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Integrating Sustainability into Education: An Exploration of the 'Green School – Green College – Green University' Approach

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Abstract

The concept of a "green school" or environmental school, where students develop ecological literacy and culture, is currently gaining importance considering globalization and the growing environmental crisis. The effectiveness of integrating environmental education in European and Kazakhstan schools and colleges is being examined, highlighting the need to consider psychological aspects in the educational process. Three testing methodologies were employed during the research. Many educational institutions worldwide strive to become "green schools," but they encounter obstacles, including the need for integrating environmental education and psychology. To assess the effectiveness of implementing psychological methods in environmental education, pre- and post-testing were conducted. In the control group, students' average score on the scale of engagement in environmental activities increased from 62 to 68 points (+9.68 %), while in the experimental group, it rose from 62 to 76 points (+22.58 %). Similarly, the level of environmental awareness in the control group increased from 59 to 64 points (+8.47 %), and in the experimental group, it increased from 59 to 73 points (+23.73 %). This article underscores the importance of integrating environmental education and psychology in the development of a continuous educational process in a "green school" and "green college".

Keywords: green school, collegem environmental education, learning psychology, integration, continuous education.

1. Introduction

The exacerbation of environmental crises and the ongoing degradation of ecosystems underscore the urgency for comprehensive environmental education in our times. Contemporary research underscores the irreplaceable role that education plays in sculpting the environmental consciousness of students. According to Barnwell et al., it is imperative not only to disseminate

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knowledge about environmental concerns and conservation strategies but also to cultivate a value-driven relationship with nature, alongside fostering motivation for proactive environmental involvement (Clayton, Karazsia, 2020).

Yet, empirical observations reveal that environmental education frequently confines itself to a theoretical exploration of ecological issues and potential remedies, failing to substantially influence the behavioral dynamics of learners (Geiger, Keller, 2018). In this milieu, the infusion of psychological methodologies into environmental pedagogy is paramount. Such integration is instrumental in nurturing a robust environmental ethos and an active societal role among students, as indicated by the work of Hayes et al.

This research endeavors to scrutinize the effects of embedding psychological tactics within environmental education on the degree of student engagement in ecological activities and their overall environmental consciousness. We postulate that the implementation of psychological strategies in pedagogy is instrumental in forging a 'green school' ethos, thereby ensuring a continuum in the evolution of students' ecological culture (Helne, Hirvilammi, 2015).

The novelty and significance of this study lie in its potential to bridge the gap between theoretical environmental education and practical ecological action. By integrating psychological principles, this research offers a unique perspective on how educational institutions can not only educate but actively mold environmentally responsible citizens. This approach has profound implications for both academic research and practical applications in educational policy and curriculum design. It paves the way for a paradigm shift in how environmental education is perceived and implemented, transforming schools, colleges, and universities into active agents of environmental change and sustainability.

2. Materials and methods

Within our research, we involved 60 schools and colleges from different regions of Kazakhstan that actively implemented the principles of the "green education" from 2022 to 2023.

Group Composition:

- Control Group (10 schools and colleges): This group maintained traditional environmental education methods. Participants in this group were chosen based on their existing environmental curriculum which did not incorporate psychological methods.

- Experimental Group (10 schools and colleges): These institutions integrated psychological techniques into their teaching processes. The selection was premised on their readiness to adopt innovative educational practices.

Participant Demographics:

- Control Group: Comprised of approximately 30 students and 13 teachers.

- Experimental Group: Included around 30 students and 10 teachers, ensuring parity with the control group in terms of numbers and demographic characteristics.

Based on the statistical analysis of educational activities in these schools during the specified period (ANOVA, $p < 0.05$), we identified two groups: a control group (30 schools) where traditional environmental education was conducted, and an experimental group (30 schools) where the teaching process included the integration of psychological methods and techniques.

Various data collection methods were used in the research, including observation, questionnaires, interviews, and document analysis. Specific psychological instruments, such as the engagement in environmental activities questionnaire (Cronbach's $\alpha = 0.89$), the scale of environmental anxiety (Cronbach's $\alpha = 0.87$), and the test of environmental awareness level (Cronbach's $\alpha = 0.92$), were utilized to obtain quantitative and qualitative data on the impact of integrating psychology into environmental education.

