HEs) significantly influences the training and readiness of the next generation for a sustainable society.[1] EE enhances a deep understanding of social and environmental issues and problem-solving and decision-making processes by teaching ecological relationships and principles underlying these issues and pointing out alternative approaches and solutions.[2] In a broad sense, behavior has many psychological antecedents, and considerable material limitations exist in any decision-making situation. To escape the compensatory cycle of environmental remediation, the current decision must be understood and addressed the environmental issues.[3]

Numerous theoretical frameworks have been developed to explain the gap between the possession of environmental knowledge and environmental awareness and the display of environmental behavior. The psychology of persuasion, norm activation, attitude priming, information framing, social-identity or category induction, conformity, values, and other topics applied to behavior are well-established fields of study. These principles have been mainly implemented with actions that are regarded as 'pro-environmental behaviors', such as recycling,[4] reusing hotel towels,[5] taking shorter showers,[6] littering,[7,8] and others. Furthermore, all the previous studies showed favorable results, indicating that the researchers effectively induced the intended behaviors. Besides social activities, bringing environmental issues into economics also receive much attention, such as environmental accounting.[9]

This research investigates the programs at some HEs in Vietnam to depict the EE picture in the HEs. The study also proposes a research model and tests factors that affect the intention to separate waste in the HEs campus to highlight the need to enhance EE in HEs. This study contributes to the growing body of evidence reinforcing the role of EE in improving the intention to address environmental issues. The results imply that promoting EE activities will help increase students' environmental intentions, helping HEs develop EE programs and green their training programs.

Literature review

Previous research in environmental education

Environmental education is crucial in fostering awareness and understanding of ecological issues among individuals and communities. The Tbilisi Declaration (1977) states that EE as:

"*A learning process that increases people's knowledge and awareness about the environment and its associated challenges develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action*".[10]

Since The Tbilisi Declaration, numerous experts, organizations, and groups worldwide have highlighted the critical role of environmental education. This education empowers individuals to make informed choices and take actions that promote sustainable development.[11] Many entities have worked to weave EE into their educational frameworks, workplaces, and community initiatives, thereby enhancing awareness among all citizens.[12] EE has gained increasing importance in educational research internationally, especially in developing countries. Previous research in environmental education has explored the relationship between environmental knowledge, awareness, attitudes, and behaviors. The EE is a critical matter for society. Many researchers have studied EE for subjects from K-12 students, university students, and household women. Previous studies have confirmed the significant role of EE in supporting teachers to tackle sustainable issues,[13] enhancing students' behavioral intentions toward environmental protection stemming from their awareness through EE.[14,15] Furthermore, thanks to EE, the household women have the potential to make more sustainable choices and educate other family members.[16]

Hypotheses development

The Theory of Planned Behavior (TPB) is a psychological framework that explains how individual attitudes, subjective standards, and perceived behavior control influence intentions and behavior. This theory can provide

valuable insights on how educational initiatives can effectively promote environmentally friendly behavior. According to TPB, behaviors are influenced by intentions, which are determined by three factors, including attitudes, subjective norms, and perceived behavioral control.[17]

EE enhances a deep understanding of social-environmental issues and problem-solving and decision-making processes. Environmental knowledge is achieved by teaching ecological relationships and principles that underpin these issues and pointing out alternative approaches and solutions.[2] Environmental education enables the development of a global community that is aware of and concerned about the environment and related issues. It has the knowledge, skills, attitudes, motivation, and commitment to work individually and collectively toward solutions to current problems.[10] Zsóka, Szerényi[18] argue that environmental knowledge is one critical predictor of environmental intention. Teaching EE enhances student perception of environmental intention and behavior.[19] This study proposes the following hypothesis:

Hypothesis H1: Environmental education positively affects the intention to separate waste at the HEs campus.

Attitude is the expression of emotions towards a person, object, or behavior, specifically objects related to the environment, and emotions can be negative or positive depending on each individual.[20] Attitude is an important factor in TPB; attitudes toward environmental activities will impact their intentions and behaviors toward participating in environmental activities. Attitude toward waste separation on HEs campus is a psychological tendency expressed by evaluating the natural environment with favorability or disfavorability. Attitude has an indirect influence on environmental protection behavior through behavioral intention,[17] so environmental attitude can be considered an essential factor for predicting environmental protection behavior that is preceded by an intention decision to protect the environment.[21,22] Karim, Rahayu[23] and Zhang, Hu[24] show that attitude is the strongest predictor of environmental protection intention. The hypothesis is given as:

Hypothesis H2: Attitude towards the environment positively affects the intention to separate waste at the HEs campus.

