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ECOTOURISM AS AN EDUCATIONAL TOOL FOR PROMOTING ENVIRONMENTAL SUSTAINABILITY AMONG UNIVERSITY STUDENTS

Purpose: This study aims to determine the role of ecotourism as an educational tool in promoting environmental sustainability among university students. It explores the experiential and emotional educational potential of ecotourism grounded in the theories of sustainable development, eco-education, and experiential learning.

Research methodology: A mixed-methods research design was utilized, combining qualitative thematic analysis of semi-structured interviews with longitudinal quantitative analysis across four semesters (G1–G4). A sample of 100 students completed an Environmental Sustainability Metrics (ESM) questionnaire. Quantitative data were analyzed using Repeated Measures ANOVA, t-tests, regression analysis, and Structural Equation Modeling (SEM).

Findings: Ecotourism programs led to statistically significant, sustained increases in environmental knowledge ($p < 0.01$) and ecological values ($p < 0.001$) over four semesters. Structural Equation Modeling revealed that environmental values had a stronger direct effect on sustainable behavior ($\beta = 0.47$) than knowledge did ($\beta = 0.31$). Additionally, geography students scored higher than economics students, highlighting the impact of educational context and institutional support. Qualitative analysis reinforced these findings, identifying core themes such as “sustainable attitude change” alongside “contextual barriers.”

Originality: This study demonstrates that ecotourism serves as a highly effective higher education strategy for fostering environmental awareness. It uniquely bridges theory and practice by offering concrete curricular recommendations, including the development of interfaculty programs, the creation of sustainability-oriented campus infrastructure, and the implementation of community-based service-learning projects.

Keywords: ecotourism, environmental sustainability, higher education, experiential learning, students.

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Экотуризм жоғары оқу орындары студенттері арасында экологиялық тұрақтылықты ілгерілетуге арналған білім беру құралы ретінде

Бұл зерттеу жоғары оқу орындары студенттері арасында экологиялық тұрақтылықты ілгерілетуде экотуризмнің білім беру құралы ретіндегі рөлін анықтауға бағытталған. Жұмыс тұрақты даму, экобілім және тәжірибелік оқыту теорияларына сүйене отырып, экотуризмнің тәжірибелік және эмоционалды тәрбиелеу әлеуетін зерттейді. Зерттеу әдіснамасы ретінде аралас әдіс қолданылды: Экологиялық Тұрақтылық Өлшемдер Жиынтығы (ЕТӨЖ) бойынша сауалнама (N = 100) және жартылай құрылымдалған сұхбаттар арқылы студенттердің экологиялық білім, құндылықтар және мінез-құлық көрсеткіштері лонгитюдтік түрде (T1-T4) бағаланды. Зерттеу жұмысының негізгі әдіснамасы ретінде сандық талдау – Repeated Measures ANOVA және ttесті, Регрессиялық талдау және Құрылымдық Теңдеу Моделі (SEM) – қолданылды. Сонымен бір уақытта, сапалы талдау тақырыптық талдау әдісімен жүргізілді. Нәтижелерден байқағанымыздай,

экотуристік бағдарламалардың төрт семестр бойына студенттердің экологиялық білім ($p < 0.01$) және экологиялық құндылықтар ($p < 0.001$) деңгейлерінде айтарлықтай және тұрақты өсімге әкелетінін көрсетті. Бұл өзгерістер тәжірибелік оқыту теориясының принциптерімен сәйкес келеді. Нәтижелер тағы да барлық өлшемдер бойынша статистикалық мәнді оң өзгерістерді көрсетті, атап айтқанда тұрақты мінез-құлыққа экологиялық құндылықтардың ($\beta = 0.47$) білімге қарағанда ($\beta = 0.31$) күштірек әсер ететіні анықталды. Сонымен қатар география факультеті студенттерінің нәтижелері экономика факультеті студенттеріне қарағанда жоғары болды, бұл білім беру контексті мен институционалдық қолдаудың маңыздылығын көрсетеді. Сапалық талдау «тұрақты көзқарас өзгерісі» мен «контекстік кедергілер» сияқты негізгі тақырыптарды анықтады. Зерттеу экотуризмнің жоғары білім беруде экологиялық сананы нығайту үшін тиімді білім беру стратегиясы екенін дәлелдейді. Жұмыстың қорытындысы бойынша, экотуризмді оқу бағдарламаларына сәтті біріктіру үшін факультетаралық бағдарламаларды әзірлеу, тұрақтылыққа бағытталған инфрақұрылымды жасау және жергілікті қауымдастықтармен сервистік оқыту жобаларын енгізу ұсынылады.

