

Article

Forest Education with the Use of Educational Infrastructure in the Opinion of the Public-Experience from Poland

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Abstract: In Poland, informal forest education is carried out mostly on forest educational paths, equipped with educational boards. Due to the diverse audience, an attempt was made to assess the elements supporting forest education from the perspective of forest users. The aim of the study is to determine the basic criteria that, in the opinion of path users, determine the use, attractiveness, and importance of educational boards in education. In an anonymous questionnaire, 504 people participated during meetings with an educator on paths in forests of the Regional Directorate of the State Forests in Lublin. In the opinion of trail users, boards are not an important element that should be present on educational trails; in their opinion, they moderately support informal forest education activities. Users generally paid attention to between one to two or three to four boards. The attractiveness of the boards is determined by the graphics of the whole board. Respondents would also prefer boards on which information is presented in graphical rather than text form. Our study indicates a somewhat negative perception of educational boards in forest education, which has prompted the authors to conduct further research in order to clarify forest users' perceptions of the issues analyzed.

Keywords: educational boards; educational paths; educational routers; forest users; survey research



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1. Introduction

Informal forest education is a long-term process of teaching and educating children, youth, and adults. It is a positive influence on people in order to shape their natural and forest awareness—wherein selected aspects of forest environment are taught [1]. It is widely practiced in many countries around the world. According to O'Hara and Salwasser [2], forestry education encompasses a wide range of knowledge from forestry as well as many other related sciences, taking into account the rapid evaluation of modern forestry and the world. Van Herzele et al. [3] emphasized the need for forestry education to be interdisciplinary, including psychology, sociology, ethics, urban landscape design, economics, and graphic design, among others, as disciplines whose knowledge is necessary for proper forestry education.

According to Donaldson et al. [4] and Glibertson et al. [5], outdoor education is much more effective when compared to traditional indoor classes. The forest is an ideal place for education because it allows for the observation of natural objects and processes [6]. It directs the appropriate interpretation of the occurring relationships in nature in the audience [7]. Numerous studies indicate that positive experiences in the natural environment produce the desired effects of environmental concern [8–11]. Environmental awareness in individuals who are exposed to nature from an early age is significantly higher compared to those who are not [12]. Outdoor educational activities are often supported by the relevant infrastructure. In Poland, these are most often appropriately prepared educational paths,

which are equipped with, for example, world windows, interactive puzzles, or educational boards [13].

Very few scientific works are devoted to the aspect of using elements of educational infrastructure in forests to support informal educational activities. On the other hand, many publications deal with facilities supporting tourism and recreation [14–16], their use for various recreational purposes [17,18], and public opinion towards the elements in question [18–21]. Educational boards are an integral part of educational path management [22–26]. Among other things, educational boards are designed to foster interpretation, which Tilden [27] defines as a necessary educational activity that seeks to reveal meanings and relationships through the use of original objects, first-hand experiences, and illustrative media, rather than simply conveying factual information.

In Poland, 80% of all forests are managed by The State Forests National Forest Holding, and there are currently some 950 educational trails in the State Forests [28], which are mainly used for non-formal forest education classes in the form of meetings with an educator. According to the State Forests Education Activity Report, in 2019, the primary audiences for these activities were children aged 7–15 (43.57%) and adults aged 19 and older (34.64%) [28]. In Poland, the first educational route was established in 1974 in Kampinos National Park [25]. Educational trails in the State Forests have been created on a larger scale since 1994, when the first Promotional Forest Complexes were established. The idea of their establishment was connected with the so-called multifunctional forestry, in which educational and social functions are combined with a uniform economic and protective program [29].

Educational trails have stopping points where educational boards can most often be found. As Snopek [30] pointed out, educational boards are needed to help build appropriate environmental attitudes in people who use forests. Ballantyne et al. [31] and Walker and Moscardo [32] pointed out that the use of educational boards can go beyond specific tourism experiences to contribute to a broader education about sustainability. In addition, Tsang et al. [33] added that educational boards, and the proper interpretation of their content, can play a key role in changing visitor attitudes and behavior. Research by Hughes and Morrison-Saunders [34] indicated that visitor knowledge and satisfaction increases with the use of roadside boards placed along trails. Hill et al. [35] showed that the use of educational aids such as brochures, worksheets, and charts during walks could increase people's understanding of nature conservation and biodiversity issues, resulting in a positive impact on their wellbeing and appreciation of the environment. Brody and Tomkiewicz [36] suggested that appropriately designed boards can foster a sense of place and identification with a natural area. As Janeczko [25] and Snopek [30] pointed out, the attractiveness and degree of refinement of trails depends on the experience of the designers, as well as the commitment of the forest educators themselves, who often work with companies that design educational boards. The design of an educational board should be attractive enough to hold the attention of forest users in order to expand their knowledge; however, due to the varying sense of ethics, both among those involved in the design and the varying sense of aesthetics among forest users, this is a difficult task [37]. However, there is still no research on people's perception of these elements as a tool to support forest education, and there is no information on what the best pattern should be for a forest board. It is for this reason that a key question for forest managers in the context of recreational and educational infrastructure is whether and how nature trails and accompanying educational displays can support educational activities conducted by forest educators.

The aim of this study is to determine the basic criteria that, according to trail users, determines the attractiveness of educational boards, supporting the activities of informal forest education. The study formulated the following research questions:

- (1) Do people resting in the forest pay attention to the educational boards accompanying the trails?
- (2) What features should educational boards have according to forest users?

- (3) Are user preferences regarding forest recreational infrastructure determined by demographic characteristics?

Our research has both cognitive and practical implications. They allow for filling the gaps in knowledge about social expectations regarding the elements of educational infrastructure in forests, as well as providing further guidance on the design and importance in forest education of the given visual aids. In practice, the results of our study are useful for creating programs and policies for the development of outdoor forest education and tourism, and recreation in the forest. In addition, they will guide land managers, policy makers, and designers in the context of graphic design of educational boards. The results also provide support for managers and decision makers who should be interested in conducting more effective forest education in the forests.

