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THE EFFECT OF THE FORM AND LEVEL OF STUDY ON THE TYPE OF PRO-ENVIRONMENTAL ACTIONS TAKEN BY STUDENTS OF HIGHER EDUCATION INSTITUTIONS IN POLAND

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Purpose: The study was conducted to assess the influence of the form and level of study on the type of pro-environmental activities undertaken by university students in Poland.
Design/methodology/approach: The study used a proprietary survey questionnaire consisting of 16 mixed questions. Surveys were collected electronically via the Interankiety.pl online platform between January and March 2023.
Findings: The form and level of study are of little importance to the rationale of tertiary students in Poland when taking pro-environmental actions. Non-stationary students are more likely to be persuaded to take the actions by potential reductions in living costs, while second-level students are more likely to be encouraged to take these actions by caring for their surroundings and the environment.
Research limitations/implications: The research presented in this article has some limitations. Firstly, it was conducted only in Poland, and secondly, only selected pro-environmental measures were taken into account.
Practical implications: Demonstrate the importance of eco-innovation, including its division into product, process and organisational, in the process of creating environmental awareness among students of higher education institutions in Poland.
Social implications: The results of the research should lead universities and state institutions to intensify their various environmental activities.
Originality/value: Evaluation of the influence of the form and level of studies on the type of environmental activities undertaken by university students in Poland.

Keywords: environmental awareness, environmental education, environmental action, ecology, eco-innovation.

Category of the paper: Research paper.

1. Introduction

A domain of today's continuously developing society, there is a very visible trend towards environmental protection. Undoubtedly, the growing environmental awareness of urban and rural residents, which creates the so-called environmental sensitivity of both social groups and individuals, contributes to this (Omoogun et al., 2016). Ecological awareness (Güven, Uyulgan, 2021; Grodzinska-Jurczak, 2000) is understood as "an understanding of the threats posed by the poor state of the environment and the role of the anthropogenic factor in shaping it" (Matel, 2016, p. 57), ecological awareness is not only knowledge of the environment, but first and foremost recognition of the environment as a value and active actions for its protection (Tuszyska, 2017). Improving environmental awareness and sensitivity will help people live in a healthier and safer environment, which is only possible through environmental education (Cetin, Nisanci, 2010).

There are many concepts that refer to environmental improvement. When considering some of them, it is worth noting the so-called futurological vision, whose creator is A. Toffler. He puts forward a very promising forecast for the future that "with the development of an information-based civilisation, ethics will change - it will be the so-called prosumer ethics, which means that man will reject the ethic of getting rich characteristic of the industrial formation, while personal, intellectual, and spiritual values will become important. Thus, human attitudes will become more eco-ethical" (Bugiel, 2002, p. 73).

A. Kuzior, on the other hand, believes that on the basis of two sciences: ecophilosophy and systematic sozology, the socioeconomic and ecological order indicated in the concept of sustainable development can be created (Kuzior, 2007).

Analysing the above trends, one can undoubtedly conclude that the concept of Corporate Social Responsibility is becoming a derivative of them (Wolniak, 2016). One of its key demands is to care for the environment (Sánchez-Torné et al., 2020) by initiating diverse activities that improve its quality, control environmental issues (shaping pro-environmental attitudes of employees). It should not be forgotten that financial benefits are not in all cases the motivation for implementing the concept of Social Responsibility (Jha, Cox, 2015). It is also worth emphasising that pro-environmental attitudes should be shaped not only in the work environment, but at a much earlier stage, before a person enters adulthood. A favourable tool for achieving this goal will be the already mentioned, multifaceted environmental education, which includes diverse forms and encourages innovation. Attention must be paid to the complexity of this process (Ober, 2022), prompting reflection and subsequent effective pro-environmental action.

Referring to the above considerations, the main objective of the study presented in this paper is to assess the impact of the form and level of study on the type of pro-environmental activities undertaken by university students in Poland. The study hypothesises that the form and level of

study differentiate the rationale of university students in Poland when taking pro-environmental actions. The study used a proprietary survey questionnaire consisting of 16 mixed questions. Surveys were collected electronically via the Interankiety.pl online platform between January and March 2023.

The structure of the remainder of the article begins with a review of the literature on environmental education, followed by a characterisation of selected activities that foster environmental protection. This is followed by a description of the methodology used in this study and the results of the analysis and discussion. Finally, conclusions are presented from a scientific and practical point of view.

2. Theoretical background

The literature offers a diverse approach to environmental education (Juzefovi, 2015). It can be defined as 'preparation for participation in response to the global environmental crisis, including the problem of climate change" (Kozlowska, 2021, p. 130). An interesting approach to this issue is presented by H. Sommer and G. Zakrzewski, who believe that "environmental education should not only be implemented through the institutionalised introduction of further subjects in this area, but should also find expression in a programme of unconventional yet effective activities addressed to individual communities" (Sommer, Zakrzewski, 2017, p. 271). Experts emphasise that this concept can be equated with education for sustainable development (Kuzior, 2014) or climate education (Pihkala, 2020). As mentioned earlier, environmental education leads to the creation of pro-environmental attitudes in society and the taking of specific actions to protect the environment. These can include: the use of alternative energy sources (Kuziemska et al., 2015; Gajdzik et al., 2023), the use of alternative and/or environmentally friendly forms of transport (Paziak, Szymaska, 2019), saving of available resources sources energy (Ysik, 2016; Kalda, Fornagiel, 2014), saving of available water resources (Rumianowska, 2013), using modern and energy efficient lighting (Bialoń, Wener, 2015), using rainwater (Bąk, Królikowska, 2016), buying second-hand items (Wilczak, 2019) or repairing damaged electronic equipment (Kubala, Stelmach, 2023). The conscious implementation of these measures will undoubtedly improve the quality of the environment, protecting society from climate catastrophe.

3. Materials and Methods

The study was conducted to assess the influence of the form and level of study on the type of pro-environmental activities undertaken by university students in Poland. The following research questions were formulated:

- Is the uptake of any pro-environmental activities by university students in Poland dependent on the form and/or level of their studies?
- Does the form and/or level of study have an impact on the type of pro-environmental activities undertaken by students at higher education institutions in Poland?
- Does the form and/or level of study make a difference in the rationale of tertiary students in Poland in taking pro-environmental action?
- Do the opinions of students at higher education institutions in Poland on the pro-environmental measures needed to be taken by state institutions and their home university in the near future depend on the form and/or level of their studies?
- Is the assessment of tertiary students in Poland regarding the impact of particular eco-innovations on creating environmental awareness linked to the form and/or level of their studies?
- Does the form and/or level of study influence university students' assessment of the level of environmental awareness in Poland?

The study used a proprietary survey questionnaire consisting of 16 mixed questions. The questionnaires were collected electronically via the Interankiety.pl online platform between January and March 2023. The main focus of this statistical analysis was eco-innovation and the evaluation of its impact on the type of pro-environmental behaviour undertaken in terms of the form and level of study of university students in Poland.

The following statistical methods were used during the analysis: the Shapiro-Wilk test, the Mann-Whitney U test and Pearson's χ^2 test of independence.

The survey was conducted among 1,000 students, including 598 men (59.80%), 376 women (37.60%), and 26 persons of the other sex (2.60%). The majority of students surveyed were studying stationary (69.10%); nearly one in three respondents were studying non-stationary (30.90%). The majority of respondents were in first-degree studies (81.10%); nearly one in five survey participants were in second-degree studies (18.90%).

4. Results and Discussion

4.1. Influence of form and level of study on taking any environmental action

The undertaking of any environmental activities by the students surveyed was not dependent on their form of study. The vast majority of respondents, both stationary and non-stationary students, performed environmental protection activities, with a slightly higher percentage of the former group (82.20% and 78.96%, respectively). However, this difference was not statistically significant, as shown by analysis with Pearson's χ^2 test: χ^2 (1) = 1.46; p = 0.226; φ = 0.038.

In contrast, the level of study was important for the students surveyed to engage in any pro-environmental activities. Although both first- and second-level students overwhelmingly performed the above-mentioned activities, the percentage of such cases was lower in the former group (80.02% and 86.24%, respectively). The difference observed was found to be statistically significant, as determined by the results of the analysis with Pearson's χ^2 test: χ^2 (1) = 3.88; p < 0.05; φ = -0.062 (Table 1).

Table 1.
Relationship between the level of study and their taking any environmental action

		Level of study				X^2 test	φ
		1st degree (n = 811)		2nd degree (n = 189)			
		n	%	n	%		
Taking any environmental action	Yes	649	80.02%	163	86.24%	χ^2 (1) = 3.88; p < 0.05	-0.062

Source: own elaboration.