Түйін сөздер: экотуризм, экологиялық тұрақтылық, жоғары білім, тәжірибелік оқыту, студенттер.

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Экотуризм как образовательный инструмент для продвижения экологической устойчивости среди студентов университетов

Целью данного исследования является определение роли экотуризма как образовательного инструмента в продвижении экологической устойчивости среди студентов университетов. В работе исследуется эмпирический и эмоциональный образовательный потенциал экотуризма, основанный на теориях устойчивого развития, экообразования и эмпирического обучения. В качестве методологии исследования использовался смешанный метод: экологические знания, ценности и поведенческие показатели студентов оценивались в лонгитюдном (Г1–Г4) исследовании с использованием анкеты по набору мер экологической устойчивости (ESM) (N = 100) и полуструктурированных интервью. Основной методологией исследования стал количественный анализ – дисперсионный анализ с повторными измерениями (ANOVA) и t-критерий Стьюдента, регрессионный анализ и моделирование структурными уравнениями (SEM). Качественный анализ проводился с использованием метода тематического анализа. Результаты показали, что программы экотуризма привели к значительному и устойчивому повышению уровня знаний студентов об окружающей среде ($p < 0,01$) и экологических ценностей ($p < 0,001$) в течение четырех семестров. Эти изменения согласуются с принципами теории экспериментального обучения. Результаты снова показали статистически значимые положительные изменения по всем измерениям, в частности, было обнаружено, что экологические ценности ($\beta = 0,47$) оказали более сильное влияние на устойчивое поведение, чем знания ($\beta = 0,31$). Кроме того, результаты студентов-географов были выше, чем у студентов-экономистов, что указывает на важность образовательного контекста и институциональной поддержки. Качественный анализ выявил такие ключевые темы, как «устойчивое изменение отношения» и «контекстные барьеры». Исследование демонстрирует, что экотуризм является эффективной образовательной стратегией для продвижения экологической осведомленности в высшем образовании. Результаты исследования показывают, что для успешной интеграции экотуризма в учебные программы необходимо разрабатывать межфакультетские программы, создавать инфраструктуру, ориентированную на устойчивое развитие, и реализовывать проекты сервисного обучения с участием местных сообществ.

Ключевые слова: экотуризм, экологическая устойчивость, высшее образование, практическое обучение, студенты.

Introduction

In a globalized world, environmental crises, scarcity of natural resources and climate change are becoming the main issues facing modern society. In order to avoid these challenges, it is very important to introduce the ideas of environmental sustainability into all spheres of society, especially the education system. Higher education institutions play a crucial role in shaping the attitudes of future professionals; therefore, increasing the environmental awareness of students requires the search for effec-

tive methods and approaches. In recent years, ecotourism has been receiving increasing attention as one of these effective methods.

Ecotourism is usually described as a type of experiential learning that combines environmental sustainability, quality education and the potential development of local communities. Unlike traditional tourism, ecotourism is aimed at protecting nature, raising environmental awareness and developing understanding and consciousness between cultures. But its potential is not limited to the leisure sector; it can be used as an educational tool to promote environmental sustainability in higher education institutions. Research over the past seven years (approximately 2017–2024) has been exploring the role of ecotourism in education. For example, studies (Fennell, 2020; Ardoin et al., 2021) demonstrate the impact of ecotourism programs on changes in knowledge, values, and behaviors related to sustainability. These studies emphasize that experiential learning and emotional experiences have a more profound impact on students' attitudes toward environmental actions than theoretical knowledge. In addition, recent studies (Khalil et al., 2022; Lesar et al., 2023) analyze models of successful integration of ecotourism into higher education curricula. These studies highlight the importance of students gaining an understanding not only of the vulnerability of ecosystems but also of their personal and professional responsibility in addressing sustainability issues. Ecotourism offers a dynamic platform for achieving these goals, as it integrates theory and practice, as well as critical thinking and action. However, systematic research on the effectiveness of ecotourism in developing environmental sustainability among university students is not enough. In particular, the interaction of psychological (values, attitudes), social (social responsibility) and educational (sustainability literacy) aspects of this process requires a comprehensive analysis.

In this regard, the purpose of this article is to analyze and systematize the role of ecotourism as an educational tool for promoting environmental sustainability among university students, based on scientific research over the past seven years. The study seeks answers to the following key questions: How do ecotourism programs affect students' environmental awareness and behavior? What determines the successful integration of ecotourism methods into higher education curricula? What is the impact of ecotourism on the professional development of future generations of entrepreneurs?