2. Materials and Methods

2.1. Test Site

The study was carried out in the Regional Directorate of State Forests in Lublin, which consists of 25 forest districts that manage the State Treasury land in the Lubelskie, partially Mazowieckie, and Podkarpackie province. The territorial range of the Directorate is 2,696,000 ha (26,960 km²). The 25 forest districts belonging to the Regional Directorate of State Forests in Lublin manage land with a total area of 426,000 ha, including 408,400 ha of forest land. Private forests cover 239,000 ha. The forest cover of the region is 24.9% and is one of the lowest in the country. The remaining 4% of forest land is covered by alder and riparian habitats. The largest area, of about 74%, is covered by fresh habitats, while wet and swamp forest habitat types occupy about 26% of the area. Lowland habitats dominate, covering 93% of the area, with upland habitats accounting for the remaining 7%. Coniferous forests dominate in the area of the directorate, occupying 49% of the area. The rest are deciduous forests with 13% and mixed forests with 38% (data from RDSF in Lublin). In 2018, RDSF in Lublin had 58 educational routes.

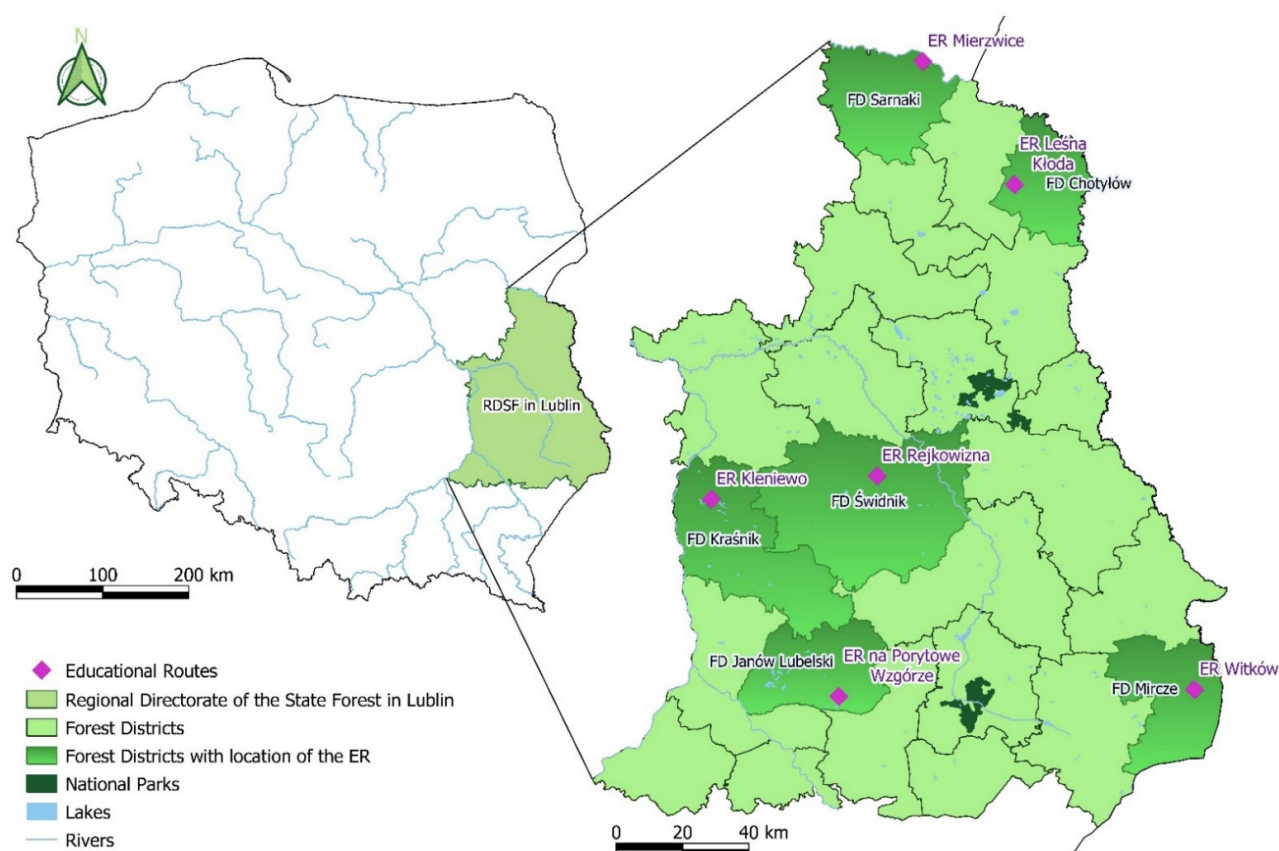
In order to isolate the routes characterized by the best parameters applicable to the general public and at the same time enjoying the greatest popularity among forest users, formalized interviews were conducted directly with educators from the 25 forest districts. Based on this, the following information was established: the spatial location of the route, its length, the time needed to walk the entire path, and the variant of the route (whether the path is in the form of a loop). In addition, it was established which paths were used for forest education classes during the work of educators, as well as which were the most frequently used by the public.

The next step was to analyze the records of educational activities carried out by individual forest districts in 2018. An important factor that allowed for distinguishing the most effective forest districts in terms of this form of education was the number of participants taking part in this activity. Only those forest districts that contained the most numerous and diverse age groups (from children in the age range of 3–6 years, to adults over 19 years) were singled out for further study. A detailed analysis of the age characteristics of the participants allowed for separating six forest districts that contained six educational paths, namely: Chotyłów, Mircze, Sarnaki, Świdnik, Janów, and Kraśnik. Detailed parameters of the educational trails are presented in Table 1.

The subject matter of educational boards varies. Most often, they refer to sustainable forest management (21.35% of boards), to the plants (22.47% of boards) and animals (8.99% of boards) found in the forests, or they refer to broadly defined nature protection (8.99% of boards). Most of the routes are located in economic forests. The educational route in Janów Lubelski Forest Districts, as the only one of the analyzed trails, is located in the area of Janów Forest Nature Reserve. The educational route in the Świdnik Forest District lies directly next to two large urban agglomerations—Świdnik and Lublin. This part of the analysis was conducted in April 2019. Figure 1 shows the location of analyzed trails in the field.