4.2. Influence of the form and level of study on the type of environmental action taken

Some of the pro-environmental actions taken by the students surveyed were significantly related to their form of study. It turned out that stationary students were more likely than non-stationary students to use alternative and/or environmentally friendly forms of transport (37.50% and 21.72% respectively); and less likely to use modern and energy-efficient lighting (61.80% and 70.08%, respectively). These differences reached statistical significance, as found in the results of the analysis with Pearson's χ^2 test, both for the use of alternative and/or green forms of transport: χ^2 (1) = 19.29; p < 0.001; φ = 0.154; and the use of modern and energy-efficient lighting: χ^2 (1) = 5.1; p < 0.05; φ = -0.079.

The remaining pro-environmental activities did not differ significantly in terms of their uptake between stationary and non-stationary students. In the former group, alternative energy sources were used almost as often as in the latter (34.51% and 35.25% respectively); available energy and/or water resources were saved slightly less often (61.62% and 68.44% respectively), second-hand items were purchased (45.42% and 51.23% respectively) and damaged electronic equipment was repaired (47.71% and 50.41% respectively); and rainwater was used more often

(41.55% and 37.70% respectively). However, the differences observed between the two groups proved to be insignificant. As the analysis with Pearson's χ^2 test showed, there was no statistically significant relationship between the form of study of the respondents and the type of environmental activities they conducted, such as the use of alternative energy sources: χ^2 (1) = 0.04; p = 0.839; φ = -0.007; saving available energy and/or water resources: χ^2 (1) = 3.43; p < 0.064; φ = -0.065; using rainwater: χ^2 (1) = 1.05; p = 0.306; φ = 0.036; buying second hand items: χ^2 (1) = 2.31; p = 0.129; φ = -0.053; and repairing broken electronic equipment: χ^2 (1) = 0.5; p = 0.481; φ = -0.025 (Table 2).

Table 2.
Relationship between the form of study and the type of environmental activities they undertake

Type of environmental action taken		Form of study				X^2 test	φ
		Stationary (n = 568)		Non-stationary (n = 244)			
		n	%	n	%		
Use of alternative energy sources	**Yes**	196	34.51%	86	35.25%	χ^2 (1) = 0.04; p = 0.839	-0.007
	Not	372	65.49%	158	64.75%		
Use of alternative and/or environmentally friendly forms of transport	**Yes**	213	37.50%	53	21.72%	χ^2 (1) = 19.29; p < 0.001	0.154
	Not	355	62.50%	191	78.28%		
Saving available energy and/or water resources	**Yes**	350	61.62%	167	68.44%	χ^2 (1) = 3.43; p < 0.064	-0.065
	Not	218	38.38%	77	31.56%		
Use of modern and energy-efficient lighting	**Yes**	351	61.80%	171	70.08%	χ^2 (1) = 5.1; p < 0.05	-0.079
	Not	217	38.20%	73	29.92%		
Use of rainwater	**Yes**	236	41.55%	92	37.70%	χ^2 (1) = 1.05; p = 0.306	0.036
	Not	332	58.45%	152	62.30%		
Buying second-hand items	**Yes**	258	45.42%	125	51.23%	χ^2 (1) = 2.31; p = 0.129	-0.053
	Not	310	54.58%	119	48.77%		
Repair of damaged electronic equipment	**Yes**	271	47.71%	123	50.41%	χ^2 (1) = 0.5; p = 0.481	-0.025
	Not	297	52.29%	121	49.59%		

Source: own elaboration.

The level of study of the students surveyed also influenced some of the environmental actions they took. First-degree students were more likely than second-degree students to use alternative energy sources (36.67% and 26.99%, respectively); and less likely to conserve available energy and/or water resources (61.33% and 73.01%, respectively), buy second-hand items (45.15% and 55.21%, respectively), and repair damaged electronic equipment (46.07% and 58.28%, respectively). Based on the results of the analysis with Pearson's χ^2 test, the above differences were considered statistically significant, both in terms of the use of alternative energy sources: χ^2 (1) = 5.38; p < 0.05; φ = 0.081; Saving available resources of energy sources and/or water: χ^2 (1) = 7.68; p < 0.01; φ = -0.097; buying second-hand items: χ^2 (1) = 5.3; p < 0.05; φ = -0.081; as well as repair damaged electronic equipment: χ^2 (1) = 7.78; p < 0.01; φ = -0.098.

For the other pro-environmental actions taken by the students surveyed, there was no significant relationship with their level of study. It appeared that first- and second-level students were similarly likely to undertake the other activities, with the former group having

a slightly higher proportion of those using alternative and/or environmentally friendly forms of transport (33.28% and 30.67%, respectively); and a lower proportion of those using modern and energy-efficient lighting (63.79% and 66.26%, respectively) and using rainwater (40.06% and 41.72%, respectively). Analysis using Pearson's χ^2 test showed that there were no statistically significant differences between the two groups in terms of both the use of alternative and/or environmentally friendly forms of transport: χ^2 (1) = 0.4; p = 0.526; φ = 0.022; use of modern and energy-efficient lighting: χ^2 (1) = 0.35; p = 0.557; φ = -0.021; as well as the use of rainwater: χ^2 (1) = 0.15; p = 0.7; φ = -0.014.

4.3. Influence of the form and level of study on the extent to which individual prerequisites encourage environmental action

The degree to which respondents were encouraged to take pro-environmental action by the issue of reducing the cost of living differed between stationary and non-stationary students. It turned out that in the former group, cost-of-living reduction was less likely to encourage the above-mentioned activities ($M_{Stationary}$ = 3.93; $SD_{Stationary}$ = 0.91 and $M_{Non\text{-}stationary}$ = 4.06; $SD_{Non\text{-}stationary}$ = 0.91). This difference was statistically significant, as shown by analysis with the Mann-Whitney U test: Z = -2; p < 0.05; r_g = -0.09.

The form of study of the respondents, in turn, did not significantly differentiate the degree to which they were prompted to take pro-environmental action for other reasons. Following an ecological trend was such a rationale for stationary and non-stationary students at the same level ($M_{Stationary}$ = 2.49; $SD_{Stationary}$ = 1.11 and $M_{Non\text{-}stationary}$ = 2.49; $SD_{Non\text{-}stationary}$ = 1.19). Slightly greater differences between the two groups were reported for concern for the environment and surroundings ($M_{Stationary}$ = 3.75; $SD_{Stationary}$ = 0.9 and $M_{Non\text{-}stationary}$ = 3.79; $SD_{Non\text{-}stationary}$ = 0.94), concern for the health of oneself, family, and loved ones ($M_{Stationary}$ = 4.19; $SD_{Stationary}$ = 0.85 and $M_{Non\text{-}stationary}$ = 4.2; $SD_{Non\text{-}stationary}$ = 0.85), concern about creating a deficit in available resources ($M_{Stationary}$ = 3.42; $SD_{Stationary}$ = 1.01 and $M_{Non\text{-}stationary}$ = 3.43; $SD_{Non\text{-}stationary}$ = 1.07), and the desire to improve quality of life ($M_{Stationary}$ = 3.95; $SD_{Stationary}$ = 0.94 and $M_{Non\text{-}stationary}$ = 3.97; $SD_{Non\text{-}stationary}$ = 0.96); in each case a higher degree among non-stationary students. The results of the analysis with the Mann-Whitney U-test indicate that there were no statistically significant differences between the two groups in terms of the degree of encouragement to take pro-environmental actions by premises such as caring for the surroundings and the environment. Z = -0.91; p = 0.36; r_g = -0.04; Concern for the health of oneself, family and loved ones: Z = -0.19; p = 0.851; r_g = -0.01; concern for creating a deficit in available resources: Z = -0.27; p = 0.79; r_g = -0.01; desire to increase quality of life: Z = -0.36; p = 0.715; r_g = -0.02 and following the trend of ecology: Z= -0.07; p = 0.946; r_g = 0 (Table 3).

