

Article

The Use of Geosites in Education—A Case Study in Central Poland

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Abstract: One of the important ways to promote geoheritage values is to use geosites in school education. Particularly useful for this are nature reserves that include interesting geological and geomorphological sites. The area of Świętokrzyskie Province is one of the most interesting geological regions of Poland. In 2021, the Holy Cross Mountains UNESCO Global Geopark was established. The main objective of this study was to determine the school students' knowledge of geoheritage sites and their use in geotourism and education. The province's nature reserves are well accessible by transportation from school. Diverse geoheritage sites were selected for the assessment of their geotourism values. An assessment of their geotourism values was made. The problem of knowledge and perception of geoheritage was studied using a questionnaire survey among students of high schools located in the city of Starachowice. The results showed that despite the presence of sites of high value, unique in the country and Europe, they are rarely visited by students and even less frequently used in formal education (field classes). On the other hand, students declare that geoheritage assets can be treated as important tourism attractions. Researchers in the field of geoeducation and geotourism should place greater emphasis on disseminating this knowledge among teachers and the public. An opportunity for the development of geoeducation will certainly be the establishment of a geopark.



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1. Introduction

Geosites are valuable objects of geoheritage—geological, geomorphological, and hydrological—which are important for the presentation and preservation of geodiversity, as well as important for science, culture, and history. They document the history of the Earth or illustrate particular geological and geomorphological processes [1]. Geosites are the basis for the creation of geoparks and the development of geotourism [2–4]. The scientific literature on geosites is already quite extensive. In the Web of Science database, there are about 300 publications containing the words ‘geosite, geosites’ in the title. In the case of a keyword search, already close to 500 publications were found (as of 11/2023). Research is mainly concerned with the inventory of such sites, the assessment of their value, their protection, and the potential for use in tourism and regional development (among others [5–8]). The importance of geosites as key resources in the creation of geoparks deserves special emphasis. Their inventory and assessment are the first steps in such activities. Geoparks are areas for the promotion of geoheritage, and the development of tourism and education with simultaneous sustainable social and economic development [9–12]. One of the most important activities of geoparks is the educational programme. Educational workshops and tours are conducted within geoparks, which ultimately raise awareness and lead to the conservation of geodiversity. Local governments, foundations, and associations are usually involved in geoheritage promotion and geoeducation [9]. Without geosites, the development of geotourism (“a knowledge-based tourism, an interdisciplinary integration

of the tourism industry with conservation and interpretation of abiotic nature attributes, besides considering related cultural issues, within the geosites for the general public”) is not possible [3].

In Poland, data on geosites are collected in the Central Register of Geosites of Poland [13]. This register is continuously updated and supplemented. Geosites are entered in the framework of projects implemented by the Polish Geological Institute-State Research Institute since 2009. The database currently includes more than 3700 sites. At the same time, in Poland, as in other countries, the concept of geosites does not function in the legal system and is used mainly by scientists. Therefore, geoheritage sites referred to as geosites function only in the Register and are not formally protected.

Therefore, the location of geosites within the existing nature conservation system may be an opportunity and a way to promote geoheritage values. In Poland, national parks or landscape parks are legally established, and have a specific management structure and developed educational and tourist products, including geoheritage. They have their own brand, recognisable among tourists, and are therefore frequently visited. However, these are area-based forms of protection covering all components of the environment. Smaller forms of nature conservation—nature reserves, nature monuments, and documentation sites—can even be identified as geosites or their complexes [14,15].

Geoeducation in the field is an important part of education. However, geosites have varying educational potential. Their suitability for this purpose is not only based on the scientific value of the geosites themselves, but also on the legibility of the phenomena, processes, and components. The target group and level of education is an important factor. Many sites that present high value to professionals will not necessarily be of interest to children or ordinary tourists. The most important thing is the understanding of the given target group: to what extent, based on the environmental features present, the recipient can imagine certain geological phenomena and processes [16]. Geoeducational potential is part of geotourism potential, which is a broader concept and includes diverse elements of tourism infrastructure [17].