Table 1. Characteristics of the analyzed educational routes.

Number	Forest Districts	Route Name	Length of the Educational Route	Number of Boards
1	Chotyłów	Educational route Leśna Kłoda	2 km	8
2	Mircze	Educational route Witków	1.5 km	17
3	Sarnaki	Educational route Mierzvice	3 km	30
4	Świdnik	Educational route Rejkowizna	3.5 km	11
5	Janów Lubelski	Educational route Portowe Wzgórze	4.7 km	10
6	Kraśnik	Educational route Kleniewo	2.8 km	13
Total			17.5 km	89

**Figure 1.** Location of the analyzed routes in the field.

2.2. Test Procedure

Based on the selected trails, forest education classes with a qualified educator were organized, with a total of 504 participants. Detailed characteristics of the respondents are shown in Table 2. In this study, 50.20% of respondents were females and 49.90% were males. The study respondents were mostly in the age range of 18–26 years (40.87%), with higher education (59.33%) and living mainly in urban areas with more than 100,000 residents (35.12%).

Lublin voivodship has a total population of 1,021,848 men and 1,086,422 women (2,108,270 in total) in 2019. On average, there are 84 people per 1 km². The age structure of the voivodship is as follows: 18.6% are over 65 years old, 66.7% are between 15 and 64 years old, and 14.7% are under 14 years old. The level of education in a province varies widely. Higher education is held by 23.9% of residents, post-secondary and secondary

vocational education is held by 24.5% of residents, 9.8% have general secondary education, 21.6% have basic vocational education, and 20.2% have lower secondary education [38].

Table 2. Detailed characteristics of the respondents.

Distribution of Respondents–Demographics		<i>n</i>	%
Gender	Female	253	50.20
	Male	251	49.80
Age	18–26	206	40.87
	27–35	105	20.83
	36–44	105	20.83
	45–53	51	10.12
	>54 years old	37	7.34
Educational level	Primary education	122	24.21
	High school	83	16.47
	University	299	59.33
Place of residence	Village	129	25.60
	City up to 25,000 inhabitants	124	24.60
	City of 25–100,000 inhabitants	74	14.68
	City of over 100,000 inhabitants	177	35.12

For organizational reasons, it was decided to send invitations to participate in the survey via social media. Each invitation included details of the meeting (place, date, time, duration of the activity, and approximate time of return to the starting point). The invitation used the so-called snowball effect [39]. Participants were asked to forward the link with the information to a minimum of two other people, which streamlined the study and allowed it to reach as wide a range of stakeholders as possible. The study was open to individuals who were of legal age.

Participants were able to talk to each other and have free dialogue with the educator. The subject matter of each meeting referred to the content of educational boards occurring on a given path. On average, there were 13 boards on each trail. Three meetings were organized on each path, which resulted in a total of 18 meetings. Volunteer groups consisted of 20 to 26 people on average. Table 3 provides summary data on the number of participants for all three walks on each of the paths.

Table 3. Number of participants who took part in the study by route.

Number	Forest Districts	Route Name	Number of Participants
1	Chotyłów	Educational route Leśna Kłoda	86
2	Mircze	Educational route Witków	63
3	Sarnaki	Educational route Mierzvice	75
4	Świdnik	Educational route Rejkowizna	118
5	Janów Lubelski	Educational route Portowe Wzgórze	82
6	Kraśnik	Educational route Kleniewo	80
Total			504

The participants received small gifts for participating in the study in the form of notebooks and magazines promoting tourism, education, and forestry in Poland. After the educational walk, the respondents evaluated the boards by means of an anonymous

survey form that consisted of demographic questions (gender, age, place of residence, and education) and a question about the frequency of visits to the forest. The form also asked about the number of boards they paid attention to; what in their opinion dominated the attractiveness of a board; and using a five-point Likert scale, to what extent the content contained therein supported informal forest education, whether in their opinion boards are needed on this type of trail, and the preferred graphical form of boards. The questionnaire contained a total of 10 questions (Supplementary Materials). The survey was conducted in the field from May to November 2019. The surveyed sample was not a representative sample for the general public or for people using the Internet and educational-nature trails in the State Forests in Poland. However, its size allows for inferring how forest users from the eastern part of Poland perceive the importance of the educational infrastructure in informal forest education.

2.3. Statistical Analysis of the Results

The Statistica 13.3 PL program (StatSoft Inc., Krakow, Poland) was used for statistical calculations. In order to examine the relationships between nominal and ordinal variables, cross-tabulations were used to synthesize the relationships and Pearson's χ^2 measures were also used. Correspondence analysis (CA), which is one of the multivariate exploratory techniques, was also used in developing the results, which allows summarizing a set of qualitative data (nominal and ordinal) in a two-dimensional graphical form [40]. We first summarized the data in a multivariate table. We then recorded the observed counts of simultaneous occurrences of R and C features in the form of a contingency table, using the following formula:

$$N = [n_{ij}]$$

where

$$i = (1, 2, \dots, r), j = (1, 2, \dots, c), 1 \leq i \leq r, 1 \leq j \leq c$$

n_{ij} is the number of units with the i -th category of the first variable (rows–R) and j -th category of the second variable (columns–C).

The analysis of statistics and graphs allows for inferring the relationships occurring between the categories of variables—columns and rows of the multivariate table [41,42].