Table 3.
Relationship between respondents' form of study and the degree to which they were encouraged by particular premises to take pro-environmental action

	Form of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standing dev.	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error.		
					-95.00%	+95.00%			
Caring for the surroundings and the environment	**Stationary (n = 568)**	3.75 ± 0.9	4 [3-4]	1-5	3.68	3.83	0.04	Z = -0.91; p = 0.36	-0.04
	Non-stationary (n = 244)	3.79 ± 0.94	4 [3-4]	1-5	3.67	3.91	0.06		
Taking care of yourself, your family and your loved ones	**Stationary (n = 568)**	4.19 ± 0.85	4 [4-5]	1-5	4.12	4.26	0.04	Z = -0.19; p = 0.851	-0.01
	Non-stationary (n = 244)	4.2 ± 0.85	4 [4-5]	1-5	4.09	4.31	0.05		
Concern for the creation of a deficit in available resources	**Stationary (n = 568)**	3.42 ± 1.01	3 [3-4]	1-5	3.33	3.50	0.04	Z = -0.27; p = 0.79	-0.01
	Non-stationary (n = 244)	3.43 ± 1.07	3.5 [3-4]	1-5	3.29	3.56	0.07		
Reduction in maintenance costs	**Stationary (n = 568)**	3.93 ± 0.91	4 [3-5]	1-5	3.85	4.00	0.04	Z = -2; p < 0.05	-0.09
	Non-stationary (n = 244)	4.06 ± 0.91	4 [4-5]	1-5	3.95	4.18	0.06		
Willingness to improve quality of life	**Stationary (n = 568)**	3.95 ± 0.94	4 [3-5]	1-5	3.88	4.03	0.04	Z = -0.36; p = 0.715	-0.02
	Non-stationary (n = 244)	3.97 ± 0.96	4 [3-5]	1-5	3.85	4.09	0.06		
Keeping up with the green trend	**Stationary (n = 568)**	2.49 ± 1.11	2 [2-3]	1-5	2.39	2.58	0.05	Z = -0.07; p = 0.946	0.00
	Non-stationary (n = 244)	2.49 ± 1.19	2.5 [1 - 3]	1-5	2.34	2.64	0.08		

Source: own elaboration.

The level of study differentiated the degree of encouragement of pro-environmental actions by also one premise, in this case care for the surroundings and the environment. It turned out that first-degree students were less likely than second-degree students to take pro-environmental actions under the influence of the aforementioned premise ($M_{1\ degree} = 3.72$; $SD_{1\ degree} = 0.92$ and $M_{2\ degree} = 3.94$; $SD_{2\ degree} = 0.87$). Based on the results of the analysis with the Mann-Whitney U test, the above difference was considered statistically significant. $Z = -2.55$; $p < 0.05$; $r_g = -0.13$.

The other rationales similarly encouraged the students surveyed to take pro-environmental actions, regardless of their level of study. First-degree students were slightly less likely than second-degree students to be driven by concern for the health of themselves, family and loved ones ($M_{1\ degree} = 4.16$; $SD_{1\ degree} = 0.87$ and $M_{2\ degree} = 4.32$; $SD_{2\ degree} = 0.74$), concern for creating a deficit in available resources ($M_{1\ degree} = 3.41$; $SD_{1\ degree} = 1.02$ and $M_{2\ degree} = 3.45$;

$SD_{2\ degree}$ = 1.05) and reducing the cost of living ($M_{1\ degree}$ = 3.95; $SD_{1\ degree}$ = 0.92 and $M_{2\ degree}$ = 4.05; $SD_{2\ degree}$ = 0.87); and more so the desire to increase quality of life ($M_{1\ degree}$ = 3.97; $SD_{1\ degree}$ = 0.95 and $M_{2\ degree}$ = 3.91; $SD_{2\ degree}$ = 0.91) and following the trend of ecology ($M_{1\ degree}$ = 2.49; $SD_{1\ degree}$ = 1.14 and $M_{2\ degree}$ = 2.47; $SD_{2\ degree}$ = 1.12). These differences were found to be statistically insignificant, in terms of the degree of encouragement of ecological activities by both concern for the health of oneself, family and loved ones: Z = -1.67; $p < 0.094$; r_g = -0.08; concern about creating a deficit in available resources: Z = -0.58; p = 0.559; r_g = -0.03; reducing the cost of living: Z = -1.17; p = 0.24; r_g = -0.06; desire to improve quality of life: Z = 0.88; p = 0.377; r_g = 0.04; as well as following the ecology trend: Z = 0.36; p = 0.716; r_g = 0.02.

4.4. Influence of the form and level of study on opinions about the environmental measures needed to be taken by state institutions and the home university in the near future

Opinions differed between stationary and non-stationary students on the two environmental measures needed to be taken by state institutions in the near future. The former group attributed greater importance to the expansion of the clean transport zone ($M_{Stationary}$ = 3.41; $SD_{Stationary}$ = 1.16 and $M_{Non\text{-}stationary}$ = 3.02; $SD_{Non\text{-}stationary}$ = 1.3) and the elimination of pollution emission sources ($M_{Stationary}$ = 3.96; $SD_{Stationary}$ = 1.01 and $M_{Non\text{-}stationary}$ = 3.69; $SD_{Non\text{-}stationary}$ = 1.18). Analysis with the Mann-Whitney U-test showed that the differences recorded were statistically significant, both in terms of opinion on the extension of the clean transport zone: Z = 4.12; $p < 0.001$; r_g = 0.16; and opinions on the elimination of emission sources: Z = 3.03; $p < 0.01$; r_g = 0.12.

The form of study of the respondents was not important for their assessment of the importance of other pro-environmental measures to be taken by state institutions in the near future. Stationary students attributed less importance than non-stationary students to the creation of new cycle paths ($M_{Stationary}$ = 3.57; $SD_{Stationary}$ = 1.12 and $M_{Non\text{-}stationary}$ = 3.59; $SD_{Non\text{-}stationary}$ = 1.19); and more importance to the creation of cycle parking facilities ($M_{Stationary}$ = 3.14; $SD_{Stationary}$ = 1.14 and $M_{Non\text{-}stationary}$ = 3.09; $SD_{Non\text{-}stationary}$ = 1.23), increasing subsidies for the purchase of various environmentally friendly solutions ($M_{Stationary}$ = 3.69; $SD_{Stationary}$ = 1.09 and $M_{Non\text{-}stationary}$ = 3.66; $SD_{Non\text{-}stationary}$ = 1.21), promoting environmentally friendly solutions to a greater extent ($M_{Stationary}$ = 3.51; $SD_{Stationary}$ = 1.02 and $M_{Non\text{-}stationary}$ = 3.46;$SD_{Non\text{-}stationary}$= 1.14) and supporting the implementation of eco-innovations ($M_{Stationary}$ = 3.7; $SD_{Stationary}$ = 0.95 and $M_{Non\text{-}stationary}$ = 3.62; $SD_{Non\text{-}stationary}$ = 1.04). The differences found were considered, based on the results of the Mann-Whitney U-test analysis, to be statistically insignificant, both with regard to the creation of new cycle paths: Z = -0.59; p = 0.558; r_g = -0.02; Creation of parking facilities for cyclists: Z = 0.27; p = 0.784; r_g = 0.01; increase in subsidies for the purchase of various environmental solutions: Z = -0.07; p = 0.948; r_g = 0; Promoting eco-friendly solutions more widely: Z = 0.42; p = 0.675; r_g = 0.02; as well as supporting the implementation of eco-innovations: Z = 1.03; p = 0.302; r_g = 0.04 (Table 4).

Table 4.
Relationship between the form of study of the respondents and their opinions on the pro-environmental measures that state institutions in the near future

	Form of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standard deviation	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error.		
					-95.00%	+95.00 %			
Extension of the Clean Transport Zone	**Stationary (n = 691)**	3.41 ± 1.16	3 [3-4]	1-5	3.32	3.50	0.04	Z = 4.12; p < 0.001	0.16
	Non-stationary (n = 309)	3.02 ± 1.3	3 [2-4]	1-5	2.88	3.17	0.07		
Creation of new cycle paths	**Stationary (n = 691)**	3.57 ± 1.12	4 [3-4]	1-5	3.49	3.65	0.04	Z = -0.59; p = 0.558	-0.02
	Non-stationary (n = 309)	3.59 ± 1.19	4 [3-5]	1-5	3.46	3.73	0.07		
Creation of parking facilities for cyclists	**Stationary (n = 691)**	3.14 ± 1.14	3 [2-4]	1-5	3.05	3.22	0.04	Z = 0.27; p = 0.784	0.01
	Non-stationary (n = 309)	3.09 ± 1.23	3 [2-4]	1-5	2.96	3.23	0.07		
Increase in subsidies for the purchase of various environmental solutions	**Stationary (n = 691)**	3.69 ± 1.09	4 [3-5]	1-5	3.61	3.78	0.04	Z = -0.07; p = 0.948	0.00
	Non-stationary (n = 309)	3.66 ± 1.21	4 [3-5]	1-5	3.52	3.80	0.07		
Promoting more environmentally friendly solutions	**Stationary (n = 691)**	3.51 ± 1.02	4 [3-4]	1-5	3.44	3.59	0.04	Z = 0.42; p = 0.675	0.02
	Non-stationary (n = 309)	3.46 ± 1.14	4 [3-4]	1-5	3.34	3.59	0.06		
Eliminating sources of pollutant emissions	**Stationary (n = 691)**	3.96 ± 1.01	4 [3-5]	1-5	3.89	4.04	0.04	Z = 3.03; p < 0.01	0.12
	Non-stationary (n = 309)	3.69 ± 1.18	4 [3-5]	1-5	3.56	3.82	0.07		
Supporting the implementation of eco-innovation	**Stationary (n = 691)**	3.7 ± 0.95	4 [3-4]	1-5	3.63	3.77	0.04	Z = 1.03; p = 0.302	0.04
	Non-stationary (n = 309)	3.62 ± 1.04	4 [3-4]	1-5	3.51	3.74	0.06		

Source: own elaboration.

