The role of motivation factors in education for the development of student's environmental leadership in HEIs

Serhii Rudyshyn[1], Iryna Truskavetska[2], Svitlana Romanyuk[3], Anatolii Vakal[4], Vitaliy Hnatyuk[5]

[1]Department of Theory and Methods of Teaching Natural Sciences, Faculty of Natural and Physical and Chemical Education, Oleksandr Dovzhenko Hlukhiv National Pedagogical University, Hlukhiv, Ukraine

[2]Department of Biology, Methodology and Teaching Methods, Hryhorii Skovoroda University in Pereiaslav, Pereiaslav, Ukraine

[3]Department of Pedagogy and Methodology of Primary Education, Faculty of Pedagogy, Psychology and Social Work, Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine

[4]Department of Biology and Teaching Methods of Biology, Faculty of Natural Sciences and Geography, Sumy State Pedagogical University named after A. S. Makarenko, Sumy, Ukraine

[5]Department of Biology, Health of a Person and Physical Rehabilitation, Faculty of Physical Culture, Sport and the Health of a Person, Berdyansk State Pedagogical University, Zaporizhzhia, Ukraine

Article Info

ABSTRACT

This study aimed to explore the motivational factors influencing the development of environmental leadership qualities among students in higher educational institutions (HEIs). The study used surveys based on the methods of Zhang and Nunez Alonso, the Karpenko criteria, and the methods of Chen and Semedo. The study revealed that the proposed program, designed to enhance motivation and foster environmental leadership qualities, positively impacted students' motivation. Approximately one-third of students exhibited only an elementary level of environmental culture, indicating a lack of focus on environmental protection. However, applying the proposed approach increased motivation, environmental culture, and environmental leadership among students. Furthermore, a correlation was identified between motivation factors, environmental culture, and environmental leadership qualities. Future research should explore strategies for promoting ecological behavior among students, schoolchildren, and adults.

Corresponding Author:

Serhii Rudyshyn
Department of Theory and Methods of Teaching Natural Sciences
Faculty of Natural and Physical and Chemical Education
Oleksandr Dovzhenko Hlukhiv National Pedagogical University
St. Kyiv-Moskovska, 24, Hlukhiv, 41401, Ukraine
Email: rud.prof.geo@gmail.com

1. INTRODUCTION

Global environmental pollution caused by growing production requires an immediate response from the governments and the introduction of strict environmental regulations for enterprises and their compliance [1]. The environmental leadership of the staff and the introduction of environmental innovations based on sustainable development are important for the development of any company. Not all leaders comply with environmental requirements and are in no hurry to apply green innovations, because they consider it too expensive and inefficient that will not bring them profit. Therefore, it is necessary to form an ecologically proactive method of management. Educational institutions should teach and raise generations with environmentally safe behaviour. As they are the places for introducing innovations, implementing technical transformations and social changes, they should form students' commitment to greening their behaviour and

to actions aimed at greening the behaviour of future colleagues and subordinates already at their higher educational institutions (HEIs) [2].

Graduates of educational institutions must be competitive in the conditions of constant change and development. Those who are motivated, know how to think creatively, have self-management, team-building, and communication skills find it much easier to get a job and build their career. Developing leadership qualities, which are not inferior in importance to professional ones, is an urgent task of educational institutions. HEIs must constantly respond and adapt to changing value systems, enhance students' learning motivation and academic success, and shape future sustainable development leaders [3]. Leadership qualities are among the basic 21st century skills. Moreover, leadership has a positive effect on enhancing the intrinsic motivation of employees, which contributes to expanding their opportunities and involvement in the creative fulfilment of professional tasks [4]. Environmental leaders should encourage and support the initiative of employees to preserve nature, as well as the development and implementation of environmental innovations.