Geotourism, in order to promote the knowledge of geoheritage values primarily in geoparks and geosites (in Poland also in legal forms of protection—reserves of geoheritage and documentation sites or monuments of geoheritage), has developed methods of geoeducation that allow geo-interpretation and the achievement of cognitive goals by the audience, i.e., a broad education in geology. Geoheritage is promoted through geoproducts, which have great potential for local development and are an important tool in geoeducation [18–20]. Museums can also play an important role in the presentation of geoheritage [21,22].

When it comes to the educational role of geosites, a very important factor is the level of knowledge of the tourist about geoheritage. This can cover the spectrum from unaware observer to geo-expert. Grant [23] separated visitors into five groups: unaware visitor, aware visitor, interested visitor, geo-specialist, and geo-expert. The recipients of geotourism content therefore differ in their level of preparation for information reception, perception, and geo-interpretation. A geotourist’s level of content preparation determines the extent to which a geoheritage site is suitable for their education [17]. The educational offer should therefore take into account the above-mentioned diversity of audiences and be addressed to those with little knowledge of geodiversity, who constitute the majority among visitors. The geoeducational values (rarity, scientific knowledge, and educational products) of geotourism sites are in many cases very high and can play a special role in school education. Students are a special group of tourists because they have little expertise. At the same time, they have a “receptive mind, curiosity about the world and a big imagination”. In relation to this group, it is necessary to appropriately develop tourist facilities for geotourism, to prepare interactive exhibitions, and to offer games and activities related to geoheritage [24].

Geoeducation “is the process to facilitate learning, or the acquisition of knowledge about Geology through the use of geological sites” [25]. The dissemination of geoeducation is of great importance, as it is the main tool for conveying the importance of geoheritage

and the need to protect it. The promotion of geological thinking is possible through geoducation activities. At the same time, without education, it will be difficult to preserve and protect geodiversity [26]. Geoheritage through geo-protection and educational activities can be preserved for future generations [3].

Research conducted so far in Poland on the relationship between geosites and forms of nature protection has mainly focused on determining to what extent the existing system of nature protection covers important geoheritage sites, including those proposed for the European GEOSITES list [27,28]. Attention was drawn to the low importance of geoheritage in the establishment of some forms of protection—for example, the NATURA 2000 network. On the other hand, a whole number of national parks in Poland are located within areas of high geoheritage value (for example, the Tatra Mountains, Karkonosze, Pieniny, and many others). The possibility of establishing geoparks within landscape parks has also been pointed out [14,15]. However, the poor promotion of geoheritage values and the small number of geotourist products are still emphasised [29–32].

The aim of this study was to find out students' perceptions of geoheritage and assess the possibilities and actual use and potential with respect to geoducational and geotouristic purposes of geosites located in the Świętokrzyskie Province. This is an area of exceptional geodiversity value at the national scale. Detailed studies on geoheritage perception and geotouristic values were conducted on the basis of analyses made for eight geoheritage reserves. Four of them are located within The Holy Cross Mountains Geopark, and the others in its vicinity. Moreover, we designed a questionnaire survey addressed to schoolchildren to assess their knowledge of geoheritage sites, perceptions of geosites, and their use in school education. The number of studies on the use of geosites for education and tourism based on surveys of schoolchildren is still not large. Nature education, including geoheritage, conducted at school is particularly important because this is when a young person's perspective on the world is formed. As such, surveys were crucial to achieving the intended goals.

2. Methods

The recognition of the use of geosites in education was conducted using a questionnaire survey. This was carried out among young people—students of three secondary schools in the city of Starachowice. It is located outside the boundaries of The Holy Cross Mountains Geopark and was an important centre of iron mining and metallurgy. For the study, students were selected not from the provincial capital but from a smaller town, so as to obtain data representative of the larger population. The surveys were conducted in 2015, 2019, and 2021 in high school classes, most of which were geography classes. Students were informed on the purpose of the survey before taking it, and all surveys were anonymous. The survey consisted of 17 questions, both open-ended and closed. The questionnaire was prepared by the authors. In 2015, questionnaires were collected at schools (in paper form) by the authors of the study. In 2019 and 2021, responses were collected via an online survey. Data from the responses to open-ended questions were processed in a spreadsheet. For open-ended questions, similar responses were grouped. The main objectives of the survey were to identify students' interests, including the places they visit in their leisure time, and their knowledge of geotourism-related terms; to assess the value of the Earth's heritage in their immediate vicinity; to assess their knowledge of selected geosites and their tourism value; and to assess their use in school education. On this basis, an assessment was made of how much of the existing significant potential of geoheritage is used in formal and informal education (geotourism).