However, among the pro-environmental measures that the home university in the near future, stationary and non-stationary students differed significantly in their assessment of the importance of greening the University. It turned out that in the former group, the issue of greening the University was considered more important than among non-stationary students ($M_{Stationary}$ = 3.93; $SD_{Stationary}$ = 1.07 and $M_{Non\text{-}stationary}$ = 3.73; $SD_{Non\text{-}stationary}$ = 1.12). This difference was statistically significant, as shown by analysis with the Mann-Whitney U test: Z = 2.64; p < 0.01; r_g = 0.1.

The other activities to be undertaken by the home university in the near future were rated similarly by the respondents, regardless of the form of study. Stationary and non-stationary students rated the relevance of activities in the form of organising conferences and/or symposia to publicise and promote pro-environmental activities the same or almost the same ($M_{Stationary}$ = 2.79; $SD_{Stationary}$ = 1.01 and $M_{Non\text{-}stationary}$ = 2.79; $SD_{Non\text{-}stationary}$ = 1.07), organising competitions for the best pro-environmental solutions ($M_{Stationary}$ = 3.29; $SD_{Stationary}$ = 1.05 and $M_{Non\text{-}stationary}$ = 3.28; $SD_{Non\text{-}stationary}$ = 1.1) and promoting waste separation and resource saving ($M_{Stationary}$ = 3.9; $SD_{Stationary}$ = 1.01 and $M_{Non\text{-}stationary}$ = 3.89; $SD_{Non\text{-}stationary}$ = 1.08). Slightly greater differences, in favour of the former group, were found when assessing the relevance of activities involving support for environmentally friendly projects ($M_{Stationary}$ = 3.88; $SD_{Stationary}$ = 0.96 and $M_{Non\text{-}stationary}$ = 3.83; $SD_{Non\text{-}stationary}$ = 1.02), promotion of healthy lifestyles and nutrition ($M_{Stationary}$ = 3.72; $SD_{Stationary}$ = 1.1 and $M_{Non\text{-}stationary}$ = 3.68; $SD_{Non\text{-}stationary}$ = 1.06) and the inclusion of education in the area of sustainability in all fields and levels of study ($M_{Stationary}$ = 3.34; $SD_{Stationary}$ = 1.09 and $M_{Non\text{-}stationary}$ = 3.3; $SD_{Non\text{-}stationary}$ = 1.16). As shown by the Mann-Whitney U test analysis, the respondents' form of study did not significantly differentiate their assessment of the relevance of the pro-environmental activities needed to be undertaken by their home university in the near future, such as organising conferences and/or symposia to publicise and promote pro-environmental activities: Z = -0.09; p = 0.928; r_g = 0; organising competitions for best pro-environmental solutions: Z = 0.11; p = 0.909; r_g = 0; Supporting environmentally friendly projects: Z = 0.38; p = 0.704; r_g = 0.02; promoting healthy living and eating: Z = 0.79; p = 0.432; r_g = 0.03; promoting waste separation and resource conservation: Z = -0.34; p = 0.734; r_g = -0.01; and mainstreaming education in the area of sustainability in all fields and levels of study: Z = 0.35; p = 0.726; r_g = 0.01 (Table 5).

Table 5.

Relationship between the form of study and their opinions on the environmental measures that their home university in the near future

	Form of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standing dev.	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error.		
					-95.00%	+95.00%			
Organising conferences and/or symposia to publicise and promote environmental activities	**Stationary (n = 691)**	2.79 ± 1.01	3 [2-3]	1-5	2.71	2.86	0.04	Z = -0.09; p = 0.928	0.00
	Non-stationary (n = 309)	2.79 ± 1.07	3 [2-4]	1-5	2.67	2.91	0.06		
Organising competitions for the best environmental solutions	**Stationary (n = 691)**	3.29 ± 1.05	3 [3-4]	1-5	3.22	3.37	0.04	Z = 0.11; p = 0.909	0.00
	Non-stationary (n = 309)	3.28 ± 1.1	3 [3-4]	1-5	3.15	3.40	0.06		

Cont. table 5.

Supporting environmentally friendly projects	**Stationary (n = 691)**	3.88 ± 0.96	4 [3-5]	1-5	3.81	3.95	0.04	Z = 0.38; p = 0.704	0.02
	Non-stationary (n = 309)	3.83 ± 1.02	4 [3-5]	1-5	3.72	3.95	0.06		
Promoting a healthy lifestyle and diet	**Stationary (n = 691)**	3.72 ± 1.1	4 [3-5]	1-5	3.63	3.80	0.04	Z = 0.79; p = 0.432	0.03
	Non-stationary (n = 309)	3.68 ± 1.06	4 [3-4]	1-5	3.56	3.79	0.06		
Promoting waste separation and resource conservation	**Stationary (n = 691)**	3.9 ± 1.01	4 [3-5]	1-5	3.83	3.98	0.04	Z = -0.34; p = 0.734	-0.01
	Non-stationary (n = 309)	3.89 ± 1.08	4 [3-5]	1-5	3.77	4.01	0.06		
Integration of education for sustainable development in all fields and levels of study	**Stationary (n = 691)**	3.34 ± 1.09	3 [3-4]	1-5	3.26	3.42	0.04	Z = 0.35; p = 0.726	0.01
	Non-stationary (n = 309)	3.3 ± 1.16	3 [3-4]	1-5	3.17	3.43	0.07		
Greening the University	**Stationary (n = 691)**	3.93 ± 1.07	4 [3-5]	1-5	3.85	4.01	0.04	Z = 2.64; p < 0.01	0.10
	Non-stationary (n = 309)	3.73 ± 1.12	4 [3-5]	1-5	3.60	3.85	0.06		

Source: own elaboration.

The evaluation of some environmental measures in terms of the necessity for state institutions to undertake them in the near future differed among first and second degree students. In the former group, the importance of measures involving the creation of new cycling paths was less highly ($M_{1\ degree} = 3.54$; $SD_{1\ degree} = 1.14$ and $M_{2\ degree} = 3.75$; $SD_{2\ degree} = 1.13$), bike parking facilities for cyclists ($M_{1\ degree} = 3.08$; $SD_{1\ degree} = 1.16$ and $M_{2\ degree} = 3.33$; $SD_{2\ degree} = 1.16$), increased subsidies for the purchase of various environmental solutions ($M_{1\ degree} = 3.65$; $SD_{1\ degree} = 1.13$ and $M_{2\ degree} = 3.84$; $SD_{2\ degree} = 1.1$) and support the implementation of eco-innovations ($M_{1\ degree} = 3.64$; $SD_{1\ degree} = 0.97$ and $M_{2\ degree} = 3.82$; $SD_{2\ degree} = 1$). The differences found between the two groups were considered, based on the results of the analysis with the Mann-Whitney U test, to be statistically significant, in terms of opinion regarding both the creation of new cycle paths: $Z = -2.46$; $p < 0.05$; $r_g = -0.11$; Creation of parking facilities for cyclists: $Z = -2.76$; $p < 0.01$; $r_g = -0.13$; Increased subsidies for the purchase of various environmentally friendly solutions: $Z = -2.12$; $p < 0.05$; $r_g = -0.1$; as well as supporting the implementation of ecoinnovations: $Z = -2.32$; $p < 0.05$; $r_g = -0.11$.

However, the level of study was not significant for the opinions of the students surveyed about other environmental measures that state institutions in the near future. First-degree students attributed slightly less importance than second-degree students to measures such as the extension of the clean transport zone ($M_{1\ degree} = 3.27$; $SD_{1\ degree} = 1.2$ and $M_{2\ degree} = 3.38$; $SD_{2\ degree} = 1.3$), promoting environmentally friendly solutions to a greater extent ($M_{1\ degree} = 3.48$; $SD_{1\ degree} = 1.07$ and $M_{2\ degree} = 3.59$; $SD_{2\ degree} = 1.02$) and elimination of

pollution emission sources ($M_{1\ degree} = 3.86$; $SD_{1\ degree} = 1.07$ and $M_{2\ degree} = 3.96$; $SD_{2\ degree} = 1.1$). However, these differences were not significant. As shown by the analysis with the Mann-Whitney U test, the study level of the respondents did not differentiate their opinions on the importance of the environmental measures needed to be taken by state institutions, such as the extension of the clean transport zone. $Z = -1.44$; $p = 0.149$; $r_g = -0.07$; promoting environmental solutions more widely: $Z = -1.17$; $p = 0.241$; $r_g = -0.05$; and elimination of emission sources: $Z = -1.43$; $p = 0.153$; $r_g = -0.07$ (Table 6).