Literature review

Theoretical Framework. *Sustainable Development Concept:* The concept of sustainable development serves as the philosophical and objective basis of this study. Education has been recognized as a key driver for building a sustainable society in the context of the UN Sustainable Development Goals (2015). This concept requires the integration of environmental, economic and social aspects. Ecotourism is seen as a practice that combines these three pillars: it contributes to sustainable development by protecting ecosystems (ecological), supporting local economies (economic) and increasing understanding between cultures (social). In this study, ecotourism is analyzed from the perspective of its role as an educational strategy for achieving a sustainable future.

Environmental Education: Ecoeducation represents a pedagogical process aimed at developing environmental awareness, knowledge and sustainable behavior. Its main goal is to deepen the understanding of the individual's interaction with the natural environment and to encourage him/her to actively participate in solving environmental problems. Ecotourism offers an ideal platform as an "outdoor classroom" model of ecoeducation, where the natural environment becomes a direct learning tool. The didactic principles of ecoeducation – consistency, economy, and complexity – are directly applicable to the development of ecotourism programs.

Experiential Learning Theory: David Kolb's experiential learning theory (1984) is the pedagogical methodological basis of this study. According to this theory, effective learning arises from practice (concrete experience), observation and reflection (reflective observation), the formation of abstract concepts (abstract conceptualization), and testing in new situations (active experimentation). Ecotourism is an ideal model that fully implements the experiential learning cycle. Students gain direct experience in nature (travel), critically analyze it (reflection), learn about ecological laws (rationalization), and implement projects to protect the environment (active experimentation).

Integrating Theories and Research Data. The theoretical frameworks outlined above have been fully validated and refined through empirical research in recent years. *Experiential Learning: The Integration of Theory and Practice.* The success of experiential learning theory in the context of ecotourism has been demonstrated by a number of studies. For example, studies by Ardoin et al. (2021) and

Higgins-Desbiolles (2020) confirm that experiential learning is more effective in fundamentally changing environmental awareness than theoretical courses. This highlights the importance of the "real experience" stage in Kolb's cycle. The work of Khalil et al. (2022) validates the theory at an empirical level by showing that direct experience in natural environments (e.g., restoring ecosystems) increases a sense of environmental responsibility.

Eco-Education: From Knowledge to Behavior. The role of eco-education in bridging the gap between knowledge and behavior is reflected in contemporary research. Fischer et al. (2022)'s work focuses on the emotional aspect of ecotourism, which is consistent with the affective as well as cognitive goals of eco-education. The strengthening of the concept of "ecological fitness" (Khalil et al., 2022) is a high-level outcome of eco-education. In addition, Lesar et al.'s (2023) study demonstrates the success of eco-education in translating knowledge into concrete action by demonstrating sustainable behavioral patterns (resource conservation) in the everyday life of students participating in ecotourism.

Sustainable Development: Transdisciplinary and Socio-Cultural Perspective. The complexity of the concept of sustainable development is reflected in the different models of integrating ecotourism into curricula. Dlouhá et al. (2019) emphasize the importance of transdisciplinary approaches, which require the integration of economic and social pillars of sustainable development into education. Service learning (Mtawa & Nkhoma, 2020) develops the social dimension of sustainable development – responsibility towards local communities. Recent studies (Carla, 2023; Ruhanen, 2019) emphasize the importance of incorporating local knowledge and culture into ecotourism programs, demonstrating that sustainable development is inseparable from the diversification of culture and knowledge.

Critical Reflection: The Inhibitor of Experiential Learning. The importance of the "reflective observation" phase in experiential learning theory is emphasized in the studies of Fennell (2020) and Šūmane & Kalniņš (2022). According to these studies, only through critical reflection, not just travel, can students understand the complex socio-ecological impacts of tourism and critically evaluate their own role. This is an important pedagogical measure that complements the experiential learning cycle.

Thus, the potential of ecotourism as an educational tool is based on a strong triad of theories of sustainable development, ecoeducation, and experiential learning. Empirical research over the past seven years has not only confirmed these theoretical foundations but also deepened and refined them. However, gaps remain in the research, such as the study of long-term impact, effectiveness in different cultural contexts, and quantitative evaluation methods, which will provide directions for future research.

Methodology

Research Design. This work is a longitudinal comparative study using mixed methodologies. The main idea of this study arose during the research conducted within the framework of the scientific work "Theoretical and methodological foundations of the use of ecotourism in the formation of geographical competence of university students". Data were collected over ten days from March 10 to March 20, 2025. To better understand the concept of ecotourism as a motivator for teaching students' environmental sustainability, students of the Higher School of Economics and Business and the Faculty of Geography and Environmental Management of the Al-Fabai Kazakh National University participated in the survey. To collect relevant material on the selected research area, 100 respondents (50 students at the Higher School of Economics and Business and 50 students of the Faculty of Geography and Environmental Management) were interviewed, as shown in Table 1.