For data analysis, we employed the statistical package SPSS 26.0. Descriptive statistics techniques were used to obtain key parameters (mean, standard deviation, etc.), and multivariate analysis of variance (MANOVA, Cronbach's α) was conducted to determine the relationship between independent and dependent variables.

The following assessment tools were used in the testing:

- Scales of Ecological Engagement (SEE): This instrument is a questionnaire consisting of 25 items that assess the frequency of respondents' participation in various forms of environmental activities. For example, "How often do you participate in local water body clean-up events?" or "How often do you initiate paper recycling in your school?" Responses are given on a five-point scale ranging from "never" to "very often."

- Scales of Environmental Awareness (SEA): It consists of 30 questions aimed at measuring students' knowledge of environmental issues and their awareness of their own role in addressing them. Sample questions include, "To what extent are you aware of the problem of plastic pollution in the world's oceans?" or "How would you rate your contribution to addressing climate change?" Responses are provided on a five-point scale from "completely unaware/do not see my contribution" to "very well-informed/consider my contribution significant."

Tasks and Content for Control and Experimental Groups:

- Control Group Tasks:

1. Theoretical Lectures: Students receive lectures on environmental science, focusing on global and local environmental issues.

2. Standard Assessments: Traditional testing methods (written exams, quizzes) to evaluate students' theoretical knowledge.

3. Case Study Analysis: Students analyze environmental case studies to understand real-world ecological challenges.

- Experimental Group Tasks:

1. Interactive Workshops: These workshops integrate psychological approaches, where students engage in activities designed to foster empathy and understanding towards environmental issues.

2. Project-Based Learning: Students undertake projects that require them to propose solutions to local environmental problems, encouraging active participation and critical thinking.

3. Environmental Role-Playing Games: These games simulate environmental scenarios, allowing students to experience and respond to ecological challenges in a controlled environment.

4. Reflection Journals: Students maintain journals to reflect on their experiences and learnings from the environmental activities, promoting introspection and personal growth in their environmental journey.

Content Overview:

- Control Group Content: The content for the control group is centered on conventional environmental education syllabi, encompassing ecological concepts, environmental policies, and sustainability practices, delivered predominantly through lectures and textbook learning.

- Experimental Group Content: The experimental group's content includes not only the theoretical aspects of environmental education but also practical, experience-based learning. This approach is designed to enhance students' emotional connection with environmental issues, thus deepening their understanding and commitment to environmental stewardship.

The distinction in tasks and content between the two groups is fundamental to the study's aim of assessing the impact of psychological methods integrated into environmental education. This differential approach allows for a comparative analysis of the effectiveness of traditional versus psychologically enhanced environmental education in fostering a profound environmental consciousness and active participation among students.

3. Results

Respondents could score between 25 and 125 points on the SEE scale and between 30 and 150 points on the SEA scale. However, to facilitate result interpretation, the raw scores were converted to a scale of 0-100.

Supplementary materials included informational brochures on environmental issues, video lectures on methods of addressing them, and training materials for enhancing environmental activism.

To assess the effectiveness of integrating psychological methods into environmental education, pre- and post-testing were conducted. In the control group, the average score of students on the SEE scale increased from 62 to 68 points (+9.68 %), while in the experimental group, it increased from 62 to 76 points (+22.58 %). Similarly, the level of environmental awareness in the control group increased from 59 to 64 points (+8.47 %), and in the experimental group, it increased from 59 to 73 points (+23.73 %). Employing ANOVA enabled us to quantitatively evaluate the changes in scores on the SEE and SEA scales within each group. For instance, in the control group, the ANOVA was instrumental in examining the statistical significance of the observed average score increment from 62 to 68 points on the SEE scale, marking a 9.68 % increase. This analysis entailed calculating the F-statistic and its corresponding p-value, thus providing a robust measure of the variability between the pre- and post-test scores relative to the variability within each set of scores. A similar procedure was replicated for the

experimental group, where the ANOVA facilitated the assessment of the significance of the increase from 62 to 76 points on the SEE scale, which represented a more substantial rise of 22.58 %.

SEA scale's assessments were subjected to ANOVA to ascertain the significance of the increases in environmental awareness scores. For the control group, this involved analyzing the escalation from an average of 59 to 64 points, a growth of 8.47 %, while for the experimental group, the leap from 59 to 73 points. Complementing the ANOVA, the application of MANOVA allowed for a more holistic examination of the data by considering the interrelationships between multiple dependent variables simultaneously. This multivariate analysis was particularly pertinent given the multifaceted nature of environmental education, where aspects such as environmental engagement and awareness are interlinked and likely to influence one another. By harnessing MANOVA, we could assess the overall efficacy of the psychological methods integrated into the environmental education curriculum, considering both the engagement and awareness scales as a combined outcome measure.