Table 6.
Relationship between respondents' level of study and their opinions on the environmental measures that state institutions in the near future

	Level of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standing dev.	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error.		
					-95.00%	+95.00%			
Extension of the Clean Transport Zone	**1st degree (n = 811)**	3.27 ± 1.2	3 [3-4]	1-5	3.18	3.35	0.04	Z = -1.44; p = 0.149	-0.07
	2nd degree (n = 189)	3.38 ± 1.3	4 [3-4]	1-5	3.19	3.57	0.09		
Creation of new cycle paths	**1st degree (n = 811)**	3.54 ± 1.14	4 [3-4]	1-5	3.46	3.61	0.04	Z = -2.46; p < 0.05	-0.11
	2nd degree (n = 189)	3.75 ± 1.13	4 [3-5]	1-5	3.59	3.91	0.08		
Creation of parking facilities for cyclists	**1st degree (n = 811)**	3.08 ± 1.16	3 [2-4]	1-5	3.00	3.16	0.04	Z = -2.76; p < 0.01	-0.13
	2nd degree (n = 189)	3.33 ± 1.16	3 [3-4]	1-5	3.16	3.49	0.08		
Increasing subsidies for the purchase of various environmental solutions	**1st degree (n = 811)**	3.65 ± 1.13	4 [3-5]	1-5	3.57	3.73	0.04	Z = -2.12; p < 0.05	-0.10
	2nd degree (n = 189)	3.84 ± 1.1	4 [3-5]	1-5	3.68	3.99	0.08		
Increased promotion of environmental solutions	**1st degree (n = 811)**	3.48 ± 1.07	4 [3-4]	1-5	3.40	3.55	0.04	Z = -1.17; p = 0.241	-0.05
	2nd degree (n = 189)	3.59 ± 1.02	4 [3-4]	1-5	3.44	3.73	0.07		
Elimination of emission sources	**1st degree (n = 811)**	3.86 ± 1.07	4 [3-5]	1-5	3.79	3.93	0.04	Z = -1.43; p = 0.153	-0.07
	2nd degree (n = 189)	3.96 ± 1.1	4 [4-5]	1-5	3.80	4.12	0.08		
Supporting the implementation of eco-innovation	**1st degree (n = 811)**	3.64 ± 0.97	4 [3-4]	1-5	3.58	3.71	0.03	Z = -2.32; p < 0.05	-0.11
	2nd degree (n = 189)	3.82 ± 1	4 [3-5]	1-5	3.68	3.96	0.07		

Source: own elaboration.

Among the pro-environmental activities needed to be undertaken by the home university in the near future, opinions on two such activities differed among first- and second-degree students. The former group attributed less importance to activities such as the support of environmentally friendly projects ($M_{1\ degree} = 3.84$; $SD_{1\ degree} = 0.97$ and $M_{2\ degree} = 3.97$; $SD_{2\ degree} = 1.01$) and the inclusion of education in the area of sustainability in all fields and

levels of study ($M_{1\ degree} = 3.29$; $SD_{1\ degree} = 1.12$ and $M_{2\ degree} = 3.5$; $SD_{2\ degree} = 1.06$). Both of these differences reached statistical significance, as demonstrated by analysis with the Mann-Whitney U test. Therefore, the level of study of the respondents differed in their assessment of the importance of environmental activities on the part of the home university, such as supporting environmentally friendly projects: $Z = -2.07$; $p < 0.05$; $r_g = -0.1$ and the inclusion of education in the area of sustainability in all fields and study levels: $Z = -2.17$; $p < 0.05$; $r_g = -0.1$.

Opinions on other pro-environmental activities that the home university of the students surveyed were not dependent on their level of study. Evaluation of the importance of the activity of organising conferences and/or symposiums to publicise and promote environmental activities was almost the same among first and second degree students ($M_{1\ degree} = 2.78$; $SD_{1\ degree} = 1.04$ and $M_{2\ degree} = 2.8$; $SD_{2\ degree} = 0.98$). In the first group, activities such as organising competitions for the best environmental solutions were considered slightly less necessary ($M_{1\ degree} = 3.26$; $SD_{1\ degree} = 1.08$ and $M_{2\ degree} = 3.41$; $SD_{2\ degree} = 1.02$), promoting healthy lifestyles and nutrition ($M_{1\ degree} = 3.67$; $SD_{1\ degree} = 1.11$ and $M_{2\ degree} = 3.85$; $SD_{2\ degree} = 0.98$), promoting waste separation and resource conservation ($M_{1\ degree} = 3.88$; $SD_{1\ degree} = 1.02$ and $M_{2\ degree} = 3.98$; $SD_{2\ degree} = 1.05$) and greening the university ($M_{1\ degree} = 3.85$; $SD_{1\ degree} = 1.09$ and $M_{2\ degree} = 3.96$; $SD_{2\ degree} = 1.06$). The results of the analysis with the Mann-Whitney U-test clearly indicate that the two groups did not differ statistically significantly in their evaluations of the pro-environmental activities needed to be undertaken by the home university such as both organising conferences and/or symposia to promote and promote pro-environmental activities: $Z = -0.1$; $p = 0.923$; $r_g = 0$; Organising environmental competitions: $Z = -1.94$; $p < 0.053$; $r_g = -0.09$; Promotion of healthy lifestyles and nutrition: $Z = -1.82$; $p < 0.068$; $r_g = -0.09$; promoting waste separation and resource conservation: $Z = -1.47$; $p = 0.142$; $r_g = -0.07$; as well as greening the University: $Z = -1.36$; $p = 0.175$; $r_g = -0.06$.

4.5. Influence of form and level of study on the assessment of the impact of individual product, process, organisational, and marketing innovations on the creation of environmental awareness

Among product innovations, stationary and non-stationary students differed in their assessment of the two types of innovation in terms of their impact on creating environmental awareness. In the former group, a greater impact was attributed to innovative means of transport ($M_{Stationary} = 3.27$; $SD_{Stationary} = 1.04$ and $M_{Non\text{-}stationary} = 3.07$; $SD_{Non\text{-}stationary} = 1.13$), while a lesser impact was attributed to improving the technical properties of products to extend their life cycle ($M_{Stationary} = 3.59$; $SD_{Stationary} = 0.95$ and $M_{Non\text{-}stationary} = 3.68$; $SD_{Non\text{-}stationary} = 1.07$). Based on the results of the analysis with the Mann-Whitney U test, the above differences were considered statistically significant, both in terms of assessing the impact of innovative means of transport: $Z = 2.34$; $p < 0.05$; $r_g = 0.09$; and evaluation of the impact of improving the technical characteristics of products to extend their life cycle: $Z = -2$; $p < 0.05$; $r_g = -0.08$.

Stationary students rated at almost the same level as non-stationary students the impact on creating environmental awareness of product innovations such as innovative renewable energy

solutions ($M_{Stationary}$ = 3.58; $SD_{Stationary}$ = 0.91 and $M_{Non-stationary}$ = 3.61; $SD_{Non-stationary}$ = 1.02) and the reduction of toxic substances through the use of new raw materials and intermediates ($M_{Stationary}$ = 3.69; $SD_{Stationary}$ = 0.96 and $M_{Non-stationary}$ = 3.7; $SD_{Non-stationary}$ = 0.99), while the impact of the reduction of non-recyclable elements through the use of new raw materials and intermediates was slightly weaker ($M_{Stationary}$ = 3.63; $SD_{Stationary}$ = 0.94 and $M_{Non-stationary}$ = 3.71; $SD_{Non-stationary}$ = 0.96). As the analysis of the Mann-Whitney U test showed, there were no statistically significant differences between the two groups in the assessment of the impact on creating environmental awareness of product innovations in the form of both innovative renewable energy solutions: Z = -0.75; p = 0.453; r_g = -0.03; reduction of non-recyclable items through the use of new raw materials and semi-finished products: Z = -1.54; p = 0.124; r_g = -0.06; as well as the reduction of toxic substances through the use of new raw materials and intermediates: Z = -0.41; p = 0.685; r_g = -0.02 (Table 7).