There are many studies on environmental leadership in the academic literature. However, there are no studies of the influence of motivation building environmental leadership competence. Therefore, the aim of this research was to study the role of motivation factors in the development of environmental leadership on the example of students of 8 HEIs of Ukraine. The aim involved the fulfilment of the following research objectives: i) identify the factors that contribute to the growth of students' learning motivation at HEIs; ii) introduce recommendations on enhancing learning motivation and building environmental leadership among students into the educational process; and iii) establish how the level of motivation and the level of students' environmental leadership qualities have changed due to the introduced recommendations.

2. LITERATURE REVIEW

Bowser and Cid [5] argue that the unique role of environmental knowledge and other environmental sciences is underrepresented in academic institutions. There is still a low level of students' involvement in the study and practical use of knowledge in this field. The authors suggest ways to enhance students' interest in ecology and environmental conservation by conducting field practices with students and familiarizing them with environmental problems directly.

Members of society should receive environmental education aimed at forming a nature-friendly attitude towards the environment while studying at school [6]. HEIs continue to shape students' environmental consciousness [7]. They build the basis for creating a sustainable future by developing the next generation of leaders [8]. Environmental leadership [9] refers to the impact on society that motivates it to use environmental practices to achieve sustainable development goals. Research by Uaikhanova et al. [10] understand three groups of competencies by leadership abilities: hard, soft, and mixed. The first group includes, for example, the use of digital technologies, the second-time management, and the third-communication with subordinates. Competencies of the first group help to get a job, while those included in the second help to build a career [11], [12]. Leadership can be motivating or, on the contrary, toxic, cruel, and destructive [13].

Programmes and methods for developing leadership qualities among students of HEIs were developed [10]. They require a creative approach to the educational process [14]. These include, for example, experimental educational projects [10], distributed leadership [15], partnership approach [14]. Irnidayanti et al. [16] proved that the teacher's didactic behaviour depends on his/her intrinsic motivation. The higher the teacher's intrinsic motivation, the more effective the teaching practice and the better student performance.

Motivation refers to the reasons or motives that encourage the performance of certain actions to achieve the necessary goals [17], [18]. It is of three types: demotivation, extrinsic, and intrinsic motivation. Intrinsic motivation manifests a student's interest, for example, in the topic being studied, in the learning process, preparation for a future profession, etc. Extrinsic motivation is related to maintaining an interest in learning from the outside (reward or diploma, and the ability to keep in touch with friends while studying) [19].

Motivation is one of the factors influencing the improvement of student learning outcomes [6]. Vrieling-Teunter et al. [20] proposed the involvement of students in learning and teachers in teacher training groups as one of those ways. At the same time, the following motivational factors motivate students to study: independence in choosing the content of educational material; the possibility of obtaining new knowledge; acquisition of social skills; achievement of personal goals; the ability to choose partners to cooperate with; equality of all participants in the educational process.

Another method is based on the influence of the culture of the educational institution, that is, the culture of interaction of all participants in the educational process, on their learning motivation [19]. Attainability of success also affects the latter [21]. The impact of the social responsibility model on decreasing student motivation was revealed [22]. The use of active learning methods, for example, gamification [23], the use of web tools on mobile devices [24], the use of the latest technologies [25], contributes to the enhancement of student motivation.

The effectiveness of learning depends on the emotional state of students [26]. Interest, attitude, faith, and motivation to study depend on it. Brubacher and Silinda [27] showed on the example of 350 students that enjoyment of learning motivates them more than existing competencies. So, the relevance of the study of the role of motivational factors in education on the development of students' environmental leadership in HEIs is obvious.

3.   METHOD
3.1. Research design
The research was conducted in three stages. The first stage involved a preliminary assessment and diagnostics of motivation, assessment of the level of environmental culture and environmental leadership of future specialists. The second stage provided for introducing recommendations to enhance motivation and develop environmental leadership skills. The third stage involved a final assessment of motivation, the level of environmental culture and environmental leadership among the students included in the sample. The study lasted one year: from February 2021 to January 2022.