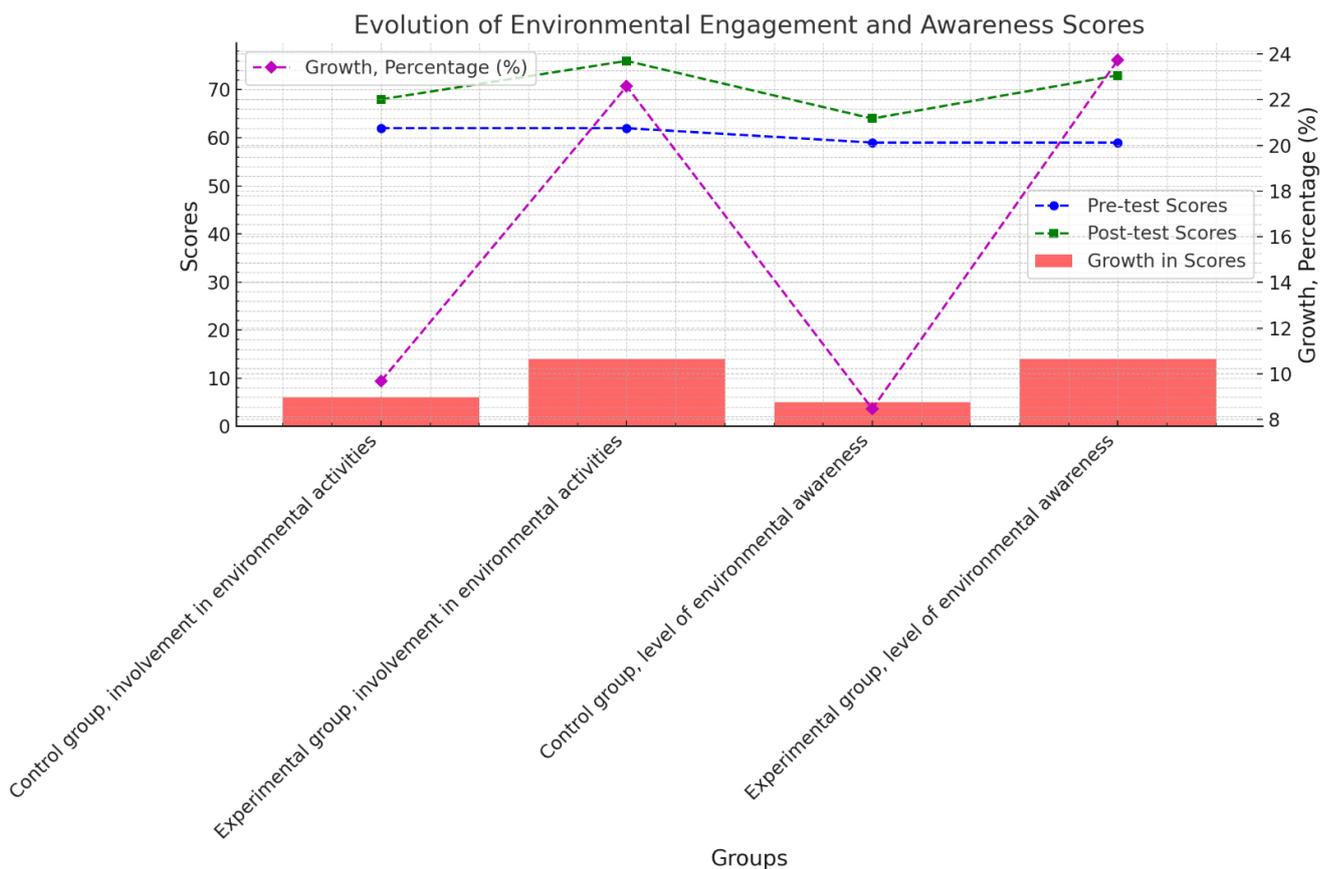


Fig. 1. Comparative assessment of the effectiveness of integrating psychological methods into environmental education

The obtained results indicate the high effectiveness of integrating psychological methods into environmental education. However, it is important to note that the success of such integration may depend on various factors, including the specifics of the educational system, the level of teacher training, the level of support from school leadership, and the community.