Table 7.
Relationship between respondents' form of study and their assessment of the impact of particular product innovations on creating environmental awareness

	Form of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standing dev.	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error.		
					-95.00%	+95.00 %			
Innovative solutions for renewable energy sources	**Stationary (n = 691)**	3.58 ± 0.91	4 [3-4]	1-5	3.52	3.65	0.03	Z = -0.75; p = 0.453	-0.03
	Non-stationary (n = 309)	3.61 ± 1.02	4 [3-4]	1-5	3.50	3.73	0.06		
Innovative means of transport	**Stationary (n = 691)**	3.27 ± 1.04	3 [3-4]	1-5	3.19	3.34	0.04	Z = 2.34; p < 0.05	0.09
	Non-stationary (n = 309)	3.07 ± 1.13	3 [2-4]	1-5	2.95	3.20	0.06		
Improving the technical properties of products to extend their life cycle	**Stationary (n = 691)**	3.59 ± 0.95	4 [3-4]	1-5	3.52	3.67	0.04	Z = -2; p < 0.05	-0.08
	Non-stationary (n = 309)	3.68 ± 1.07	4 [3-4]	1-5	3.56	3.80	0.06		
Reduction of non-recyclable components by using new raw materials and semi-finished products	**Stationary (n = 691)**	3.63 ± 0.94	4 [3-4]	1-5	3.56	3.70	0.04	Z = -1.54; p = 0.124	-0.06
	Non-stationary (n = 309)	3.71 ± 0.96	4 [3-4]	1-5	3.60	3.82	0.05		
Reduction of toxic substances through the use of new raw materials and intermediates	**Stationary (n = 691)**	3.69 ± 0.96	4 [3-4]	1-5	3.62	3.76	0.04	Z = -0.41; p = 0.685	-0.02
	Non-stationary (n = 309)	3.7 ± 0.99	4 [3-4]	1-5	3.59	3.81	0.06		

Source: own elaboration.

In contrast, none of the process innovations differed between stationary and non-stationary students in their assessment of their impact on creating environmental awareness. The former group attributed a slightly lower, often almost the same impact as the latter group to each of the process innovations analysed, that is, innovative recycling methods ($M_{Stationary}$ = 3.81; $SD_{Stationary}$ = 0.89 and $M_{Non\text{-}stationary}$ = 3.85; $SD_{Non\text{-}stationary}$ = 0.96), innovative upcycling methods ($M_{Stationary}$ = 3.66; $SD_{Stationary}$ = 0.91 and $M_{Non\text{-}stationary}$ = 3.68; $SD_{Non\text{-}stationary}$ = 1.01), innovative wastewater and grey water treatment methods ($M_{Stationary}$ = 3.67; $SD_{Stationary}$ = 0.92 and $M_{Non\text{-}stationary}$ = 3.68; $SD_{Non\text{-}stationary}$ = 1.02), use of innovative energy saving technologies in the production and delivery of products ($M_{Stationary}$ = 3.6; $SD_{Stationary}$ = 0.91 and $M_{Non\text{-}stationary}$ = 3.61; $SD_{Non\text{-}stationary}$ = 0.94) and the development and implementation of environmentally friendly innovative production and product delivery methods ($M_{Stationary}$ = 3.53; $SD_{Stationary}$ = 0.93 and $M_{Non\text{-}stationary}$ = 3.62; $SD_{Non\text{-}stationary}$ = 0.98). Analysis with the Mann-Whitney U test showed that there were no statistically significant differences between the two groups in terms of assessing the impact on creating environmental awareness of both innovative recycling methods: Z = -0.95; p = 0.34; r_g = -0.04; Upcycling: Z = -0.71; p = 0.478; r_g = -0.03; Treatment of wastewater and grey water: Z = -0.67; p = 0.504; r_g = -0.03; Use of innovative energy-saving technologies in the production and delivery of products: Z = -0.14; p = 0.888; r_g = -0.01; as well as the development and implementation of environmentally friendly innovative production and product supply methods: Z = -1.5; p = 0.133; r_g = -0.06.

The remote organisation of learning with the use of innovative IT tools was the only organisational innovation that differed in terms of the assessment of its impact on the creation of environmental awareness between stationary and non-stationary students. In the former group, the impact of the aforementioned organisational innovation was rated lower compared to non-stationary students ($M_{Stationary}$ = 3.03; $SD_{Stationary}$ = 1.11 and $M_{Non\text{-}stationary}$ = 3.23; $SD_{Non\text{-}stationary}$ = 1.23). Based on the results of the analysis with the Mann-Whitney U test, the above difference was considered statistically significant: Z = -2.47; $p < 0.05$; r_g = -0.1.

For the other organisational innovations analysed, there were no significant differences in the ratings of their impact between the groups of stationary and non-stationary students. The impact of remote work organisation with the use of innovative IT tools on the creation of environmental awareness was rated slightly lower among stationary students compared to non-stationary students ($M_{Stationary}$ = 3.13; $SD_{Stationary}$ = 1.05 and $M_{Non\text{-}stationary}$ = 3.27; $SD_{Non\text{-}stationary}$ = 1.15). The same was true for evaluations of innovations such as the pro-environmental reorganisation of the company ($M_{Stationary}$ = 3.36; $SD_{Stationary}$ = 0.92 and $M_{Non\text{-}stationary}$ = 3.39; $SD_{Non\text{-}stationary}$ = 1.01) and the introduction of new quality management systems ($M_{Stationary}$ = 3.32; $SD_{Stationary}$ = 0.97 and $M_{Non\text{-}stationary}$ = 3.34; $SD_{Non\text{-}stationary}$ = 0.99). In contrast, the creation of an environmental risk department and/or unit in terms of its impact on creating environmental awareness was rated slightly better in the former group ($M_{Stationary}$ = 3.17; $SD_{Stationary}$ = 1 and $M_{Non\text{-}stationary}$ = 3.1; $SD_{Non\text{-}stationary}$ = 1.05). However, these differences did not reach statistical significance, as shown by the Mann-Whitney U test analysis. This means that the respondents' form of study did not significantly differentiate their

assessments of the impact of organisational innovations, such as remote work organisation with the use of innovative IT tools, on creating environmental awareness: Z = -1.95; p < 0.051; r_g = -0.08; pro-environmental corporate reorganisation: Z = -0.95; p = 0.343; r_g = -0.04; introduction of new quality management systems: Z = -0.36; p = 0.716; r_g = -0.01; and the creation of a department and / or cell of environmental risk: Z = 1.03; p = 0.301; r_g = 0.04 (Table 8).

Table 8.
Relationship between respondents' form of study and their assessment of the impact of particular organisational innovations on creating environmental awareness

	Form of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standing dev.	Median [Q25 - Q75]	Min. - Max.	Confidence interva -95.00%	Confidence interva +95.00%	Stand error.		
Remote organisation of learning with innovative information tools	**Stationary (n = 691)**	3.03 ± 1.11	3 [2-4]	1-5	2.95	3.12	0.04	Z = -2.47; p < 0.05	-0.10
	Non-stationary (n = 309)	3.23 ± 1.23	3 [2-4]	1-5	3.10	3.37	0.07		
Remote working with innovative information tools	**Stationary (n = 691)**	3.13 ± 1.05	3 [2-4]	1-5	3.05	3.21	0.04	Z = -1.95; p < 0.051	-0.08
	Non-stationary (n = 309)	3.27 ± 1.15	3 [2-4]	1-5	3.14	3.39	0.07		
Pro-ecological company reorganisation	**Stationary (n = 691)**	3.36 ± 0.92	3 [3-4]	1-5	3.29	3.43	0.03	Z = -0.95; p = 0.343	-0.04
	Non-stationary (n = 309)	3.39 ± 1.01	3 [3-4]	1-5	3.28	3.51	0.06		
Introduction of new quality management systems	**Stationary (n = 691)**	3.32 ± 0.97	3 [3-4]	1-5	3.25	3.40	0.04	Z = -0.36; p = 0.716	-0.01
	Non-stationary (n = 309)	3.34 ± 0.99	3 [3-4]	1-5	3.23	3.45	0.06		
Creation of an environmental risk department and/or unit	**Stationary (n = 691)**	3.17 ± 1	3 [3-4]	1-5	3.10	3.25	0.04	Z = 1.03; p = 0.301	0.04
	Non-stationary (n = 309)	3.1 ± 1.05	3 [2-4]	1-5	2.98	3.21	0.06		

Source: own elaboration.

Among the marketing innovations, green marketing - the introduction of environmentally friendly marketing methods - was the only one that differed in the assessment of its impact on the creation of environmental awareness between stationary and non-stationary students. It turned out that the former group perceived greater importance of the above-mentioned innovation for creating environmental awareness ($M_{Stationary}$ = 3.17; $SD_{Stationary}$ = 1.07 and $M_{Non\text{-}stationary}$ = 2.96; $SD_{Non\text{-}stationary}$ = 1.16). Based on the results of the analysis with the Mann-Whitney U test, the above difference reached statistical significance: Z = 2.39; p < 0.05; r_g = 0.09.