The research was carried out according to the following programme. The experimental group used scientific, systemic, value, normative, and personal-activity approaches when building environmental competence in this study. Students were introduced to the concepts of ecology and the legal framework related to environmental protection. The need for an environmentally responsible attitude towards the environment was formed in students both during professional activities, and in everyday life. The teachers were tasked to achieve positive dynamics of students achieving a high level of cognitive, motivational, activity-practical, axiological and reflective levels of environmental competence, as well as achieving a high level of environmental leadership. To effectively fulfil this task, teachers had to create conditions that would motivate students and promote their conscious assimilation of knowledge related to ecology and environmental protection and understand their importance in further professional activities. For this purpose, visits were made to ecological research stations and field camps, meetings with company leaders were organized, examples of the positive impact of environmental leadership on company profits were provided, etc. Students participated in public events aimed at preserving the environment, preventing damage and environmental pollution, environmental conferences, trainings, and excursions. Field explorations were also carried out to obtain an authentic experience of ecological research. Mobile applications and augmented reality were also used for a more detailed study of the environment. It was important to form students' ecological thinking through the development of a sense of identity and commitment to the environment. Interactive methods were the most frequently used teaching methods. For example, business and research games, cases, projects. The research topics were focused on ecology. Students also wrote essays, prepared reports and posters, and defended the research results. Besides, teachers demonstrated ecological behaviour by their own example: they did not print assignments posting them on online platforms instead. They did not use special printed notebooks for practical or laboratory work, using their digital analogues instead, used electricity and natural resources economically. The educational process was built in such a way as to motivate students to ecological behaviour aimed at the development of environmental values.

3.2. Sampling
The sample included 392 students of 8 HEIs of Ukraine: Oleksandr Dovzhenko Hlukhiv National Pedagogical University; Hryhorii Skovoroda University in Pereiaslav; Makarenko State Pedagogical University of Sumy; Yuriy Fedkovych Chernivtsi National University; Nizhyn Mykola Gogol State University; Uzhhorod National University; Shevchenko National University "Chernihiv Colehium"; and Drahomanov National Pedagogical University. The experimental group (EG) included 203 students, where the recommendations developed in this study were implemented with the purpose of enhancing students' motivation and developing their environmental leadership qualities. The control group (CG) included 189 students, who studied traditionally. Students studied at the 2nd - 4th years of HEIs. The average age was 20.3 years, the youngest participant was 18 years old, the oldest was 33 years old. A total of 21 teachers of HEIs were included in the sample. Teaching experience ranged from 7 to 29 years, with an average of 14.2 years. All teachers of the sample had an academic degree: 18-PhDs and 3-DSc. The average age of teachers was 42 years. All of them were informed about the conditions and features of the experiment. A total of 3 experts were also involved to ensure an objective and qualified assessment of the level of students' environmental competence: 2 Doctors of Biological Science and 1 Doctors of Medical Science.

3.3. Methods
The study provided for a survey to determine the motivation factors of students according to the method described in [18], and to determine the level of learning motivation in HEIs [28]. The level of students' environmental culture was determined according to criteria [29]. The experts assessed the level (elementary,

medium, sufficient or high) of motivational, axiological, cognitive, reflective and practical components of the environmental culture of students included in the sample. The level of environmental leadership competence was also determined by using the questionnaires [12], [30].

3.4. Data collection

The data were collected online using Google Forms. Students' motivation and environmental leadership were assessed on a five-point Likert scale, where 1 is "not influential", 5 is "highly influential". Mathematical data processing methods and Statistica software were used during data analysis. The Pearson correlation coefficient ranged from 2.27 to 3.03 when using the technique [19], and reached 884, with d = 320 when determining the level of motivation [28]. The ratio of χ^2 to *df* was 1.93 when determining environmental leadership [30]. The root mean squared error of approximation was 0.05, and the comparative index of conformity reached 0.9, the Cronbach's alpha coefficient was within 0.72 ÷ 0.83. Cronbach's alpha coefficient was higher -0.812 ÷ 0.962 when using the Semedo's method. Composite reliability exceeded 0.7. Overall reliability was higher than 0.76. The average variance extracted was 0.44 ÷ 0.77.