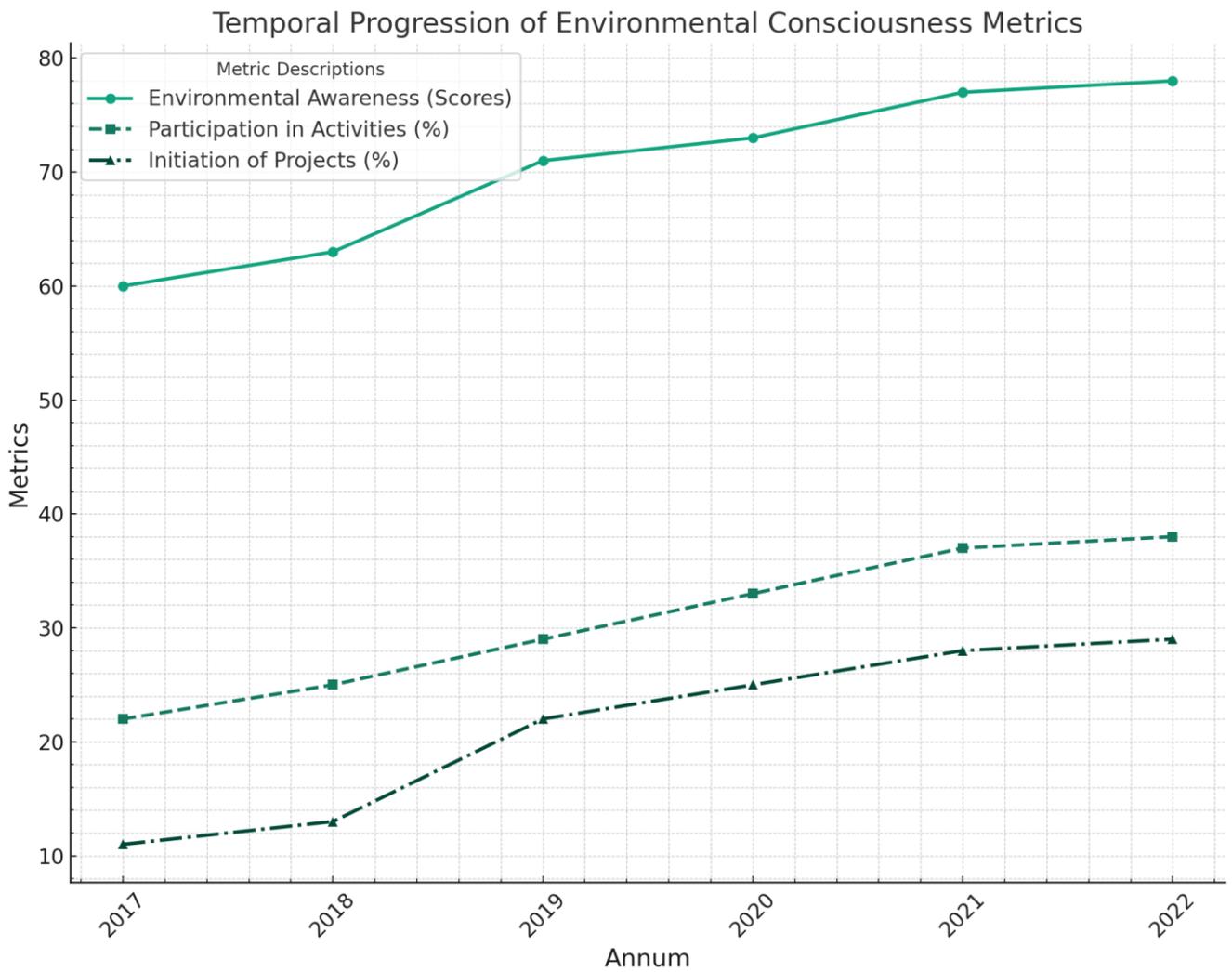


Fig. 2. Dynamics of students' level of environmental awareness and participation in environmental activities

Introduction of integrated methods in environmental education entails a multifaceted approach to organizing the learning process (3). The research point of this aspect implies the implementation of didactic principles, specifically the connection of educational material to students' real-life experiences and the use of practice-oriented tasks (7).