Below is the list of questions used in the questionnaire:

1. Where do you usually spend your summer holidays? (closest neighbourhood, mountains, Masuria, Baltic coast).
2. Do you have any special interests—your favourite subject at school?
3. Have you ever encountered the term geotourism? (yes, no)
4. What do you think the term geotourism means?

5. Have you ever been interested in geology or geotourism? (yes, no)
6. In your opinion, is the city of Starachowice attractive in terms of geotourism? (yes, no, hard to say)
7. Specify on a scale of 1 to 5 the tourist attractiveness of Starachowice and the surrounding area taking into account the factors listed: (5 highest value, 1—lowest value): Geoheritage sites (e.g., rocks, quarries), Biodiversity sites (e.g., forests, protected trees), Monuments, Possibility of relaxation, Transport accessibility, Accommodation, Catering facilities
8. How do you rate the geoheritage values of Starachowice and the surrounding area? (rating scale 1–6)
9. Do you think geoheritage sites (rocks, waterfalls, caves) can be a important tourist attraction? (yes, no)
10. Have you visited the nature reserves listed below in the current/last year?
11. Have the listed reserves ever been discussed during lessons?
12. Does the school organize field trips or lessons in the region to the eight listed nature reserves?
13. How did you learn about these sites? (tourist guides, lessons at school, from friends, others)
14. Which of the eight listed reserves do you think is the most interesting in terms of tourism? (select a maximum of three sites)

Eight geoheritage sites, which are also nature reserves, were studied—described and evaluated—as test sites. Sites with very different geoheritage values were selected. They are located in the vicinity of the city of Starachowice, where the survey among students was conducted. The scientific value, rank of geosites, and their distance from Starachowice varied. Half of the geosites are located within the boundaries of the Świętokrzyski Geopark. For the reserves, an assessment of their geotouristic values was carried out. This was done using the method proposed by Gajek et al. [7] for the assessment of the geoeducational values of the quarries of the projected Małopolski Vistula River Gap Geopark (Table 1). In each criterion, geosites could receive 0, 1, or 2 points.

Table 1. Criteria for the quantitative assessment of geotourist values of nature reserves; assessment rules after Gajek et al. [7].

Scientific	Educational	Functional	Tourist
Rarity (S1)	Availability of educational products (leaflets, interpretive boards) (E1)	Limitation to access (F1)	Scenic value (T1)
Scientific knowledge (S2)	Didactic potential (clarity of features) (E2)	Accessibility (distance from the paved road) (F2)	Location in relation to tourist trails (T2)
Geoheritage diversity (S3)	Availability of educational products (leaflets, interpretive boards) (E1)	Other educational sites in vicinity (F3)	Distance from tourist centres (T3)

An important element affecting the possibility of using geosites (nature reserves) in geoeducation is their time availability. In the case of formal education, it can be of a crucial character as lessons in the field can be implemented within a specific time regime. We analysed travel time by car from all schools (1118) in the Świętokrzyskie Province to 72 nature reserves. The determination of the time required to perform the geoeducational activity in the geosites was performed using the ArcMap application from the ArcGIS 10.8.1 software package. Linear data on roads and point data on the location of car parks, villages, and bus stops were obtained from the OpenStreetMap portal. The permissible speed of vehicle traffic was assigned for each road type. Data on nature reserves for the whole of Poland were provided by the portal of the General Directorate for Environmental Protection, and the list of schools was provided by the Ministry of Education and Science. Buffer zones (polygons) of accessibility, with predefined time intervals (0–15, 0–30, 0–60, 0–120 min), around pre-set points (schools) were designated, based on the existing road

network. Travel times were based on the existing road network and the assumed speed of travel. It was then determined for each reserve how many schools are located within the specified travel time zone.