4. RESULTS

To determine the factors that influenced the students' motivation, they were asked to evaluate the influence of the motivational factors indicated in Table 1 on their willingness to study and learn new things, including those related to ecology and environmental protection. Table 1 presents the results for motivation factors determined by students. As Table 1 showed, the importance of some motivational factors changed during the study. For example, in the experimental group, the role of information obtained by students during studies on their interest in the educational process increased by 13% (by 3% in the control group). Besides, the influence of personal interest in learning on the growth of students' motivation increased by 10% (2% in CG). Factors related to professional training and professional competences were found to have a greater influence on motivation. An expert survey was conducted to determine the level of formation of students' environmental culture before and after the implementation of the experiment. The obtained results are displayed in Table 2.

Table 1. Motivational factors

Motivational factor	Before CG and EG		After	
	M	SD	CG ΔM	EG ΔM
Academic subjects	3.2	0.73	+0.2	+0.3
The information I obtain	3.1	0.69	+0.1	+0.4
The prospect of getting a good job	4.0	0.84	+0.1	+0.3
The prospect of receiving a diploma of higher education	4.3	0.66	+0.2	+0.3
Personal interest in learning	3.9	0.93	+0.1	+0.4
Interaction with classmates	3.8	1.13	+0.2	+0.4
Acknowledgment of the student's academic success by others	2.3	1.41	+0.2	+0.3
A student's sense of his/her own importance	2.2	0.78	0	+0.2
Achieving academic performance	3.1	1.04	+0.1	+0.3
More thorough preparation for future professional activity	2.7	1.19	+0.1	+0.5
The opportunity to enter the labour market in the field that you like the most	2.9	1.25	+0.1	+0.5
An opportunity to build the necessary professional competences	2.8	1.16	+0.1	+0.5
The satisfaction of learning something new	2.4	1.23	+0.1	+0.4
The satisfaction of discovering the unknown	2.6	1.18	+0.1	+0.4
The satisfaction of deepening knowledge on topics of interest	2.7	0.92	0	+0.2
The satisfaction of mastering a difficult academic activity	1.9	0.81	+0.1	+0.3
The satisfaction of seeking excellence in learning	2.1	1.07	0	+0.3
I like to share my ideas and discoveries with others	2.5	1.16	0	+0.2
The satisfaction of obtaining interesting information	2.8	1.19	+0.1	+0.4

where: M – average value; SD – standard deviation, At p < 0.05.

As Table 2 shows that 29% of students had an elementary level of interest in studying environmental issues and indifference to the environmental protection issues at the initial stage of the study. A total of 22% did not choose the need to value nature and considered themselves not involved in solving environmental problems. Moreover, 25% did not take the initiative to solve environmental problems, did not want to have academic knowledge on environmental issues. There were 31% who did not have the persistence needed to organize environmental protection, while 37% were unable to solve environmental problems in practice.

The situation changed after conducting a formative experiment during the year. Positive changes were recorded in both the control and experimental groups. In the control group, changes are due to the influence of

traditional educational activities. They ranged within 1-2%. In the experimental group, the number of students who had a high level of environmental competencies increased by 5%. Those competencies help to carry out ecological and professional interaction effectively. The number of students in the experimental group who acquired stable knowledge increased by 7%, which made them feel confident in the field of environmental protection. The number of students in the experimental group who realized their importance in preserving the environment increased by 5%. The number of students who became more responsible in making decisions about environmental protection and can predict the results of the impact of their future professional activities on the environment increased by 4%. Table 3 presents the results of the study of the state of environmental leadership among students.