3. Results

3.1. Respondents' Preferences for Forest Visits

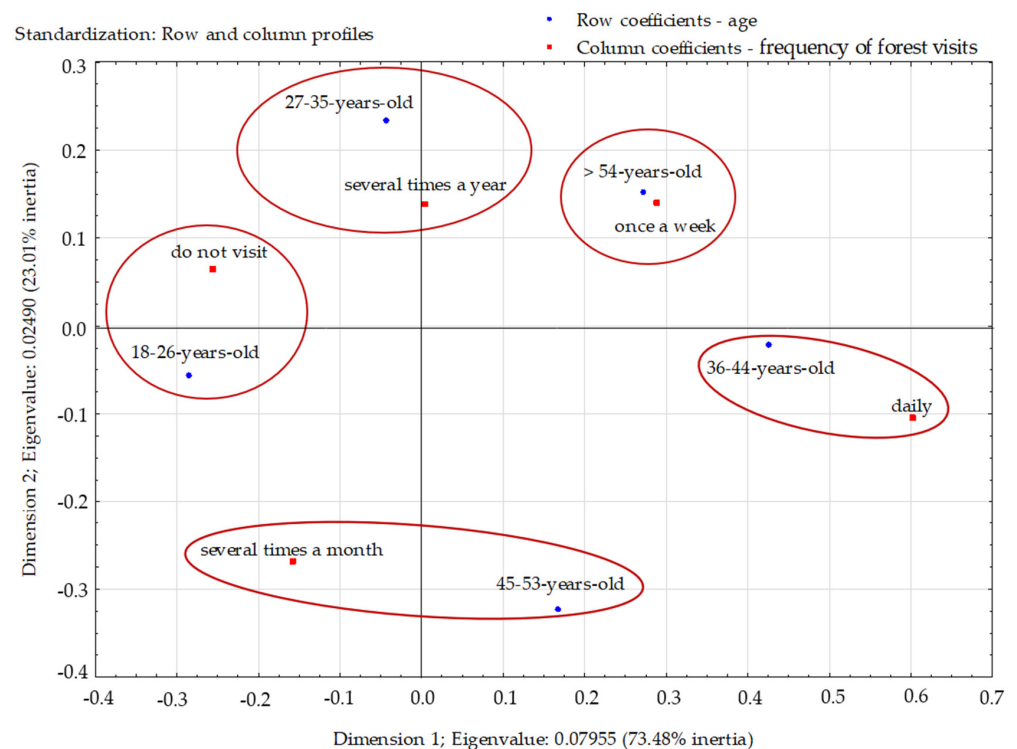
Almost one third of respondents stated they did not visit forests at all. A small percentage of respondents declared that they visited forests several times a year (27.38%). The remaining group of respondents (43.65%) visited forests more often—21.03% several times a month, 9.52% at least once a week, and 13.10% every day. Gender, age group, and place of residence significantly differentiated the answers regarding frequency of visiting forests during the year. Men went to forests significantly less often than women (Table 4).

The total inertia was equal to 0.108, indicating a significant dispersion of profiles. Profiles were mainly mapped by the first dimension (73.48%). Five clusters were outlined in the factor space. The two youngest age groups were characterized in comparison to the others by the fact that they did not visit forests very often, while the oldest group went there at least once a week (Figure 2).

The total inertia was equal to 0.088, indicating not much dispersion of profiles. Profiles were mainly mapped by the first dimension (85.88%). Two clusters were outlined in the factor space. People living in villages were distinguished from other groups by visiting forests several times a year. Among people living in cities with 25,000–100,000 inhabitants, there were many who, on the one hand, visited forests at least once a week, but also many who did not go there at all (Figure 3).

Table 4. Frequency of forest visitation by respondents.

Grouping Variable		Frequency of Forest Visits [%]					Statistics	
		Do Not Visit	Several Times a Year	Several Times a Month	Once a Week	Daily	Chi ² Pearson	<i>p</i> *
Gender	Female	26.88	24.90	23.72	8.30	16.21	8.198	0.045 *
	Male	31.08	29.88	18.33	10.76	9.96		
Age	18–26	35.92	26.21	26.21	5.83	5.83	54.559	0.000 *
	27–35	33.33	31.43	13.33	12.38	9.52		
	36–44	19.05	25.71	16.19	13.33	25.71		
	45–53	19.61	19.61	31.37	9.80	19.61		
	>54-years-old	18.92	37.84	13.51	10.81	18.92		
Educational level	Primary education	27.05	34.43	21.31	6.56	10.66	8.494	0.387
	High school	28.92	27.71	25.30	7.23	10.84		
	University	29.77	24.41	19.73	11.37	14.72		
Place of residence	village	36.49	14.86	22.97	14.86	10.81	44.121	0.000 *
	City up to 25,000 inhabitants	31.45	30.65	20.16	8.87	8.87		
	City of 25–100,000 inhabitants	32.77	17.51	21.47	10.17	18.08		
	City of over 100,000 inhabitants	17.05	44.96	20.16	6.20	11.63		
TOTAL		28.97	27.38	21.03	9.52	13.10		

* Statistically significant differences ($p < 0.05$).**Figure 2.** Frequency of forest visits by different age groups of respondents (correspondence analysis).

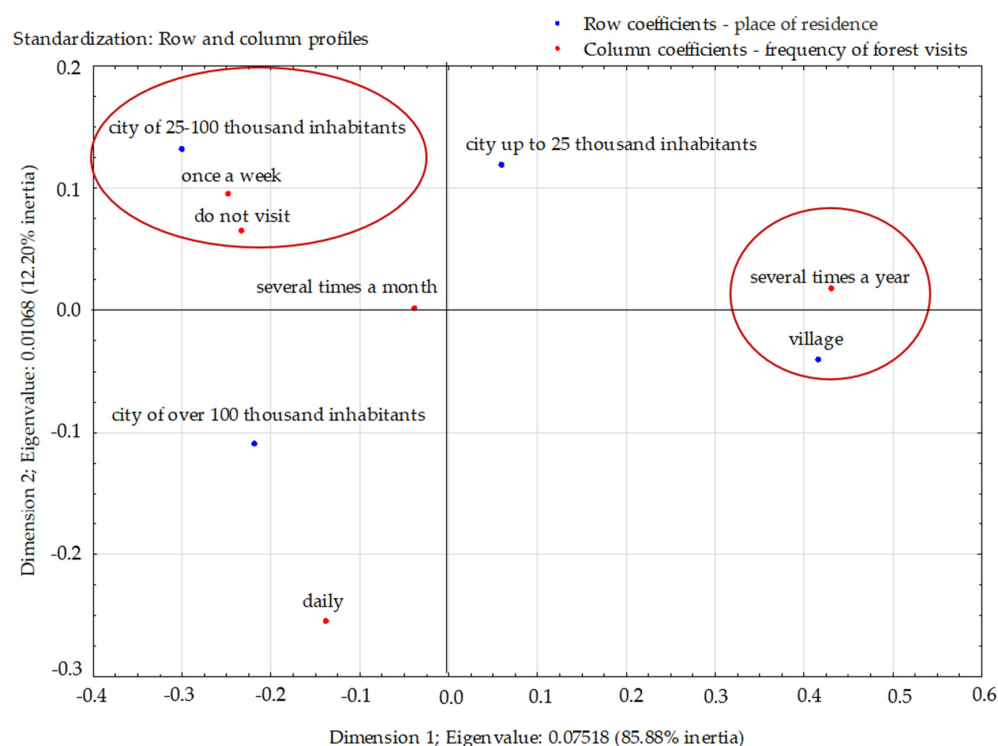


Figure 3. Frequency of forest visitation by respondents versus place of residence (correspondence analysis).