3. Study Area

Świętokrzyskie Province is situated in the southeastern part of Poland and includes the Kielce Upland, the Nida Basin, and the Przedborska Upland. It is distinguished by a wealth of geological sites and their high quality for educational and cognitive purposes (Figures 1 and 2) [33,34]. A large part of the province is covered by protected areas, namely, 1 national park, 11 landscape parks, 57 nature reserves (including 25 geological reserves), 120 monuments of geoheritage, 12 documentation sites, 4 nature and landscape complexes, and 1 ecological utility. In the small territory of the Świętokrzyskie Mountains, we can find rocks dating from the Cambrian to the Neogene, which is a unique phenomenon on a European scale. The numerous quarries found here make it possible to observe tectonic structures, rocks, and fossils. This gives us an idea of the huge value of the Świętokrzyskie region in terms of its educational potential or research in the field of earth sciences [33]. The province has 21 sites listed in the Catalogue of Geotourist Sites and 259 geosites listed in the Central Register of Geosites of Poland. The highest concentration of sites is found in the central part of the province and they are connected with the highest ranges of the Świętokrzyskie Mountains (Figure 1). The characteristics of the reserves selected for detailed studies are presented below.

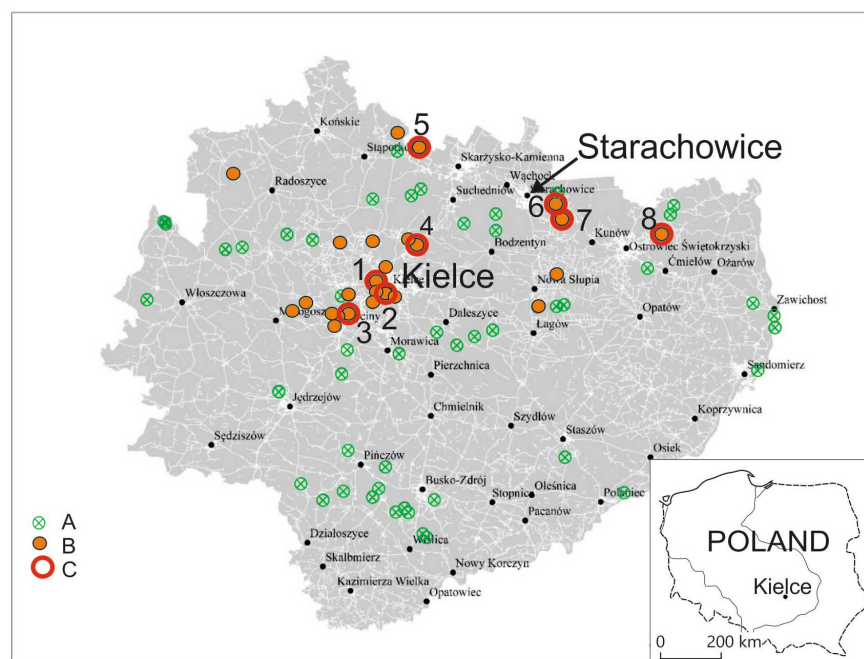


Figure 1. Nature reserves in Świętokrzyskie Province. A—nature reserves, B—geoheritage reserves, C—reserves under detailed study. 1—Kadzielnia, 2—Slichowice, 3—Jaskinia Raj, 4—Barcza, 5—Gagaty Sołtykowskie, 6—Skały pod Adamowem, 7—Skały w Krynkach, 8—Krzemionki Opatowskie.

Kadzielnia is an geoheritage reserve established in 1963 and described as the most valuable as well as the oldest geological site in Kielce. In the area of the reserve, there are Upper Devonian limestones with preserved remains of fauna. In one of the quarry walls, a clear Frasnian–Famennian boundary is exposed, which is a record of a mass extinction event at the end of the Devonian. In addition, the best preserved fossil karst forms in Poland occur here (Figure 2A). In the area of Kadzielnia, there are about 26 caves formed by young karst phenomena. Most of them (16) are located in the Geologists’ Rock. The largest of the caves is considered to be the Szczelina Kadzielniańska (Kadzielnia Gap); it measures

180 metres and has two access entrances. The Kadzielnia Reserve is one of the best suited geotourism sites in the Świętokrzyskie Voivodeship. It is an example of the excellent use of a post-mining area, by transforming it into a didactic park with an amphitheatre [34].