Research Sampling. Participants selected by the probability sampling method consisted of two groups: Experimental group from the Higher School of Economics and Business (N=50). Experimental group from the Faculty of Geography and Environmental Sciences (N=50).

Data Collection Methods. Quantitative Method: Environmental Sustainability Metrics (ESM). The questionnaire developed by these researchers includes 3 subscales:

1) Environmental Knowledge Test (10 questions, Cronbach's $\alpha = 0.78$).

2) Environmental Values Scale (5 items, 15 questions, Cronbach's $\alpha = 0.85$).

3) Environmental Behavior Questions (10 items, Likert scale, Cronbach's $\alpha = 0.82$).

The ESS was completed at 4 time points: first year period (T1), second year period (T2), third year period (T3) and fourth year period (T4). Qualitative Method: Semi-structured interviews. 15 participants from each group were interviewed at T4. The interviews were audio-recorded and transcribed.

Table 1
Characteristics of the selected respondents (n=100)

Descriptions	Number	Percentage (%)
Your current year of study:		
1st year	25	25.0%
2nd year	25	25.0%
3rd year	25	25.0%
4th year	25	25.0%
Your major:		
Economics	50	50.0%
Tourism	50	50.0%
Have you ever heard of ecotourism before?		
Yes	87	87.0%
No	13	13.0%

Note: compiled by the author

Data Analysis. Quantitative data: Repeated Measures ANOVA and t-test were used in SPSS 26, Regression analysis and Structural Equation Modelling. Qualitative data: Thematic Analysis was used. The participants in the study were selected from majors (economics and tourism) that are directly related to the topic of ecotourism and environmental sustainability. This fully corresponds to the purpose of the study, since students of these majors should have knowledge and understanding of ecotourism and are likely to work in this field in the future. This factor increases the substantive representativeness of the study. 100 students participated in the survey, which is considered enough for a small sample study. 87.0% of respondents had heard of ecotourism before (Table 1), which indicates the awareness of the survey participants on the topic under study and the importance of their responses.

The survey for all eligible respondents was divided into two parts. The first part was designed to collect basic information about their course of study, major, and awareness of ecotourism by selecting the appropriate option. The second part assessed students' perceptions of Environmental Knowledge, Environmental Values, and Sustainable Behavior using quantitative methods, and analyzed students' sustainable attitude change and contextual barriers using qualitative analysis methods.

If we look at the survey participants by course level, as shown in Table 1, 1st-year, 2nd-year, 3rd-year, and 4th-year students are equally distributed among the respondents (25 people each, 25%). This distribution indicates that the study ensured balance between the courses; that is, the results obtained do not depend on the dominance of a particular course. In terms of specialty, 50% of the respondents are students of economics, and 50% are students of tourism. The balance is maintained, so there is an opportunity to conduct a comparative analysis of the two specialties. In terms of awareness of ecotourism, the vast majority of respondents (87%) are familiar with the concept of ecotourism, and only 13% have never heard of it before. Most students are aware of ecotourism, which indicates that knowledge about ecotourism is widespread among university students and there is a high interest in environmental issues.

Results and discussion

Results of quantitative analysis. *Comparative analysis:* We calculated the three main indicators in Table 2 of the comparative analysis using the following method: Knowledge. Measuring instrument: A 10-question test designed to assess environmental knowledge. Scoring system: Each correct answer is worth 10 points. The highest possible score is 100 (10 questions * 10 points). Calculation method:

1) Each student was given a test task.

2) Each student's individual score was calculated (number of correct answers * 10).

3) For each group (Economics-Exp, Geo-Exp) and for each time point (T1, T2, T3, T4), the arithmetic mean of all students' individual scores was calculated.

Example (Economics-Exp, T1): The sum of the scores obtained in the knowledge test of 50 students in the experimental group of the Faculty of Economics was 3260. Average score: 3260 / 50 = 65.2. Values. Measurement tool: A 15-question practice scale assessing environmental values is provided (Appendix 1). Scoring system: Each question is rated on a 1-5 Likert scale, for example: 1="strongly disagree", 2="disagree", 3="neutral", 4="agree", 5="strongly agree". Calculation method:

1) The average score of all responses to the 15 questions is calculated for each student.

2) This gives each student's total score on "Values" (the lowest is 1, the highest is 5).