3.2. Respondents' Preferences for Educational Boards

Respondents mostly paid attention to three to four (44.05%) or one to two boards (33.73%) during educational activities in the forest. Less than 3.17% of respondents declared that they did not pay attention to any board. Every fifth respondent paid attention to five to six boards. None of the respondents declared a greater number of boards to which they paid attention. Age group and education significantly influenced the differences in the number of boards to which respondents paid attention (Table 5).

Table 5. Respondents' preferences regarding the number of boards they paid attention to during forest education classes.

Grouping Variable		Number of Boards [%]				Statistics	
		None	1–2	3–4	5–6	Chi ² Pearson	<i>p</i> *
Gender	Female	3.16	31.23	47.43	18.18	2.465	0.482
	Male	3.19	36.25	40.64	19.92		
Age	18–26	3.88	31.55	41.26	23.30	20.556	0.047 *
	27–35	4.76	32.38	45.71	17.14		
	36–44	0.95	46.67	38.10	14.29		
	45–53	1.96	19.61	56.86	21.57		
	>54-years-old	2.70	32.43	54.05	10.81		
	Primary education	3.28	32.79	45.08	18.85	12.491	0.050 *
Educational level	High school	4.82	22.89	59.04	13.25		
	University	2.68	37.12	39.46	20.74		

Table 5. Cont.

Grouping Variable		Number of Boards [%]				Statistics	
		None	1–2	3–4	5–6	Chi ² Pearson	<i>p</i> *
Place of residence	Village	5.41	22.97	54.05	17.57	13.917	0.125
	City up to 25,000 inhabitants	5.65	29.84	45.97	18.55		
	City of 25–100,000 inhabitants	2.26	38.42	40.68	18.64		
	City of over 100,000 inhabitants	0.78	37.21	41.09	20.93		
Frequency of forest visits	Do not visit	3.03	42.42	42.42	12.12	15.017	0.241
	Several times a year	1.89	27.36	50.94	19.81		
	Several times a month	3.62	34.78	38.41	23.19		
	Once a week	4.11	28.77	47.26	19.86		
	Daily	2.08	47.92	37.50	12.50		
TOTAL		3.17	33.73	44.05	19.05		

* Statistically significant differences ($p < 0.05$).

The total inertia was equal to 0.041, indicating that the profiles were not very dispersed. Three clusters were outlined in the factor space. The youngest age group had the highest percentage of individuals who paid attention to the greatest number of boards. The two oldest age groups (45–53-years-old, >54-years-old) did not stand out from the others in terms of the number of educational boards they paid attention to (Figure 4).

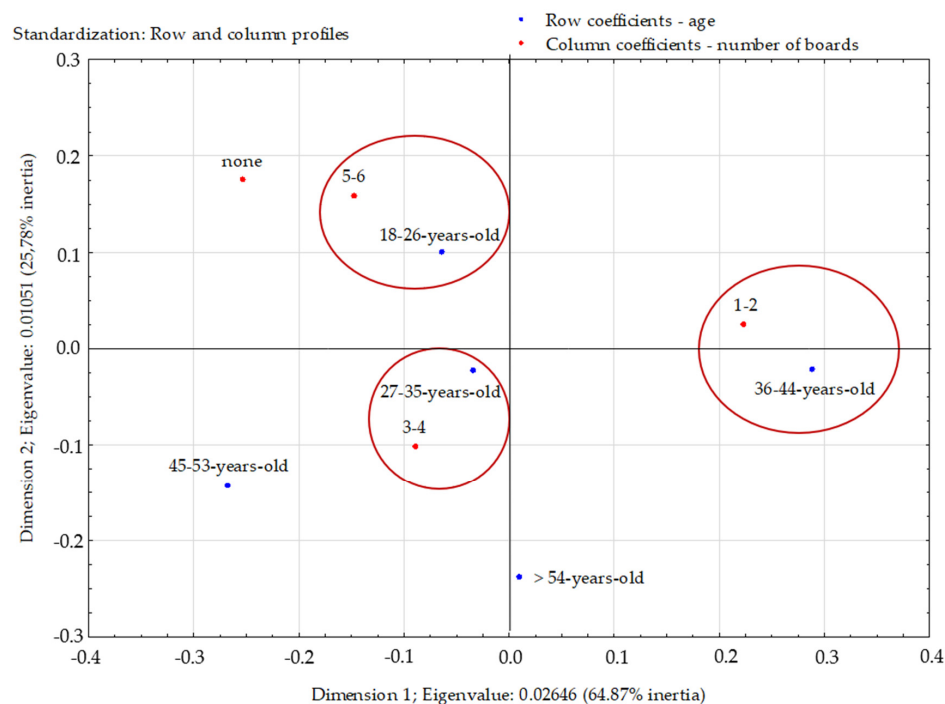


Figure 4. Number of boards highlighted by respondents vs. the age group they belonged to (correspondence analysis).

The total inertia was equal to 0.025, indicating that the profiles were not very dispersed. Three clusters were outlined in the factor space, and the profiles were mapped almost exclusively by the first dimension (99.96%). The higher the education, the fewer arrays respondents paid attention to. Middle-educated people were also characterized in comparison to other groups by the percentage of people who did not pay attention to any board (Figure 5).