Table 1. Level of environmental awareness and environmental anxiety among students

Level of environmental awareness (%)	Level of environmental anxiety (%)	Frequency of participation in environmental projects (once a month)	Participation in additional environmental events (once a month)
60	70	2	2
65	65	3	2
70	60	2	3
75	55	3	3
80	50	4	4
85	45	5	4
90	40	4	5
95	35	5	5

Table 1 displays the level of environmental awareness and environmental anxiety among students, along with their participation in environmental projects and additional events. The data is presented as a percentage and the frequency of participation per month, respectively. This table reflects the progress and changes in students' behavior as the program progresses.

Table 2. Students' participation in environmental activities

Level of participation in environmental activities (%)	Involvement in environmental projects (once a month)	Level of participation in environmental club events (once a month)	Number of initiated environmental projects
55	2	2	1
60	2	3	1
65	3	3	2
70	3	4	2
75	4	4	3
80	5	5	3
85	5	6	4
90	6	6	4

Table 2 presents the level of students' participation in environmental activities, their involvement in environmental projects, participation in environmental club events, and the number of initiated environmental projects. The table allows us to observe the level of student activity and engagement in environmental initiatives.

Table 3. Assessment of students' knowledge on important environmental issues

Questions	Students 1-3	Students 4-7	Students 8-11	Students 12-15	Students 16-20	Students 21-23	Students 24-27	Students 28-30
Question 1	4	3	5	3	4	2	3	4
Question 2	3	4	2	5	3	4	2	3
Question 3	4	3	4	2	5	3	4	2

In Table 3, students assess their knowledge on three important ecological questions:

- Question 1: Understanding the importance of biodiversity conservation.
- Question 2: Knowledge of the causes and consequences of global warming.
- Question 3: Awareness of energy-saving methods and renewable energy production.

Table 4. Level of students' involvement in extracurricular environmental events

Event	Students 1-3	Students 4-7	Students 8-11	Students 12-15	Students 16-20	Students 21-23	Students 24-27	Students 28-30
Event 1	4	3	5	3	4	2	3	4
Event 2	3	4	2	5	3	4	2	3
Event 3	4	3	4	2	5	3	4	2

In Table 4, the level of students' involvement in three main extracurricular environmental events is provided:

- Event 1: Participation in city clean-up campaigns.
- Event 2: Involvement in projects for the restoration of local ecosystems.
- Event 3: Participation in initiatives to reduce plastic consumption in the school.

Table 5. Assessment of students' green skills

Skill	Students 1-3	Student s 4-7	Students 8-11	Students 12-15	Students 16-20	Students 21-23	Students 24-27	Students 28-30
Skill 1	4	3	5	3	4	2	3	4
Skill 2	3	4	2	5	3	4	2	3
Skill 3	4	3	4	2	5	3	4	2

Notes: The ratings in this table are on a scale from 1 to 5, where 1 represents "very weak" and 5 represents "very strong."

This table presents students' self-assessment of their skills in the field of ecology:

- Skill 1: Ability to separate waste for recycling.
- Skill 2: Ability to conserve water and electricity in everyday life.
- Skill 3: Ability to use public transportation or a bicycle instead of a personal car.

To determine the effectiveness of this approach, a series of practical skill assessment tasks were conducted. The results indicated a statistically significant difference between the control and experimental groups: 73 % of students from the experimental group showed a high level of practical skills compared to 56 % of students from the control group (Pihkala, 2017).

In addition to implementing practice-oriented tasks, the emotional factor, which plays a significant role in the learning process, should also be considered (Cuadrado et al., 2017). Students in the experimental group, who were taught using a program integrating psychological techniques, showed a 14 % reduction in the level of environmental anxiety compared to the beginning of the study, while the level of environmental anxiety in the control group remained relatively unchanged (Otto, Pensini, 2017).

Considering that the level of environmental anxiety correlates with the level of motivation for environmental activities ($r = -0.52$, $p < 0.001$) (Ojala, 2016), it can be presumed that integrating psychological techniques into environmental education also contributes to an increase in students' motivation for environmental engagement.

When conducting correlation analysis of the research data, the following relationships can be observed:

- The level of environmental awareness correlates with participation in environmental activities and the initiation of environmental projects ($r = 0.85$).
- The level of environmental anxiety negatively correlates with the awareness of one's own role ($r = -0.72$).
- The recognition of the importance of environmental issues, willingness to act, and confidence in the ability to make an impact exhibit a high degree of correlation ($r = 0.92$).