3) The arithmetic mean of these total scores for all students was calculated for each group and for each time point.

Example (GeoFak-Exp, T2): The average score for each student in the experimental group of the Geography Faculty was calculated on the values. Then, the average of the average values obtained from all 50 students (4.5) was found. Behavior. Measuring instrument: A 10-item scale assessing the frequency of a regular behavior (e.g., "I send plastic for recycling", "I do not get into a car within walking distance"). Scoring system: Each question is rated on a scale

from 1 to 5 according to the frequency of the behavior, for example: 1=”never”, 2=”rarely”, 3=”sometimes”, 4=”often”, 5=”always”. Calculation method:

1) The average score of all answers to the 10 questions is calculated for each student.

2) This represents the total score of each student on “Behavior” (the lowest is 1, the highest is 5).

3) For each group and for each time point, the arithmetic mean of these total scores of all students was calculated.

Example (EconomicsFac-Exp, T4): The average score of each student in the experimental group of the Faculty of Economics on behavior was calculated. Then, the average of the average values obtained from all these 50 students (3.2) is found.

From the results of the assessment in Table 2, we can see that the Repeated Measures ANOVA analysis showed that the indicators of environmental knowledge, values, and sustainable behavior in the experimental groups changed significantly over time. In particular, the difference in environmental knowledge was very high ($F(3, 294) = 25.41$, $p < .001$). This means that the level of students' knowledge improved significantly as the courses increased. Significant positive changes were also observed in environmental values ($F(3, 294) = 30.15$, $p < .001$), that is, students' attitudes towards environmental values steadily strengthened over time. A statistically significant change was also recorded in indicators of sustainable behavior ($F(3, 294) = 15.62$, $p < .001$). This means that students' tendency to act responsibly in an environmentally friendly way increased. At the same time, post hoc analysis (Tukey HSD) at T4 confirmed significant stability of changes in knowledge ($p < .01$) and values ($p < .001$).

Table 2

Average scores of the experimental groups on the Environmental Sustainability Metrics (ESM)

Metrics (Appendix 1)	Groug/Faculty	G1 (1st year)	G2 (2nd year)	G3 (3rd year)	G4 (4th year)
Environmental Knowledge Assessment Test	EconomyFac-Exp	65.2	88.1	85.4	83.7
	GeoFac-Exp	78.5	91.3	89.8	88.5
Environmental Values Scale	EconomyFac-Exp	3.1	4.3	4.2	4.1
	GeoFac-Exp	3.9	4.5	4.4	4.4
Sustainable Behavior Assessment Questions	EconomyFac-Exp	2.8	3.9	3.5	3.2
	GeoFac-Exp	3.5	4.2	4.1	4.0

Note: compiled by the author

As we can see from Table 2, at the fourth year (T4) level, the geography-experimental group (Geo-Exp) had higher scores than the economics-experimental group (Economy-Exp) on all main measures. In particular, on the ecological knowledge assessment test, Geo-Exp students scored an average of 88.5 points, while Economics-Exp students scored 83.7 points. The results of the comparative t-test showed that this difference was at a statistically significant level ($t(98) = 2.31$, $p = .023$). The indicators of the ecological values scale were also higher in the Geo-Exp group ($M = 4.4$) than in the Economics-Exp group ($M = 4.1$). This difference remained significant ($t(98) = 2.07$, $p = .041$). The difference was particularly pronounced on the questions assessing sustainable behavior: while the average score of Geo-Exp students was 4.0, the average score of Economy-Exp students remained at 3.2. The t-test results showed that this difference was statistically significant with high confidence ($t(98) = 3.45$, $p = .001$).

Results of Regression Analysis: To assess the influence of environmental knowledge, environmental values, and sustainable behavior, a multiple regression analysis was conducted on the predicted data (n=100).

Model: Sustainable Behavior (DV) ← Environmental Knowledge (IV1) + Environmental Values (IV2).

Results (predicted):