Table 2. Level of environmental culture

Criteria	Elementary			Medium			Sufficient			High		
	Before	After		Before	After		Before	After		Before	After	
		CG r.	EG r.		CG r.	EG r.		CG r.	EG r.		CG r.	EG r.
Motivational	29	27	18	38	39	34	27	28	37	6	6	11
Axiological	22	21	10	36	37	31	33	33	43	9	9	16
Cognitive	25	22	11	39	40	36	32	33	44	4	5	9
Reflective	31	28	19	37	38	33	29	30	41	3	4	7
Practical	37	35	23	43	44	39	18	19	32	2	2	6

Number of students, %

Table 3. State of students' environmental leadership

Questions	Before CG and EG		After CG	After EG
	M	SD	ΔM	ΔM
When choosing a future workplace, will you pay attention to whether the organization complies with environmental standards and requirements?	1.9	0.62	0	+1.2
Do you have enough knowledge to implement preventive measures for environmental protection?	2.4	0.92	+0.1	+1.8
Are you ready to take responsibility for compliance with environmental standards and requirements?	1.6	0.43	+0.2	+2.1
Do you think it is necessary to introduce rewards to employees for their compliance with ecological behaviour?	1.2	0.49	+0.1	+3.5
Do you use social networks and other communication channels to clarify environmental issues?	1.1	0.53	0	+3.2
Are you concerned about your impact on the environment?	1.6	0.59	+0.1	+2.2
Are you interested in maintaining relationships with people who adhere to environmentally friendly behaviour?	2.7	0.89	+0.1	+1.0
Do you enjoy taking care of the environment?	1.5	0.66	0	+1.9
Do you like to encourage others to follow ecological behaviour?	1.1	0.49	0	+1.8
Do you reuse documents for drafting paper?	2.9	0.91	+0.1	+1.6
Do you sort garbage for the purpose of its re-processing?	1.3	0.52	0	+1.5
Can you identify areas in which it is still necessary to carry out environmental training of subordinates?	1.1	0.43	0	+1.2
Can you demonstrate high standards of performance in preserving the environment by your own example?	1.2	0.51	0	+0.9
Will you introduce employee rewards for innovation and environmental performance?	1.4	0.57	0	+1.1
Will realize new environmental knowledge in the workplace?	1.1	0.42	0	+1.2

where: M – average value; SD – standard deviation

The methods of mathematical data processing determined reliability, Cronbach's alpha coefficient, χ^2 and squared correlation between motivational factors and environmental culture of students, as well as between motivational factors and environmental leadership as shown in Table 4. As Table 4 shows, the reliability was sufficient. A correlation was also found between motivational factors and environmental culture and leadership of students.

Table 4. Reliability and correlation indicators

	Overall reliability	Cronbach's alpha	$\frac{\chi^2}{df}$	Correlation square
Motivational factors	0.75	0.72	1.67	0.0026
Environmental culture	0.73	0.76	2.81	0.031
Environmental leadership	0.76	0.81	1.89	0.0017

5.   DISCUSSION

This study showed that visiting research stations and field camps, participating in conferences on environmental protection issues, trainings, and working on projects on ecology. contributed to enhancing students' intrinsic motivation. They also shifted the emphasis to such motivational factors as the information that students obtain in the learning process; thorough preparation for future professional activity, which allows

students to enter the labour market in the field of interest. This, in turn, influenced the development of environmental culture and ecological behaviour of students of HEIs. The authors identified several aspects of productive pedagogical behaviour [16]: ensuring a safe and motivating atmosphere in the classroom; organising a class effectively; providing clear and understandable instructions; involvement of students in active forms of learning; using a differentiated approach. Students chose the following motivational factors: educational climate, discipline, teacher's gender, and teaching experience.

Research by Zhang *et al.* [19] found other priorities regarding motivational factors: studying together with friends, the impact of education on getting a future job, the teacher's personality, and the rating of the educational institution. One of the reasons for the differences in the results obtained in different studies is the difference in the conditions of the experiments. The experiment involving 3,354 university students showed that the type of teacher's leadership depends on students' motivation and their academic success [17]. It is also worth noting that learning outcomes correlate with teaching experience, age, gender, and level of teacher's education [31].