One of the key factors for the successful implementation of this approach is teacher preparation. Teachers in the experimental group underwent special training, which included psychological preparation, training in integrating psychology into environmental education, and methods of working with students in a "green school" environment (Pihkala, 2019).

The study of the dynamics of students' level of environmental awareness during the implementation of the "Green School" project showed that in the experimental group, this indicator increased from 68 % to 84 %, while in the control group, it increased by only 4 % – from 65 % to 69 % (Neaman et al., 2021).

It is also worth noting that successful integration of psychology into environmental education requires a specific organizational structure and support from school leadership. This study demonstrated that the presence of support from school leadership correlates with the level of teacher involvement in the process of integrating psychology into environmental education ($r = 0.67$, $p < 0.001$) (Nairn, 2019).

A crucial component of integration is the constant dynamics and continuity in maintaining an environmental culture. To sustain this process and further motivate students, special environmental clubs were created, where monthly events were held to draw students' attention to environmental issues (Moser, 2019). The study showed that students regularly attending such clubs exhibited a higher level of environmental awareness and engagement in environmental activities compared to students who did not participate in these events (Kjell, 2011).



Fig. 3. Correlation of research data

Based on our results, we can provide several recommendations for practice. It is important to consider the psychological characteristics of students when designing environmental education programs. Additionally, it is necessary to ensure continuity in environmental education at all levels of the educational process and incorporate psychological training for teachers as part of their professional development.

4. Discussion

Let's analyze the obtained data. An important dynamic in the development of environmental awareness and concern (Table 3) is observed as the educational program progresses (Eaton, 2017). This indicates the effectiveness of integrating environmental education and underscores the importance of its continuity in shaping a "green school."

Tables 1 and 2 reveal that students' level of participation in environmental activities and their involvement in initiating environmental projects (Fiorino, 2018) increase over time. This signifies the transformation of environmental education from a theoretical concept to active practice, which is a crucial component of a "green school."

Tables 4-6 demonstrate that students successfully apply their acquired knowledge and skills in practice (Saari, 2018). It is noteworthy that the development of these skills is accompanied by an increase in environmental awareness and a decrease in environmental concern (Stickney, Skilbeck, 2020).

However, it is important to note that despite the overall positive trend in the dynamics of environmental awareness and activity, the levels of students' participation in environmental projects and their initiative in initiating such projects significantly differ (Wallace et al., 2020). This may indicate the need for an individualized approach in the implementation of environmental education and the establishment of a "green school."

The relationship between environmental awareness and activity is likely influenced by various factors, including students' age, their prior experience in environmental activities, and the characteristics of the educational program (Verlie, 2019). This emphasizes the importance of further exploring this relationship to promote environmental awareness and activity more effectively within the context of a "green school."

The observed correlation between the level of environmental concern and students' participation in environmental activities is of special interest to psychology. It suggests that despite the difficulties, students strive for active involvement in addressing environmental issues, and their motivation may be enhanced by an increase in the level of environmental concern. This represents a significant aspect that should be considered when developing environmental education programs and implementing the principles of a "green school" (Stickney, Skilbeck, 2020).

In conclusion, it is important to emphasize that all the conclusions presented here require further verification and may be refined or supplemented through subsequent research. However, we can already conclude that continuous environmental education within the framework of a "green school" contributes to the growth of students' environmental awareness and activity while reducing their level of environmental concern.

5. Conclusion

The study demonstrates the significance of continuous environmental education within the context of a "green school" – "green college". The presented data confirm the effectiveness of integrating environmental education and psychology in shaping students' active environmental stance.

There is a positive trend in the development of students' environmental awareness and their activity in initiating and participating in environmental projects. This emphasizes not only the importance of theoretical knowledge but also the practical implementation of that knowledge.

The increasing interest in environmental activities, as evidenced by the research results, indicates the formation of a positive attitude towards ecology among students and their recognition of the importance of personal involvement in addressing environmental issues. Despite the positive outcomes, attention should be paid to the disparity in students' level of participation in environmental projects and their activity in initiating such projects, highlighting the need for an individualized approach in the implementation of environmental education.

Overall, the research findings underscore the importance of further implementing the principles of a "green school" and integrating continuous environmental education into the school curriculum to support environmentally active and informed youth.

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