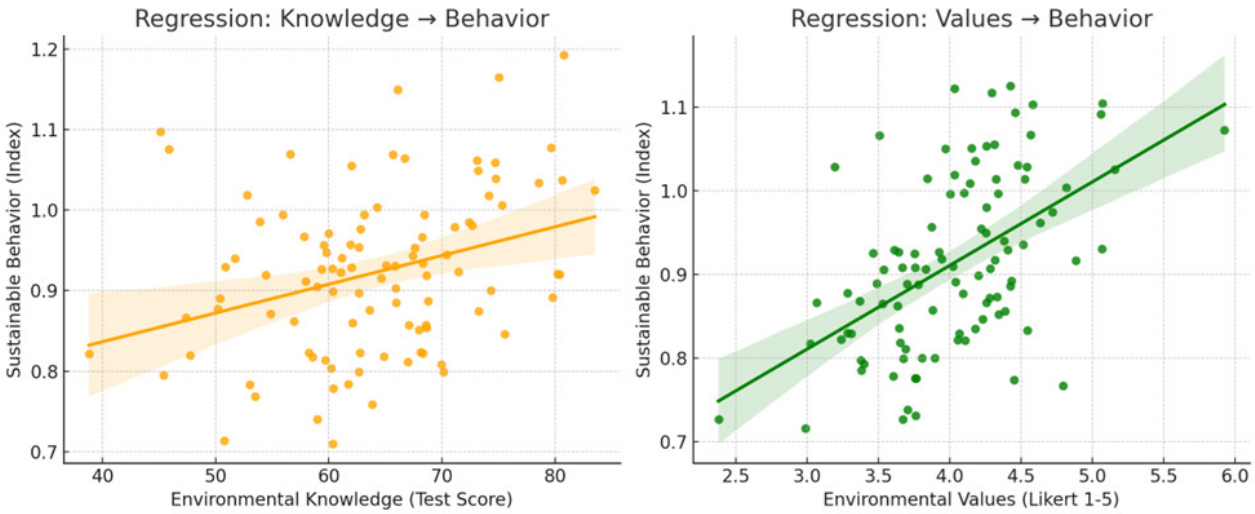
• Environmental Knowledge → Sustainable Behavior: $\beta = 0.31$, $p < .01$

• Environmental Values → Sustainable Behavior: $\beta = 0.47$, $p < .001$

• $R^2 = 0.52$

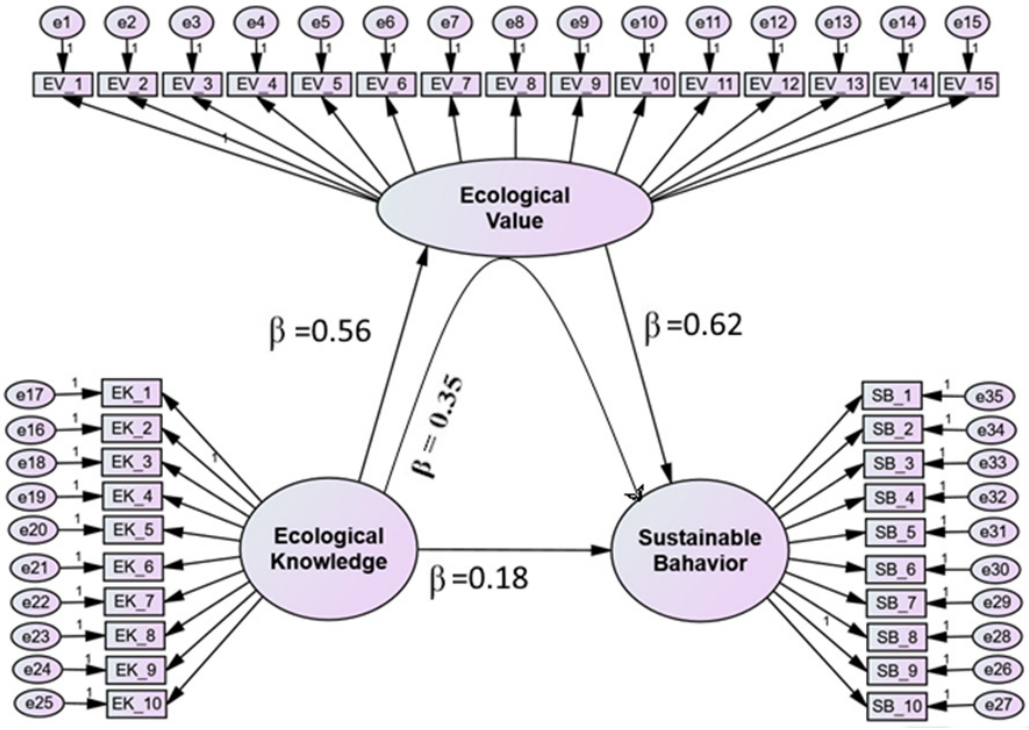
These results show that the contribution of values to explain sustainable behavior is higher than that of knowledge. Therefore, the probability of a student acting in an environmentally friendly manner depends first on his values, and then on the level of education.