The form of study of the respondents, on the other hand, had no significance for their evaluation of the other marketing innovations in terms of their impact on creating environmental awareness. Among stationary and non-stationary students, the impact of innovations involving the introduction of new sales channels based, for example, on healthy food and/or ecology was rated at the same level ($M_{Stationary}$ = 3.17; $SD_{Stationary}$ = 0.97 and $M_{Non\text{-}stationary}$ = 3.17; $SD_{Non\text{-}stationary}$ = 1.04). In the former group, a slightly higher impact was attributed to innovations such as innovative information campaigns promoting environmental care ($M_{Stationary}$ = 3.21; $SD_{Stationary}$ = 0.99 and $M_{Non\text{-}stationary}$ = 3.14; $SD_{Non\text{-}stationary}$ = 1.07); changing product packaging to eco-friendly and/or biodegradable ($M_{Stationary}$ = 3.75; $SD_{Stationary}$ = 0.99 and $M_{Non\text{-}stationary}$ = 3.6; $SD_{Non\text{-}stationary}$ = 1.06); and changing product names to suggest that they were produced by a natural method ($M_{Stationary}$ = 2.7; $SD_{Stationary}$ = 1.12 and $M_{Non\text{-}stationary}$ = 2.59; $SD_{Non\text{-}stationary}$ = 1.2). The results of the Mann-Whitney U-test analysis indicate that there are no statistically significant differences between the two groups in terms of the evaluation of the impact on creating environmental awareness of marketing innovations such as innovative information campaigns promoting environmental care: Z = 0.57; p = 0.566; r_g = 0.02; introduction of new sales channels based, for example, on healthy food and/or ecology: Z = -0.04; p = 0.97; r_g = 0; changing product packaging to organic and/or biodegradable: Z = 1.62; p = 0.104; r_g = 0.06; and changing product names to suggest that they were produced by a natural method: Z = 1.39; p = 0.165; r_g = 0.05.

The analysis showed that the study level of the respondents differentiated their assessment of the impact of two product innovations on the creation of environmental awareness. First-degree students perceived less impact than second-degree students on innovative means of transport ($M_{1\ degree}$ = 3.17; $SD_{1\ degree}$ = 1.09 and $M_{2\ degree}$ = 3.37; $SD_{2\ degree}$ = 1.01) and the reduction of non-recyclable items through the use of new raw materials and semi-finished products ($M_{1\ degree}$ = 3.62; $SD_{1\ degree}$ = 0.95 and $M_{2\ degree}$ = 3.79; $SD_{2\ degree}$ = 0.94). As shown by the analysis with the Mann-Whitney U test, the differences recorded reached statistical significance, both when assessing the impact of innovative means of transport: Z = -2.31; p < 0.05; r_g = -0.11; as well as the assessment of the impact of the reduction of non-recyclable items through the use of new raw materials and intermediates: Z = -2.35; p < 0.05; r_g = -0.11.

First-degree students also attributed a lower impact on creating environmental awareness to product innovations such as innovative renewable energy solutions than second-degree students ($M_{1\ degree}$ = 3.57; $SD_{1\ degree}$ = 0.94 and $M_{2\ degree}$ = 3.68; $SD_{2\ degree}$ = 0.94), improving the technical characteristics of products to extend their life cycle ($M_{1\ degree}$ = 3.61; $SD_{1\ degree}$ = 0.97 and $M_{2\ degree}$ = 3.67; $SD_{2\ degree}$ = 1.08), and reduction of toxic substances through the use of new raw materials and intermediates ($M_{1\ degree}$ = 3.67; $SD_{1\ degree}$ = 0.98 and $M_{2\ degree}$ = 3.78; $SD_{2\ degree}$ = 0.93). Differences were found to be statistically insignificant based on the results of the analysis with the Mann-Whitney U test, with regard to the assessment of the impact of both innovative renewable energy solutions: Z = -1.14; p = 0.254; r_g = -0.05; improving the technical properties of products to extend their life cycle: Z = -1.27; p = 0.205; r_g = -0.06; and reducing toxic substances through the use of new raw materials and intermediates: Z = -1.56; p = 0.119; r_g = -0.07 (Table 9).

Table 9.
Relationship between respondents' level of study and their assessment of the impact of individual product innovations on creating environmental awareness

	Level of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standard deviation	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error.		
					-95.00%	+95.00%			
Innovative solutions for renewable energy sources	**1st degree (n = 811)**	3.57 ± 0.94	4 [3-4]	1-5	3.51	3.64	0.03	Z = -1.14; p = 0.254	-0.05
	2nd degree (n = 189)	3.68 ± 0.94	4 [3-4]	1-5	3.54	3.81	0.07		
Innovative means of transport	**1st degree (n = 811)**	3.17 ± 1.09	3 [2-4]	1-5	3.09	3.24	0.04	Z = -2.31; p < 0.05	-0.11
	2nd degree (n = 189)	3.37 ± 1.01	4 [3-4]	1-5	3.23	3.51	0.07		
Improving the technical properties of products to extend their life cycle	**1st degree (n = 811)**	3.61 ± 0.97	4 [3-4]	1-5	3.54	3.68	0.03	Z = -1.27; p = 0.205	-0.06
	2nd degree (n = 189)	3.67 ± 1.08	4 [3-4]	1-5	3.52	3.83	0.08		
Reduction of non-recyclable components by using new raw materials and semi-finished products	**1st degree (n = 811)**	3.62 ± 0.95	4 [3-4]	1-5	3.56	3.69	0.03	Z = -2.35; p < 0.05	-0.11
	2nd degree (n = 189)	3.79 ± 0.94	4 [3-4]	1-5	3.66	3.93	0.07		
Reduction of toxic substances through the use of new raw materials and intermediates	**1st degree (n = 811)**	3.67 ± 0.98	4 [3-4]	1-5	3.61	3.74	0.03	Z = -1.56; p = 0.119	-0.07
	2nd degree (n = 189)	3.78 ± 0.93	4 [3-4]	1-5	3.65	3.92	0.07		

Source: own elaboration.

In the case of process innovations, the assessment of the impact of two such innovations on creating environmental awareness also differed between first- and second-degree students. In the former group, less impact was attributed to the use of innovative energy-saving technologies in the production and delivery of products ($M_{1\ degree} = 3.57$; $SD_{1\ degree} = 0.91$ and $M_{2\ degree} = 3.74$; $SD_{2\ degree} = 0.92$) and the development and implementation of environmentally friendly innovative production and product delivery methods ($M_{1\ degree} = 3.53$; $SD_{1\ degree} = 0.94$ and $M_{2\ degree} = 3.68$; $SD_{2\ degree} = 0.97$). With an assumed significance level of $p < 0.05$, significant differences between the two groups were found, based on the results of the Mann-Whitney U-test analysis, in terms of assessing the impact of both the use of innovative energy-saving technologies in the production and delivery of products: $Z = -2.16$; $p < 0.05$; $r_g = -0.1$; as well as the development and implementation of environmentally friendly innovative production and delivery methods: $Z = -2.09$; $p < 0.05$; $r_g = -0.1$.

However, the study level of the respondents was not significant for their assessment of impact of the other process innovations in the context of creating environmental awareness. In the group of first degree students, the impact of innovations such as innovative recycling methods ($M_{1\ degree} = 3.79$; $SD_{1\ degree} = 0.93$ and $M_{2\ degree} = 3.93$; $SD_{2\ degree} = 0.82$), innovative recycling methods ($M_{1\ degree} = 3.64$; $SD_{1\ degree} = 0.94$ and $M_{2\ degree} = 3.78$; $SD_{2\ degree} = 0.93$) and innovative methods for treating wastewater and grey water ($M_{1\ degree} = 3.65$; $SD_{1\ degree} = 0.97$ and $M_{2\ degree} = 3.77$; $SD_{2\ degree} = 0.88$). On the basis of the results of the analysis with the Mann-Whitney U test, the above differences were considered statistically insignificant. This was the case when assessing the impact of innovative methods for both recycling: $Z = -1.56$; $p = 0.12$; $r_g = -0.07$; Upcycling: $Z = -1.94$; $p < 0.053$; $r_g = -0.09$; what wastewater and grey water treatment: $Z = -1.54$; $p = 0.124$; $r_g = -0.07$.

Significant differences were observed between first- and second-degree students in terms of their assessment of the impact on creating environmental awareness of two organisational innovations. The first group perceived a lower impact of remote learning organisation using innovative IT tools ($M_{1\ degree} = 3.04$; $SD_{1\ degree} = 1.15$ and $M_{2\ degree} = 3.32$; $SD_{2\ degree} = 1.1$) and pro-environmental corporate reorganisation ($M_{1\ degree} = 3.33$; $SD_{1\ degree} = 0.94$ and $M_{2\ degree} = 3.52$; $SD_{2\ degree} = 0.95$). These differences were found to be statistically significant, as shown by analysis with the Mann-Whitney U test, with regard to the assessment of the impact of both remote learning organisations using innovative IT tools: $Z = -2.88$; $p < 0.01$; $r_g = -0.13$; and pro-environmental corporate reorganisation: $Z = -2.26$; $p < 0.05$; $r_g = -0.11$.