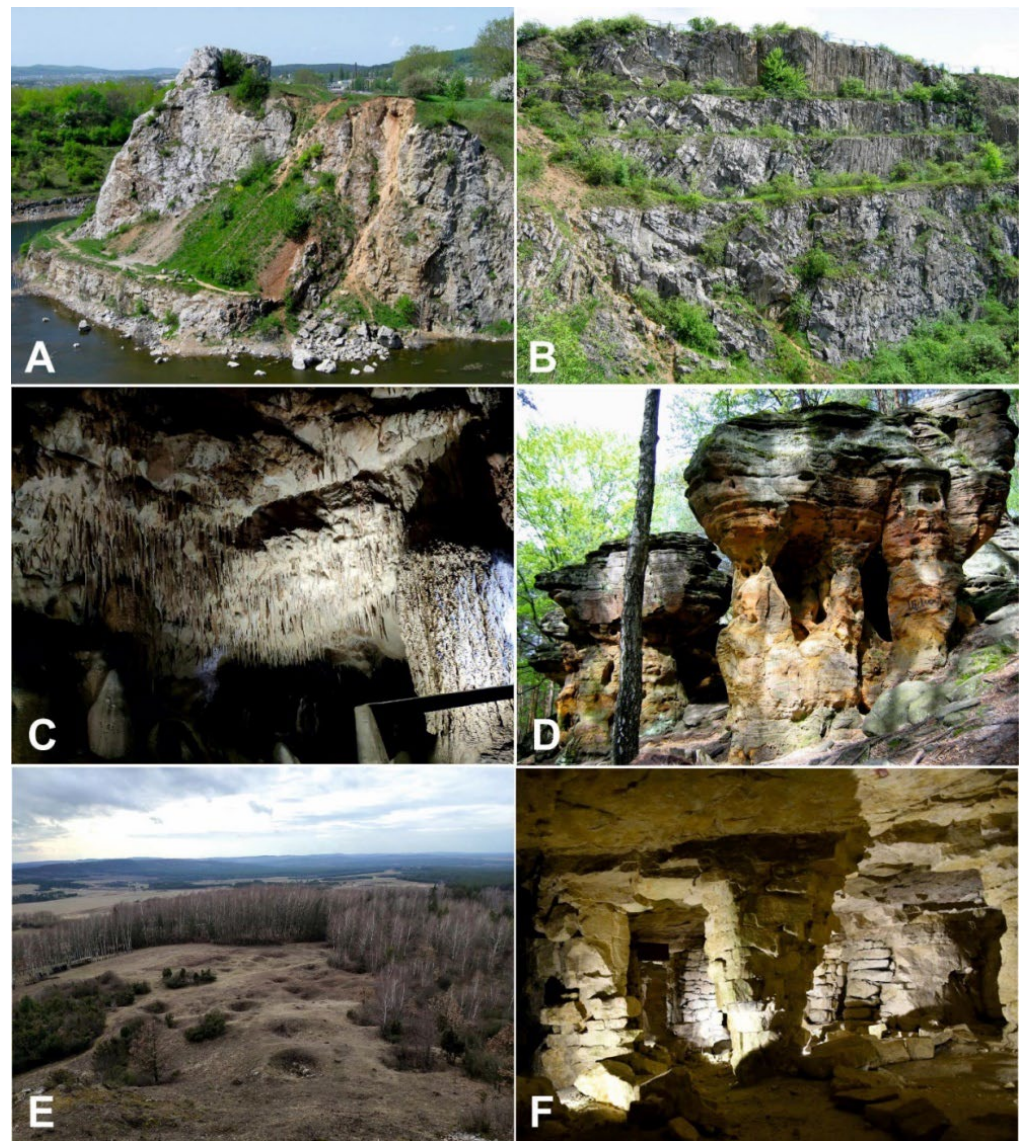


Figure 2. Examples of geoheritage in Świętokrzyskie Province. (A) Kadzielnia nature reserve, (B) Ślichowice nature reserve, (C) Jaskinia Raj nature reserve, (D) Piekło Pod Niekłaniem nature reserve, (E) Miedzianka nature reserve, (F) Krzemionki Opatowskie nature reserve. (Photo by W. Zgłobicki (A,B,D,F), Grzegorz Gajek (C,E), get permission from Grzegorz Gajek).