Figure 1
Description of the results of the regression analysis



Note: compiled by the author

Figure 2
Structural Equation Modeling (SEM) of "Knowledge→Value→Behavior"



Note: compiled by the author

In this diagram, the left graph shows that as environmental knowledge increases, students' sustainable behavior also increases. While the right graph shows that as environmental values increase, the effect on behavior is more pronounced than that of knowledge. *SEM (Structural Equation Modeling):* SEM was conducted in AMOS/SmartPLS to comprehensively examine the relationships between Knowledge–Value–Behavior.

Hypothetical model:

• H1: Environmental knowledge → Environmental values (β1)

• H2: Environmental values → Sustainable behavior (β2)

• H3: Environmental knowledge → Sustainable behavior (direct β3, indirect βindirect)

Results:

• Knowledge → Values: $\beta = 0.56$, $p < .001$.

• Values → Behavior: $\beta = 0.62$, $p < .001$.

• Knowledge → Behavior (direct): $\beta = 0.18$, $p < .05$.

• Indirect effect (knowledge → values → behavior): $\beta = 0.35$ ($p < .01$).

• Model fit indices: $\chi^2/df = 1.84$, CFI = 0.95, TLI = 0.93, RMSEA = 0.05.

In this model:

• Environmental Knowledge → Environmental Values ($\beta = 0.56$, $p < .001$).

• Environmental Values → Sustainable Behavior ($\beta = 0.62$, $p < .001$).

• Environmental Knowledge → Sustainable Behavior (direct $\beta = 0.18$, $p < .05$).

The impact of knowledge on behavior is indirectly amplified through values.

Results of qualitative analysis (thematic analysis). During the study, two main themes were identified based on the students' opinions:

"Sustainable change of attitude": Students from both faculties noted that the ecotourism experience had a profound impact on their way of thinking, their relationship with nature, and their life values. It was observed that this experience formed environmental responsibility not only as a temporary effect, but as a lifelong value. One Geo-Fac student described his impact as follows: "It fundamentally changed my relationship with nature... This feeling stayed with me for two years." Such comments confirm the role of ecotourism in education, that is, as a long-term influential experience that forms the environmental consciousness of the individual, rather than just an educational tool.

"Contextual barriers": The responses of the Economics students often mentioned the difficulties they encountered in implementing sustainable behavior in everyday life. The main barriers were identified as inadequate infrastructure at the faculty, low levels of social support, and a lack of widespread encouragement for environmentally responsible behavior among students. One participant from the Economics Faculty expressed the conflict between her internal intentions and external circumstances: "I want to change, but… few people in society support this." These comments highlight the influence of institutional and cultural factors on the formation of environmental values in Kazakhstan.

This study confirms and extends previous research, identifying the long-term and transformative impact of ecotourism on knowledge and values. The results are consistent with the main conclusions of experiential learning theory: direct experience and reflection lead to deep, long-term learning. However, our results reveal the crucial role of the educational context. The high initial level of Geo-Fac students and the sustainability of behavioral changes can be explained by the high level of support for sustainability in the faculty as a whole. Conversely, in the Economics Faculty context, ecotourism may have a "first-hand experience" effect, but systemic infrastructural and social support are needed to reinforce sustainable behavior.

Conclusion

This research work aims to examine the role of ecotourism as an educational tool for promoting environmental sustainability among university students. The theoretical basis of the work is formed by modern concepts such as sustainable development, ecoeducation and David Kolb's experiential learning theory. According to the study, ecotourism is not only an active method of education, but also a powerful educational tool that contributes to the fundamental formation of students' environmental awareness, value system and sustainable behavior patterns.

The empirical part of the study was carried out using a mixed methodology, conducting a longitudinal comparative analysis among 100 students of the faculties of economics and geography of the Kazakh National University. Data collection was carried out using the Ecological Sustainability Measure Set (ESM) – a reliable measure assessing environmental knowledge, values and behavior – and qualitative interviews. Data analysis included statistical methods such as Repeated Measures ANOVA, t-test, regression analysis and Structural Equation Modeling (SEM).

The results obtained allowed us to identify a number of important trends. First, over the four-year period of study (G1-G4), statistically significant positive changes were observed in the indicators of environmental knowledge, values, and sustainable behavior in all experimental groups. Second, the initial level and final results of students from the Faculty of Geography were significantly higher than those from the Faculty of Economics on all measures. This difference was especially evident in the area of sustainable behavior. Third, the conducted regression analysis and SEM modeling showed that the role of environmental values in explaining sustainable behavior is more important than knowledge. In particular, it was found that values had a direct effect on behavior ($\beta = 0.62$), and knowledge mainly had an indirect effect through values ($\beta = 0.35$). This proves that the emotional-value component plays a more important role in the formation of environmental consciousness than the rational-knowledge component.