The impact of the creation of an environmental risk department and/or cell on the creation of environmental awareness was assessed almost the same in the study groups distinguished by level of study ($M_{1\ degree} = 3.15$; $SD_{1\ degree} = 1.02$ and $M_{2\ degree} = 3.16$; $SD_{2\ degree} = 0.98$). Remote work organisation using innovative IT tools was rated slightly lower by first degree students in this respect compared to second degree students ($M_{1\ degree} = 3.14$; $SD_{1\ degree} = 1.09$ and $M_{2\ degree} = 3.31$; $SD_{2\ degree} = 1.07$); as was the introduction of new quality management systems ($M_{1\ degree} = 3.31$; $SD_{1\ degree} = 0.97$ and $M_{2\ degree} = 3.39$; $SD_{2\ degree} = 1$). However, the differences noted were not statistically significant, as indicated by the results of the analysis with the Mann-Whitney U test. This was true for both remote work organisations using innovative IT tools: $Z = -1.89$; $p < 0.059$; $r_g = -0.09$; introduction of new quality management systems: $Z = -0.93$; $p = 0.355$; $r_g = -0.04$; and the creation of an environmental risk department and/or unit: $Z = -0.03$; $p = 0.979$; $r_g = 0$ (Table 10).

Table 10.
Relationship between respondents' level of study and their assessment of the impact of particular organisational innovations on creating environmental awareness

	Level of study	Descriptive statistics						Mann-Whitney U test	r_g
		Mean ± Standing dev.	Median [Q25 - Q75]	Min. - Max.	Confidence interval		Stand error.		
					-95.00%	+95.00%			
Remote organisation of learning using innovative IT tools	**1st degree (n = 811)**	3.04 ± 1.15	3 [2-4]	1-5	2.96	3.12	0.04	Z = -2.88; p < 0.01	-0.13
	2nd degree (n = 189)	3.32 ± 1.1	3 [3-4]	1-5	3.16	3.48	0.08		
Remote work using innovative IT tools	**1st degree (n = 811)**	3.14 ± 1.09	3 [2-4]	1-5	3.06	3.21	0.04	Z = -1.89; p < 0.059	-0.09
	2nd degree (n = 189)	3.31 ± 1.07	3 [3-4]	1-5	3.16	3.47	0.08		
Green corporate reorganisation	**1st degree (n = 811)**	3.33 ± 0.94	3 [3-4]	1-5	3.27	3.40	0.03	Z = -2.26; p < 0.05	-0.11
	2nd degree (n = 189)	3.52 ± 0.95	4 [3-4]	1-5	3.39	3.66	0.07		
Introduction of new quality management systems	**1st degree (n = 811)**	3.31 ± 0.97	3 [3-4]	1-5	3.25	3.38	0.03	Z = -0.93; p = 0.355	-0.04
	2nd degree (n = 189)	3.39 ± 1	3 [3-4]	1-5	3.25	3.54	0.07		
Creation of an environmental risk department and/or unit	**1st degree (n = 811)**	3.15 ± 1.02	3 [3-4]	1-5	3.08	3.22	0.04	Z = -0.03; p = 0.979	0.00
	2nd degree (n = 189)	3.16 ± 0.98	3 [3-4]	1-5	3.02	3.30	0.07		

Source: own elaboration.

In contrast, none of the marketing innovations differed between first- and second-degree students in terms of their assessment of its impact on creating environmental awareness. The former group perceived a slightly lower impact of innovative information campaigns promoting care for the environment ($M_{1\ degree} = 3.17$; $SD_{1\ degree} = 1.03$ and $M_{2\ degree} = 3.28$; $SD_{2\ degree} = 0.94$); the introduction of new sales channels based, for example, on healthy food and/or ecology ($M_{1\ degree} = 3.15$; $SD_{1\ degree} = 1.01$ and $M_{2\ degree} = 3.25$; $SD_{2\ degree} = 0.92$); changing product packaging to organic and/or biodegradable ($M_{1.\ degree} = 3.69$; $SD_{1\ degree} = 1.02$ and $M_{2\ degree} = 3.77$; $SD_{2\ degree} = 0.99$); change product names to suggest that they were produced by a natural method ($M_{1\ degree} = 2.66$; $SD_{1\ degree} = 1.16$ and $M_{2\ degree} = 2.69$; $SD_{2\ degree} = 1.09$) and green marketing ($M_{1\ degree} = 3.1$; $SD_{1\ degree} = 1.11$ and $M_{2\ degree} = 3.14$; $SD_{2\ degree} = 1.06$). The above differences, as shown by the Mann-Whitney U test analysis, did not reach statistical significance. This means that the study level of the respondents did not differentiate their evaluation of the impact on creating environmental awareness of marketing innovations such as innovative information campaigns promoting care for the environment: $Z = -1.12$; $p = 0.265$; $r_g = -0.05$; introduction of new sales channels based, for example, on healthy food and/or ecology: $Z = -1.25$; $p = 0.211$; $r_g = -0.06$; change of product packaging to organic and/or biodegradable: $Z = -0.98$; $p = 0.329$; $r_g = -0.05$; changing product names to suggest they were produced by a natural method: $Z = -0.31$; $p = 0.759$; $r_g = -0.01$; and green marketing - introducing environmentally friendly marketing methods: $Z = -0.49$; $p = 0.627$; $r_g = -0.02$.

4.6. Influence of form and level of study on the assessment of the level of environmental awareness in Poland

The form of study of the respondents did not substantially affect their assessment of the level of environmental awareness in Poland. On a scale of 1-5, stationary students rated the level of the aforementioned awareness almost the same as in the group of non-stationary students ($M_{Stationary}$ = 2.37; $SD_{Stationary}$ = 0.83 and $M_{Non\text{-}stationary}$ = 2.32; $SD_{Non\text{-}stationary}$ = 0.9). Analysis with the Mann-Whitney U test did not show statistically significant differences in this respect between the two groups: Z = 1.13; p = 0.26; r_g = 0.04.

The assessment of the level of environmental awareness of the students surveyed in Poland was also not related to their level of study. First- and second-degree students rated the level of the above-mentioned awareness almost the same ($M_{1\ degree}$ = 2.36; $SD_{1\ degree}$ = 0.85 and $M_{2\ degree}$ = 2.34; $SD_{2\ degree}$ = 0.85). Based on the results of the analysis with the Mann-Whitney U test, it was found that there were no statistically significant differences between the two groups in terms of the assessment of the level of environmental awareness in Poland: Z = 0.61; p = 0.543; r_g = 0.03.

5. Conclusions

Second-cycle students are more likely to undertake any pro-environmental activities. On the contrary, the form of study is not important for tertiary students in Poland to take this type of action.

Stationary students are more likely to take environmentally friendly measures by using alternative and/or environmentally friendly forms of transport. Non-stationary students are more likely to use modern and energy-efficient lighting, respectively. In terms of degree level, first degree students are more likely to use alternative energy sources, while second degree students are more likely to take cost-saving measures, i.e. save energy and/or water resources, buy second-hand items and repair broken electronic equipment, respectively.

The form and level of study have little bearing on the rationale of tertiary students in Poland to take pro-environmental action. Non-stationary students are more likely to be persuaded to take the above-mentioned actions by potential reductions in living costs, while second-level students are more likely to be encouraged to take these actions by caring for their surroundings and the environment.

The opinions of students of higher education institutions in Poland on some of the pro-environmental actions necessary to be taken by state institutions and their home university in the near future depend on the form and level of their studies. Stationary students in the context of actions on the part of state institutions pay more attention to the necessity of extending the clean transport zone and eliminating sources of pollutant emissions, while with regard to

universities, they pay more attention to greening, respectively. On the other hand, in the case of the degree level, second-level students, in the context of actions necessary on the part of state institutions, consider the creation of new cycle paths and parking facilities for cyclists as more important, as well as an increase in the purchase of various environmentally friendly solutions and support for the implementation of eco-innovations; while with regard to universities, support for environmentally friendly projects and the inclusion of education in the area of sustainable development in all fields and levels of study, respectively.

The research presented in this article has some limitations. Firstly, it was conducted only in Poland, and secondly, only selected pro-environmental measures were taken into account. The results of the study can be used in practice as a kind of guideline for pro-environmental actions taken by students. From the point of view of scientific development, it seems interesting to compare the results obtained with other countries in the world.

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