Ślichowice is the oldest geoheritage reserve in Poland, established in 1952. Strictly protected is the exposure of fold structures in Devonian limestone, exposed during the exploitation of a former quarry. The most valuable element is the exposed geological structure with two folds, an overthrown one and a lying one, which are a textbook example of this type of formation (Figure 2B). Numerous didactic excursions and increased interest in the area have contributed to the development of tourist facilities. Among other things, a nature trail with information boards has been created here. The location of the site also helps to develop the tourist function, as the reserve is situated on the shoreline of the city, which is another point of interest during excursions, but it is also a place of daily recreation for local residents [34].

Jaskinia Raj is one of the most beautiful caves in Poland, distinguished by its scientific, didactic, and aesthetic values. The length of the cave is 260 m, while the route open to the public is 145 metres long. The cave is under strict reserve protection [32]. The main value of the cave are the very well preserved limestone stalactites, stalagmites, stalagnates, columns, and cave pearls (Figure 2C). Also important is the life history contained in the mottling that fills most of the passages. Archaeological finds and research into them have made it possible to determine the history of the cave and the life that once existed here. Remains of a mammoth, a cave bear, a woolly rhinoceros, and a primeval bison, among others, have been discovered here [31]. Visiting the cave is possible almost all year round. It has been suitably adapted for tourist groups. A suitable walkway has been created to allow movement through it, the safety of visitors is ensured, and the facility is protected against damage.

The Barcza reserve is situated 8 km northeast of Kielce. It covers an area of 14.57 ha and includes two inactive quarries currently filled with water and forests occurring on the western side of Barcza Mountain. It is mainly protected by exposures of Lower Devonian sedimentary rocks [34]. The lakes were created as a result of human activity; they are the result of quartzite sandstone mining. The colour of the water in the lakes is a result of the presence of tuffite, a volcanic rock. The reserve's tourist facilities include a car park and a tourist shelter located at its entrance. Unfortunately, getting to the reserve is very difficult.

The Gagaty Sołtykowskie nature reserve is located in the northwestern part of the Świętokrzyskie Mountains. It covers 13.33 hectares of a former ceramic clay mine. The heaps and dumps formed after the former ceramic clay mining make the landscape of the site almost lunar [32]. The reserve mainly provides protection for the exposures of the Lower Jurassic rocks. The clays found here are rich in the remains of fossil flora, which in places are transformed into gagates, a jeweller's variety of lignite [34]. One of the reserve's most interesting values are the tracks of several Jurassic dinosaurs. They have been preserved in excellent condition, protected, and made accessible to the public through the construction of a wooden shelter to protect them from precipitation. Most of the tracks found there have not yet been exposed for fear of damaging them. Four information boards have been placed in the reserve to help visitors learn about the area and explain the phenomena occurring there, and a wooden platform has been prepared to facilitate access to the site [34].

The nature reserve **Skąły pod Adamowem** is located on the left slope of the valley of the Kamienna River. It covers an area of 8.98 hectares and stretches for about 800 m. The rocks found there are protected, some of them taking the form of pulpits, thresholds, walls, tables, and rock blocks. There are 50 sites in the reserve, most of them along the slope of the valley. The rocks vary in form and size, with the largest not exceeding 6 m, while the smallest are only 0.5 m [34]. Tourist facilities in the reserve are limited to educational boards and prepared resting places.