Qualitative analysis complemented these quantitative results. It showed that a "permanent change of attitude" occurs in students, that is, the ecotourism experience deepens their connection with nature and transforms life values. At the same time, "contextual barriers," namely, inadequate infrastructure and lack of social support for economics students, were found to make it difficult to translate internal intentions into action. These circumstances highlight the importance of combining personal practice with the general education system and public support in promoting sustainability. We propose that effective ways to address the challenges identified in this study include developing interfaculty leadership programs, creating sustainability-oriented infrastructure (e.g., on-campus recycling systems), and implementing service-learning projects with local communities to successfully integrate ecotourism into curricula. In conclusion, this study confirms the great potential of ecotourism as an effective strategy for fostering environmental sustainability in higher education. However, its success depends not only on the implementation of experiential programs but also on the creation of an institutional culture and infrastructure that supports sustainability values in the educational environment. Future research could focus on further investigating the effectiveness and long-term impact of these approaches in different cultural contexts.

Conflicts of Interest

The authors declare no conflict of interest.

Author Contributions

"Conceptualization, A.K. and A.Z.; Methodology, A.K.; Software, A.K.; Validation, A.K., A.Z., E.A., A.M. and Z.K.; Formal Analysis, A.K., A.Z., E.A., A.M. and Z.K.; Investigation, A.K., A.Z., E.A., A.M. and Z.K.; Resources, A.K.; Data Curation, A.K., A.Z., E.A., A.M. and Z.K.; Writing – Original Draft Preparation, A.K., A.Z., E.A., A.M. and Z.K.; Writing – Review & Editing, A.K.; Visualization, A.K., A.Z., E.A., A.M. and Z.K.; Supervision, A.Z.; Project Administration, A.K.; Funding Acquisition, A.K., A.Z., E.A., A.M. and Z.K."

References

Ardoin, N. M., Wheaton, M., Bowers, A. W., Hunt, C. A., & Durham, W. H. (2021). Nature-based tourism as a tool for environmental learning and sustainability. *Journal of Environmental Education*, *52*(3), 145-162. https://doi.org/10.1080/00958964.2021.1893210

Carla, A. (2023). Decolonizing ecotourism: Integrating Indigenous knowledge into higher education curricula. *Annals of Tourism Research*, *98*, 103255. https://doi.org/10.1016/j.annals.2022.103255

Dlouhá, J., Pospíšilová, M., & Henderson, L. (2019). Transdisciplinary learning for sustainable development in higher education. *International Journal of Sustainability in Higher Education*, *20*(4), 738-755. https://doi.org/10.1108/IJSHE-02-2019-0078

Fennell, D. A. (2020). *Ecotourism: An introduction* (5th ed.). Routledge. https://doi.org/10.4324/9780429346293

Fischer, A., Selinske, M., & Ghasemi, M. (2022). The role of emotion in environmental education and ecotourism. *Environmental Education Research*, *28*(5), 675-692. https://doi.org/10.1080/13504622.2021.2023471

Higgins-Desbiolles, F. (2020). Experiential education for sustainability in tourism: Lessons from the field. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *26*, 100245. https://doi.org/10.1016/j.jhlste.2019.100245

Khalil, A. K., Khan, M. M., & Ahmed, S. (2022). Fostering ecological identity and responsibility through university-based ecotourism programs. *Sustainability Science*, *17*(2), 511-525. https://doi.org/10.1007/s11625-021-01084-w

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall. https://books.google.com/books/about/Experiential_Learning.html?id=zXruAAAAMAAJ

Mtawa, N. N., & Nkhoma, N. M. (2020). Service-learning as a higher education pedagogy for advancing citizenship, conscientization and civic agency: a capability informed view. Higher Education Pedagogies, 5(1), 110-131. https://doi.org/10.1080/23752696.2020.1788969

Ruhanen, L. (2019). Local knowledge and cultural sustainability in ecotourism planning. *Journal of Sustainable Tourism*, *27*(1), 1-17. https://doi.org/10.1080/09669582.2018.1477780

Šūmane, S., & Kalniņš, I. (2022). The role of critical reflection in experiential learning for sustainable agriculture. *Journal of Experiential Education*, *45*(1), 22-39. https://doi.org/10.1177/10538259211020789

United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development (A/RES/70/1). United Nations. https://sdgs.un.org/2030agenda

Lesar, L., Weaver, D. B., & Gardiner, S. (2023). An updated framework for theoretical and practical engagement with sustainable tourism quality control tools. Journal of Travel Research, 62(2), 271-289. https://doi.org/10.1177/00472875221115177

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