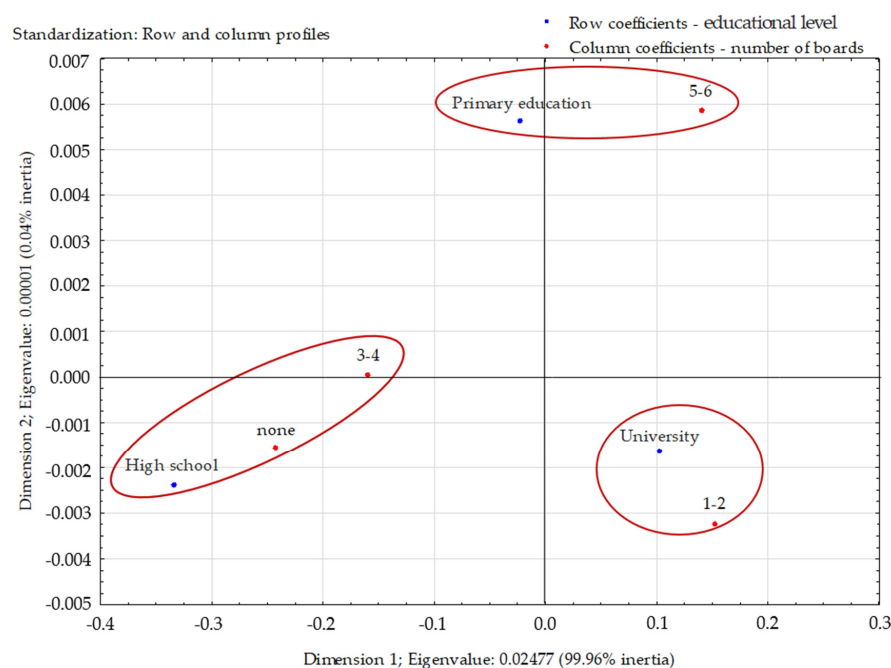


Figure 5. Number of boards highlighted by respondents vs. their education (correspondence analysis).

More than three quarters of respondents (76.59%) believed that the board's attractiveness is determined by the graphic form of the board itself. One-fifth (20.24%) thought that the board's attractiveness was influenced by the content, and only 3.17% thought that the attractiveness was determined by the proper positioning of the board and its integration into the environment. Demographic factors and frequency of forest visits did not significantly influence respondents' views on the attractiveness of the boards (Table 6).

Table 6. The preferences of the respondents concerning the factors that influence the attractiveness of the educational boards.

Grouping Variable		Factors Determining the Attractiveness of an Educational Board [%]			Statistics	
		Graphic Form	Location of the Board in the Field	Content	Chi ² Pearson	p *
Gender	Female	78.66	2.77	18.58	1.243	0.537
	Male	74.50	3.59	21.91		
Age	18–26	74.27	3.40	22.33	3.685	0.884
	27–35	79.05	3.81	17.14		
	36–44	77.14	1.90	20.95		
	45–53	76.47	1.96	21.57		
	>54-years-old	81.08	5.41	13.51		
Educational level	Primary education	78.69	3.28	18.03	1.877	0.758
	High school	77.11	4.82	18.07		
	University	75.59	2.68	21.74		
Place of residence	Village	75.68	1.35	22.97	2.547	0.863
	City up to 25,000 inhabitants	77.42	4.03	18.55		
	City of 25,000–100,000 inhabitants	75.14	2.82	22.03		
	City of over 100,000 inhabitants	78.29	3.88	17.83		

Table 6. Cont.

Grouping Variable		Factors Determining the Attractiveness of an Educational Board [%]			Statistics	
		Graphic Form	Location of the Board in the Field	Content	Chi ² Pearson	<i>p</i> *
Frequency of forest visits	Do not visit	75.76	0.00	24.24	8.365	0.399
	Several times a year	77.36	2.83	19.81		
	Several times a month	77.54	5.07	17.39		
	Once a week	74.66	2.05	23.29		
	Daily	79.17	6.25	14.58		
TOTAL		76.59	3.17	20.24		

* Statistically significant differences ($p < 0.05$).

More than half (58.53%) of the respondents said that educational boards support informal forest education to a medium extent. One-fourth (25.60%) were of the opinion that educational boards support forest education to a great and very great extent, whereas 15.87%, said that educational boards support forest education to a small and very small extent. Gender and age groups significantly differentiated the opinion of respondents on the analyzed topic. According to the majority of men, educational boards support informal forest education to a medium extent. Women had more divergent views on this issue (Table 7).

Table 7. Respondents' preferences for supporting informal forest education through the use of educational boards.

Grouping Variable		To What Extent Do Educational Boards Support Informal Forest Education Activities [%]					Statistics	
		Very Small	Small	Medium	Large	Very Large	Chi ² Pearson	<i>p</i> *
Gender	Female	4.74	14.23	50.59	26.48	3.95	16.290	0.003 *
	Male	5.58	7.17	66.53	17.53	3.19		
Age	18–26	3.40	9.22	60.68	22.82	3.88	25.024	0.049 *
	27–35	5.71	8.57	63.81	20.95	0.95		
	36–44	6.67	13.33	53.33	20.00	6.67		
	45–53	9.80	21.57	41.18	23.53	3.92		
	>54-years-old	2.70	2.70	70.27	24.32	0.00		
Educational level	Primary education	4.92	13.11	59.84	19.67	2.46	6.229	0.621
	High school	8.43	7.23	61.45	18.07	4.82		
	University	4.35	10.70	57.19	24.08	3.68		
Place of residence	Village	4.05	13.51	62.16	18.92	1.35	8.785	0.721
	City up to 25,000 inhabitants	3.23	11.29	60.48	20.16	4.84		
	City of 25,000–100,000 inhabitants	7.34	11.30	57.06	21.47	2.82		
	City of over 100,000 inhabitants	4.65	7.75	56.59	26.36	4.65		
Frequency of forest visits	Do not visit	4.55	12.12	53.03	25.76	4.55	11.840	0.755
	Several times a year	1.89	11.32	61.32	21.70	3.77		
	Several times a month	5.07	11.59	59.42	19.57	4.35		
	Once a week	6.85	10.96	58.90	19.86	3.42		
	Daily	8.33	4.17	56.25	31.25	0.00		
TOTAL		5.16	10.71	58.53	22.02	3.57		

* Statistically significant differences ($p < 0.05$).