The Skąły w Krynkach reserve includes exposures of Triassic sandstone found on the right slope of the Kamienna River valley. The largest number of protected rock formations can be found on the northwestern slope of the elevated forest area. The site is distinguished by interesting geotouristic as well as landscape values [34]. Such rock formations as thresholds, cliffs, blocks, rock mushrooms, and cascades can be found in the reserve. Some of them reach 4 m in height and their size depends on the form they have taken. At the northern part of the reserve, there are also five cave structures and a unique rock gorge. The depth of the gorge reaches 10 m and its length is about 150 m. There is an educational board, which contains basic information about the reserve.

The Krzemionki Opatowskie archaeological reserve is located northeast of Ostrowiec Świętokrzyski. An area of 378 ha is protected here and includes a prehistoric mining field with 3000 shafts and galleries. In the past, it was the most important site in Europe for the extraction of striped flint, and is now one of the oldest and best preserved Neolithic mines both in Poland and Europe [31]. It is a unique geological and archaeological site, listed as a UNESCO World Heritage Site. A 465-m-long underground route is open

to visitors, allowing them to admire the flint workings and learn about the geology of the region (Figure 2F). Visitors are transported to another world while learning about the work of Neolithic miners, admiring the reconstruction of an encampment, a flint workshop, and the architecture of the mine. A number of attractions also await visitors above ground. A Neolithic settlement has been established there, where in the summer, museum lessons are organised for both children and adults to learn about the life of the people of that time [34]. The reserve plays an important educational role, with a rich offering of didactic activities. During the summer season, classes, archaeological workshops, or meetings with nature are organised here. Krzemionki Opatowskie has varied tourist offerings that will satisfy tourists of all ages (<https://krzemionki.pl>, accessed on 16 August 2023).

In April 2021, the UNESCO Executive Council approved the establishment of The Holy Cross Mountains Geopark. This is an association of municipalities that wants to nurture and promote the geological, cultural, and natural heritage of the region. The Holy Cross Geopark covers the area of five municipalities: Kielce, Chęciny, Morawica, Sitkówka, and Piekoszów. The value of the Geopark is due to its internationally unique geological diversity, which coexists with natural wealth and cultural heritage. It is a very important site for research into Europe's geological past. This is because it is located in the zone of the so-called Trans-European Tectonic Seam, a boundary area between three geological units of our continent. It is the only such area where sedimentary rocks from all periods of Earth's history from the Cambrian to the Quaternary (<https://geopark.pl/>) are exposed on the surface. Within the Geopark borders are the Kadzielnia, Ślichowice, Barcza, and Jaskinia Raj reserves.

4. Results

4.1. Geotouristic Assessment

All nature reserves in Świętokrzyskie Voivodeship are generally characterised by good transport accessibility. For 12 of them, the arrival and return time, including walking, is less than 2 h for more than 500 schools. For a further 30 reserves, the number of schools is greater than 100, while for 10, the arrival time for all schools is greater than 2 h.

Analyses performed for the eight selected reserves indicated that they are characterized by (a) varied accessibility, with a predominance of those easily accessible, and (b) high scientific values; (c) they are located at different distances from Starachowice, including reserves close to it; and (d) four reserves are located within The Holy Cross Mountains Geopark (Table 2).

Table 2. Transport accessibility of the studied nature reserves.

Nature Reserves	0–15 min (One Way)	0–30 min (One Way)	2 h (Return and Access to Site on Foot)
Number of Schools Located within a Certain Travel Time to the Reserve			
Kadzielnia	154	250	573
Ślichowice	154	240	510
Jaskinia Raj	31	242	285
Barcza	21	265	218
Gagaty	21	127	383
Sołtykowskie			
Skały pod Adamowem	54	165	229
Skały w Krynkach	16	154	147
Krzemionki	68	89	133
Opatowskie			

The individual reserves have varying geotourism values (Table 3). The highest scores were given to Kadzielnia and Ślichowice, followed closely by Jaskinia Raj and Krzemionki Opatowskie. Clearly lower in value are the reserves located in the northern

part of the region—Skały pod Adamowem and Skały w Krynkach—mainly due to their smaller rarity, lack of educational products, and greater distance from tourist centres. The reserves were characterised by their high didactic potential and convenient location in relation to tourist routes. The criteria related to the presence of educational products and the presence of other educational facilities in the immediate vicinity were rated the lowest. Among the analysed reserves, those located within the Świętokrzyskie Geopark received the highest marks. Concerning the others, only Krzemionki Opatowskie stands out in this assessment due to its status.