Regarding TPB theory, intentions depend not only on attitudes toward the environment but also on the beliefs and behaviors of others.[25] Subjective norms are an individual›s perception of what they should do.[26] Subjective norm refers to perception of the attitudes and behaviors of others in society.[27] It reflects the level of an awareness of the behavior of others based on their observations of the behavior of others in specific situations.[7] Subjective norms can also be understood as social influence, reflecting the pressure that individuals perceive from the judgments of others about whether a behavior should be performed or not. Subjective norms are believed to influence consumption intentions.[25] Subjective norms clearly impact intentions to protect the environment.[14,28] This study proposes the following hypothesis:

Hypothesis H3: Subjective norms positively affect the intention to separate waste at HEs campus.

Perceived behavioral control is the perceived ability of an individual to perform a behavior or a feeling of how difficult or easy it is to perform a specific behavior.[29] Perceived behavioral control indicates the level of control over performing the behavior, not the outcome of the behavior.[30] Perceived behavioral control includes both perceived ability and perceived control over the situation. Perceived behavioral control describes people's perception of how easily they can act together with society to protect the environment, and it impacts on intention to engage in environmental actitivites.[14,19] The following hypothesis is proposed:

Hypothesis H4: Perceived behavioral control has a positive effect on the intention to separate waste at the HEs campus.

This study examines the relationship among EE and the TPB factors that influence students' behavioral intention in waste separation at the HEs campuses. Developing practical actions in line with the influencing factors will help promote environmental practice behaviors at HEs.

METHOD

Variable Measurement

This research adopted measurements from a previous study by Liao and Li (14) with 17 items of dependent and independent constructs. The dependent variable is the intention to separate waste on the university campus, including three items from INT1 to INT3. The independent variables are environmental education (EDU1 to EDU4), attitude towards the environment (ATT1 to ATT4), subjective norm (SN1 to SN3), and perceived behavior control (PBC1 to PBC3). As Malhotra, Kim[31] mentioned, common method variance is the variances related to the measurement method, so this research used two scales, Likert 7-point for the dependent variable and Likert 5-point for independent variables, and reversed two items, ATT1 and PBC1, to reduce common method variance.

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Data collection

The study collected primary and secondary data to solve research objectives. Regarding the secondary data, the study searched "training program" and "environment" to collect university training programs. The research selected 10 training programs at HEs in Northern Vietnam. Then, the study searched for extracurricular activities through the keywords "extracurricular activities" and "environment". The records from the searches were compiled and summarized. The primary data was collected through student surveys. The research obtained 490 valid responses from students at HEs.

Data analysis

The research used descriptive statistics and multiple regression. Descriptive statistics aimed to solve the secondary data about HEs programs and extracurricular activities. Multiple regression was to test the primary data collected from student surveys about determinants of the intention to separate waste on HEs campus with the support of the SPSS 22 software.

RESULTS

Integrating environmental education in higher education programs

The research collects programs from the HEs in North Vietnam. After collecting the training programs from the HEs website, the programs with environmental modules are summarized. The result indicates that the total training program credits are 126 to 161 credits. The "Environmental Engineering" program of Hanoi University of Science and Technology has the highest total credits with 161 credits. Environmental bachelor's degree programs have fewer total credits than environmental engineering programs. In general, the training programs in environmental engineering and management have included many modules related to the environment. Training programs in social sciences such as development economics or accounting and auditing have also integrated EE.

Moreover, the study investigates the extracurricular activities toward environmental education. The research collects information from the HEs pages to summarize the extracurricular activities toward EE. The result is summarized in table 1.

Table 1. Environmental education in extracurricular activities at HEs

University	Activity	Type
VNU-University of Economics and Business	Vietnam ESG Challenge	Student Contest
Saodo University	Collect and classify waste	Volunteer activities
Ho Chi Minh Open University	OU Green Story	Volunteer activities
	OU Green Plus Club	Student club
Tra Vinh University	Volunteer Saturday, Green Sunday	Volunteer activities
	Environment Club	Student club
	One step - the whole world is green	Student activities

The results of factors affecting the intention to separate waste in HEs campus

The reliability test and exploratory factor analysis (EFA) are used to test measurement quality.

Results of measurement quality

The study use Cronbach alpha to demonstrate the reliability. Nunnally and Bernstein[32] suggest the threshold value of Cronbach alpha is 0,6. Table 2 summarizes the results of the measurement quality testing.

Table 2. Summary of EFA analysis

Variables	Items	Cronbach Alpha	EFA analysis Results	Factor
Intention	INT1, INT2, INT3	,880	KMO = ,730 Bartlett test = 800,585 Sig. = ,000	INTEND
Environmental education	EDU1, EDU2, EDU3, EDU4	,785	KMO = ,875 Bartlett test = 2644,280 Sig. = ,000	EEDU
Attitude	ATT1, ATT2, ATT3, ATT4	,744		ATT
Subjective norm	SN1, SN2, SN3	,795		SNORM
Perceived behavior control	PB1, PB2, PB3	,674		PBC

The reliability test results in table 2 show that Cronbach alpha values range from 0,6 to 0,9, indicating all

measurements meet the requirement of reliability threshold.[33] The EFA analysis with varimax rotation was performed separately for independent and dependent variables. The results of the EFA analysis in table 4 show a KMO coefficient greater than 0,5, and the reliability of Bartlett's test is equal to 0,000, indicating that the research data is consistent with the proposed model. Regarding the independent variables, four independent variables were loaded, and the research calculated the representative variables, including SNORM, ATT, PBC, and EEDU, by calculating the mean value. The dependent variable loaded one variable named INTEND.