The total inertia was equal to 0.050, indicating that the profiles were not very dispersed. In the factor space, two clear clusters emerged. The two youngest groups (18–26-years-old and 27–35-years-old) of respondents stood out from the rest in that they were of the opinion

that educational boards support informal forest education to a medium to high degree. In contrast, the 45–53 age group was of the opposite opinion—they largely believed that this support was either very low or low (Figure 6).

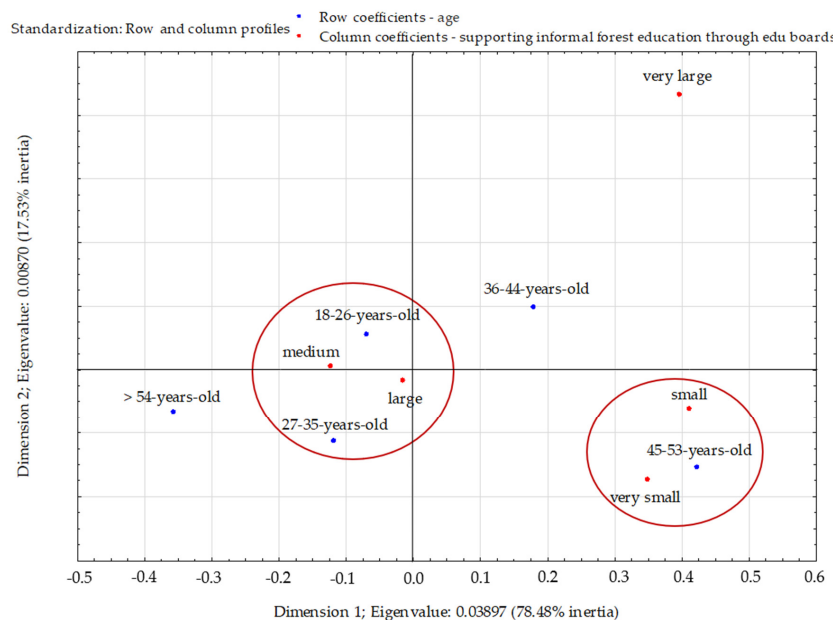


Figure 6. Degree of support of informal forest education activities by educational boards according to different age groups of respondents (correspondence analysis).

The total inertia was equal to 0.033, indicating that the profiles were not very dispersed. Two clear clusters emerged in the factor space. Among the people who thought that educational boards were not needed on forest paths, most people declared that they did not visit forests at all or that they did it only a few times a month. Most people who thought that the presence of boards on the forest paths was necessary, visited forests once a week or several times a year. People who visited forests every day did not stand out in terms of their opinion compared to other groups of respondents (Figure 7).

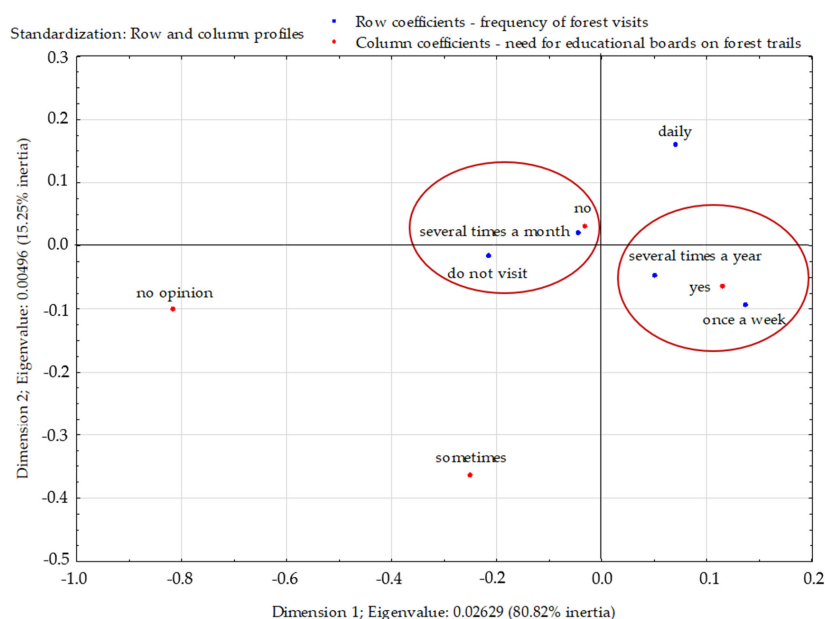


Figure 7. Factors determining the attractiveness of an educational board vs. frequency of visiting forests by respondents (correspondence analysis).

Three quarters of the respondents (75.15%) felt that boards were not needed on forest trails. Every fifth respondent (20.8%) was of the opposite opinion. A small number of forest users had no opinion on this issue (1.99%). Frequency of visiting forests significantly differentiated the views on the issue (Table 8).

Table 8. Respondents' preferences on whether educational boards are needed on educational trails in forests.

Grouping Variable		Are Educational Boards Needed on Forest Trails [%]				Statistics	
		No	Sometimes	Yes	No Opinion	Chi ² Pearson	<i>p</i> *
Gender	Female	73.91	2.37	21.74	1.98	0.500	0.919
	Male	76.10	2.39	19.12	2.39		
Age	18–26	76.70	2.91	17.96	2.43	9.900	0.625
	27–35	72.38	1.90	20.95	3.81		
	36–44	78.10	1.90	19.05	0.95		
	45–53	66.67	3.92	29.41	0.00		
	>54-years-old	75.68	0.00	24.32	0.00		
Educational level	Primary education	79.51	0.82	17.21	2.46	3.494	0.745
	High school	73.49	2.41	22.89	1.20		
	University	73.58	3.01	21.07	2.01		
Place of residence	Village	72.97	0.00	22.97	4.05	8.506	0.484
	City up to 25,000 inhabitants	80.65	2.42	16.13	0.81		
	City of 25,000–100,000 inhabitants	75.71	2.26	20.34	1.69		
	City of over 100,000 inhabitants	69.77	3.88	23.26	2.33		
Frequency of forest visits	Do not visit	78.79	0.00	21.21	0.00	16.361	0.045 *
	Several times a year	75.47	1.89	19.81	2.83		
	Several times a month	72.46	2.90	23.19	0.72		
	Once a week	78.08	3.42	14.38	4.11		
	Daily	66.67	2.08	31.25	0.00		
TOTAL		75.15	2.39	20.48	1.99		

* Statistically significant differences ($p < 0.05$).