The approach used in this work demonstrated a positive result for building students' environmental leadership. During a year of pedagogical formative experiment, they learned to determine ways of achieving environmental goals and implement them in future professional activities. They are also ready to encourage colleagues and subordinates to protect the environment. This has certain advantages, as confirmed by previous studies. The model of the universal effect of the connection of environmental leadership, environmental innovations and company productivity was used in that case. Observance of environmental norms by the organization increases its image, provides competitive advantages in obtaining state resources, cooperation and growth in demand for ecological goods [32].

- Research limitations

This study had a limitation: the students of the sample studied in non-environmental majors. There was no comparison of the results obtained in this work with the environmental leadership skills acquired by students of environment-related majors during their studies at HEIs. We suggest understanding the leader's ecological culture as a "code of conduct" in the company and the environment. Ecological culture is characterized by a system of ecological knowledge, values, actions, and behaviour, which are aimed at achieving sustainable development goals. These are: decent work and economic growth; innovation and infrastructure; sustainable development of cities and communities; responsible consumption and production; mitigating the consequences of climate change; preservation of health and well-being; protection and restoration of ecosystems; partnership for sustainable development. The ability to understand and implement the sustainable development strategy in professional activity and social life should be included in the curricula for students of all majors in the GCs (general competences) category.

6. CONCLUSION

This study revealed the positive dynamics of the impact of active learning on the enhancement of students' intrinsic motivation. The relationship between motivational factors, the environmental culture and the development of environmental leadership skills among students of HEIs was also established. The most influential motivational factors were the opportunity to build professional competences and enter the labour market according to the field of interest. The growth of motivation contributes to the increasing environmental knowledge and competences to show environmental initiative and encourage others to ecological behaviour. The results of this study can be useful for teachers and ecologists who seek ways to improve the environmental culture of society, and work on the environmental leadership issue. Further research should focus on the ways of transferring environmental knowledge, as well as solving the issue of environmental education and environmental leadership not only among students of HEIs, but also among postgraduates and lifelong learners. It is also important to spread the model of ecological behaviour to all population groups and achieve its manifestations in professional activities and everyday life.

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BIOGRAPHIES OF AUTHORS

Serhii Rudyshyn is a Doctor of Pedagogical Sciences, Professor, Department of Theory and Methods of Teaching Natural Sciences, Faculty of Natural and Physical and Chemical Education, Oleksandr Dovzhenko Hlukhiv National Pedagogical University, Hlukhiv, Ukraine. Corresponding Author. He can be contacted at email: rud.prof.geo@gmail.com.

Iryna Truskavetska ia a Ph.D. in Historical Sciences, Associate Professor, Department of Biology, Methodology and Teaching Methods, Hryhorii Skovoroda University in Pereiaslav, Pereiaslav, Ukraine. She can be contacted at email: lingnlinguistic@gmail.com.

Svitlana Romanyuk is a Doctor of Pedagogical Sciences, Professor, Department of Pedagogy and Methodology of Primary Education, Faculty of Pedagogy, Psychology and Social Work, Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine. She can be contacted at email: teachers29420@gmail.com.

Anatolii Vakal is an Ph.D. of Biological Sciences, Associate Professor, Department of Biology and Teaching Methods of Biology, Faculty of Natural Sciences and Geography, Sumy State Pedagogical University named after A. S. Makarenko, Sumy, Ukraine. He can be contacted at email: liplotn@yahoo.com.

Vitaliy Hnatyuk is a Ph.D. in Biology, Associate Professor, Department of Biology, Health of a Person and Physical Rehabilitation, Faculty of Physical Culture, Sport and the Health of a Person, Berdyansk State Pedagogical University, Zaporizhzhia, Ukraine. He can be contacted at email: oxieducation@gmail.com.