Result of testing hypotheses

Correlation and multiple regression analysis were used to test hypotheses. The correlation result is depicted in table 3, which reveals a significant correlation between the independent and dependent variables, with sig. = ,000.

Table 3. The correlation analysis results

		SNORM	EEDU	ATT	PBC	INTEND
SNORM	Pearson Correlation	1	,540**	,478**	,447**	,477**
	Sig. (2-tailed)		,000	,000	,000	,000
	N	490	490	490	490	490
EEDU	Pearson Correlation	,540**	1	,501**	,466**	,516**
	Sig. (2-tailed)	,000		,000	,000	,000
	N	490	490	490	490	490
ATT	Pearson Correlation	,478**	,501**	1	,429**	,416**
	Sig. (2-tailed)	,000	,000		,000	,000
	N	490	490	490	490	490
PBC	Pearson Correlation	,447**	,466**	,429**	1	,451**
	Sig. (2-tailed)	,000	,000	,000		,000
	N	490	490	490	490	490
INTEND	Pearson Correlation	,477**	,516**	,416**	,451**	1
	Sig. (2-tailed)	,000	,000	,000	,000	
	N	490	490	490	490	490

**. Correlation is significant at the 0,01 level (2-tailed).

Table 4 summarizes the multiple regression results. Regarding the model summary, the R-Square coefficient is 0,362, which means 36,2 % of the variation in the dependent variable, the intention to separate waste in HEs campus, is explained by four independent variables in the model, including environmental education, subjective norms, attitudes, and perceived behavioral control of students.

Regarding the ANOVA table, the F-value is 68,876 with sig. 0,000 < 0,05, revealing that the regression model is appropriate for the whole population. Regarding the coefficients' results, the significance level is less than 0,05, confirming that four independent variables have a statistically significant impact on the intention to separate waste at HEs campus.

Table 4. The multiple regression results

Model Summary[b] R Square: ,362 Adjusted R Square: ,357 Durbin-Watson: 1,671

ANOVA[a] F: 68,876 Sig.: ,000[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	,199	,317		,628	,531		
	SNORM	,311	,073	,195	4,247	,000	,623	1,604
	EEDU	,469	,083	,267	5,689	,000	,599	1,671
	ATT	,187	,079	,106	2,379	,018	,663	1,509
	PBC	,290	,065	,194	4,489	,000	,701	1,426

Note: a. Dependent Variable: INTEND

DISCUSSION

The findings indicate the presence of numerous environmental training programs in Vietnamese HEs that provide students with knowledge, skills, and attitudes about environmental issues. Significantly, few HE

institution incorporates environmental modules into their programs to enhance the environmental literacy of economics bachelor. However, few HEs are integrating environmental subjects into their training programs. Some HEs engage in environmental education through extracurricular environmental activities for students, such as ESG contests or volunteer activities. According to UNESCO[10], EE constitutes a lifelong endeavor and should not remain confined to formal systems that integrate with other educational forms, particularly those related to occupational education. It should permeate all aspects of formal and non-formal programs.

Three TPB factors, including subjective norms, attitude, and perceived behavior control have positive effects on student intention toward waste seperation. The results are consistent with previous studies by Karim, Rahayu[23], Zhang, Hu[24], Liao and Li[14], and Boca and Saraçlı[19]. Behavioral factors are still important factors in motivating individuals' behavioral intentions in specific actions. Therefore, with environmental activities, individuals' attitudes and perceived behavioral control and the subjective norms of the surrounding society all have a positive influence on the environmental behavior of those individuals. Besides TPB factors relating to individuals, such as subjective norms, attitudes, and perceived behavioral control, environmental education positively influences intentions about environmental issues. The findings reinforce the role of EE in environmental intention and behaviors that Zsóka, Szerényi[18] and Boca and Saraçlı[19] stated. Based on these findings, the research proposes some recommendations to promote EE in HEs. The HE training programs, especially in economics, need to integrate EE through the organization of classes and extracurricular activities appropriate to the characteristics of students in each training major. The HEs should have many extracurricular programs/activities in the environment to help students gain knowledge and skills about the environment. Environment knowledge and skills can be educated by organizing festivals, screening films, and environmental contests.

CONCLUSIONS

EE is a global attention issue, and EE at HEs is essential in higher education. This study shows that environmental training programs in Vietnam provide students with environmental knowledge, skills, and attitudes. Some universities have environmental activities such as organizing competitions and volunteering activities on the environment. The study tested the research model and showed that, in addition to the TPB's factors, environmental education positively affects environmental intentions, precisely the intention to classify waste on the campus of HEs. From there, the study proposes some recommendations to help promote environmental education at universities.

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