According to the vast majority of respondents (76.14%), there should be more graphics than text on an educational board. The remaining respondents were of the opinion that the proportion of text and graphics should be similar. None of the respondents felt that text should dominate the educational board. The demographic factors and frequency of visiting forests did not significantly differentiate respondents' opinions about the appearance of educational boards (Table 9).

Table 9. Respondents' preferences regarding what graphical form an educational board should take.

Grouping Variable		The Educational Board Should Include [%]		Statistics	
		Text and Graphics in Proportion 50/50	More Graphics than Text	Chi ² Pearson	<i>p</i> *
Gender	Female	23.72	76.28	0.006	0.940
	Male	20.90	76.10		

Table 9. Cont.

Grouping Variable		The Educational Board Should Include [%]		Statistics	
		Text and Graphics in Proportion 50/50	More Graphics than Text	Chi ² Pearson	<i>p</i> *
Age	18–26	21.36	78.64	2.377	0.667
	27–35	23.81	75.24		
	36–44	27.62	72.38		
	45–53	21.57	78.43		
	>54-years-old	29.73	70.27		
Educational level	Primary education	17.21	82.79	4.416	0.110
	High school	28.92	71.08		
	University	25.08	74.58		
Place of residence	Village	27.03	72.97	2.315	0.510
	City up to 25,000 inhabitants	27.42	72.58		
	City of 25,000–100,000 inhabitants	22.60	77.40		
	City of over 100,000 inhabitants	20.16	79.07		
Frequency of forest visits	Do not visit	28.79	71.21	2.828	0.587
	Several times a year	24.53	75.47		
	Several times a month	19.57	79.71		
	Once a week	26.03	73.97		
	Daily	20.83	79.17		
TOTAL		23.86	76.14		

* Statistically significant differences ($p < 0.05$).

4. Discussion

Educational paths are an important element of organized recreational space in the forest [24]. They enable active recreation, allowing visitors to learn about the natural and cultural values of the environment. Our study clearly shows that a small section of Polish society visits forest areas regularly (Table 3). In addition to the demographic factors that determine the results obtained, the main problem that may affect the frequency of visits to forest areas is their fragmentation [6], which is caused by constantly growing urban agglomerations; the large number of people who want to rest in forest areas, which may be a disturbing factor for others [43,44]; and their lifestyle itself, related to work, education, health, wealth, or parenthood [45,46]. Another reason may be the common opinion about the dangers accompanying a stay in the forest, such as wild animals and ticks [46]. This is a very disturbing phenomenon because, in addition to the more effective outdoor forest education provided by the natural environment compared to traditional activities [47], being in forest areas also has a positive effect on the mental and physical state of people, which has been confirmed by numerous studies [48–51].

Most of the forest users from the experiment did not pay attention to a large number of educational boards (five to six boards), which confirms our first hypothesis. This is likely due to the fact that during the course of the visit, the educator conducted the activity in an interesting way, drawing attention away from the boards themselves, even though they made a stop at each board, referring with conversation to the content on the boards. The work of Kerley et al. [52] clearly shows that the use of guides, bringing the natural world closer by conversation, affects the quality of users' observation and understanding of the natural world. According to Ap and Wong [53], the role of the guide or educator is not only to convey information, but also to present it in an interesting and sincere way, adapting the content of the message to the perception of the audience.

On the other hand, educational boards, in the opinion of trail users, are not an important element for supporting informal forest education (Table 6). A significant number of respondents also indicated that this type of educational infrastructure is unnecessary on the trails (Table 7). In their work, Švajda and Činčera [24] also focused on these aspects, showing that only interactive objects are more likely to attract the attention of visitors and keep it for longer than static boards. Additionally, the authors drew attention to the wasted financial resources related to the creation, inventory, and maintenance of the boards, as well as unjustified interference in the natural landscape, which is disturbed by the introduction of new elements. This last statement was also confirmed in the study by Korcz et al. [49], that educational boards located on a forest path where forest bathing was advised interfered with psychological restoration.

According to Weis et al. [54], the graphical form of educational boards is largely responsible for attracting attention, which is also confirmed by our study (Table 5). However, the participants in this study indicated that they would prefer educational boards that are predominantly graphical (Table 8). As Dowse, Lin, and Biggs [55,56] pointed out, icons, pictograms, and pictures are ubiquitous in everyday life, which may condition the participants' responses. By visualizing content, perceptual processes in forest education are more attractive than the standard teaching method that most people are used to (school teaching, basics, etc.) [57]. Doak et al. [57] indicated that visually attractive, clear, and simple educational content is easier to remember. In an era where "literate" people are being displaced by a society of "illiterate" people, and many authors emphasize that research over the past several years has documented the prevalence of limited literacy among adults worldwide [58–60], thus the "readability" of educational, information boards must be as simple, useful, and attractive to the viewer as possible.

5. Conclusions

The majority of respondents to the survey did not visit forests at all, and the amount of time spent in forests was determined by age, gender, and place of residence. The perception of educational boards used by the State Forests as elements that should support informal forest education was also determined by the demographic characteristics of the respondents; however, a significant proportion of forest users believed that the elements moderately serve to support forest education activities in the field, as well as being an unnecessary element. Most of the respondents preferred educational boards that are dominated by graphics, finding them more attractive.

Our study prompted the authors to reflect more deeply and to undertake further research in the direction of evaluating educational boards as tools supporting informal forest education and their public perception. Namely, the design of educational boards should be looked at more closely in order to understand why they are so critically perceived by forest users. It is also necessary to check whether the level of accessibility of the texts placed on the boards is adequate and not too difficult to read, which may discourage further education, and whether the topics of the educational boards are related to the accessibility of the texts, enabling forest users to remember the content of the boards.

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