Table 3. Results of the geotouristic assessment of reserves.

Nature Reserves	S1	S2	S3	E1	E2	E3	F1	F2	F3	T1	T2	T3	Total
Kadzielnia	2	2	2	2	2	2	2	2	2	2	2	2	24
Slichowice	2	2	2	2	2	1	2	2	2	2	2	2	23
Jaskinia Raj	2	2	1	1	2	1	1	2	2	2	2	2	20
Barcza	2	1	1	0	1	2	1	2	1	1	1	1	14
Gagaty Sołtykowskie	2	1	1	1	1	1	1	0	0	0	2	1	11
Skały pod Adamowem	0	1	1	0	2	1	1	1	0	1	2	0	10
Skały w Krynkach	0	1	1	0	2	1	1	1	0	1	2	0	10
Krzemionki Opatowskie	2	2	2	2	2	2	2	2	1	1	0	1	19
Mean	1.5	1.5	1.4	1.0	1.8	1.4	1.4	1.5	1.0	1.3	1.6	1.1	

Assessment criteria as per Table 1.

4.2. Survey Research

A total of 350 questionnaires were completed. The age structure was as follows: under 18 years 38%, 18 years 40%, and 19 years 22%. A total of 61% of the respondents were women. The first question was focused on high school students' leisure preferences—holiday destinations. The most frequently chosen answer, indicated by 46% of the respondents, was the immediate surroundings. In second place, with 36% of indications, was the Baltic Sea coast. The least frequently students spend their holidays in the mountains, Masuria, and abroad. Another question concerned leisure time interests. As many as 19% of the respondents were unable to indicate any specific interests. The most popular among the surveyed group was sport (18% of answers).

Geography and English (15% each) were indicated by the respondents as their favourite subject at school. Mathematics (along with computer science) was chosen by 10% of the respondents. A large group of students (27%) showed other passions, unrelated to school subjects. The vast majority—79% of the respondents—said they had never been interested in geology and geotourism. Only 21% of the respondents declared knowledge or interest in this topic.

Nearly 70% of the respondents indicated that they were familiar with the term geotourism. Only 13% of all respondents did not attempt to define the term. Respondents accounting for 80%, the vast majority, defined the term correctly or came close to explaining it correctly. Students connect geotourism (grouped answers) with: tourism; a combination of geography and tourism; a branch of tourism related to the geological attractiveness of a place; tourism related to the acquisition of geographical knowledge; visits to natural places; the most beautiful holiday places; natural places; travelling and sightseeing; tourism where we learn about the geology of a place; tourism that is related to geographical objects; tourism at the level of caves and mountains; sightseeing in the mountains; the science of tourism; tourism of the interior of the Earth; geothermal tourism; agrotourism; tourism testifying to the attractiveness of the region; tourism connected with the Earth; tourism connected with nature; tourism connected with geological research; recreation; and spending free time in an interesting way.

Respondents also assessed the area around Starachowice (their place of residence) in terms of geotourism. As many as 54% of the respondents believed that it is not an attractive place, only 24% were of the opposite opinion, and 22% of the respondents could not express

Table 5. Educational use of the studied nature reserves.

Nature Reserve	Have You Visited the Reserve This/Last Year?		Were the Listed Reserves Discussed in Lessons ?		Does the School Organise Field Trips or Lessons in the Region (in Reserves)?	
	Yes	No	Yes	No	Yes	No
Kadzielnia	29%	71%	21%	79%	9%	91%
Jaskinia Raj	28%	73%	59%	41%	20%	80%
Krzemionki Opatowskie	16%	84%	50%	50%	7%	93%
Slichowice	6%	94%	5%	95%	1%	99%
Skały pod Adamowem	21%	79%	10%	90%	2%	98%
Skały w Krynkach	22%	78%	7%	93%	2%	98%
Barcza	9%	91%	11%	89%	-	100%
Gagaty	5%	95%	4%	96%	-	100%
Sołtykowskie						

Students rated the tourist attractiveness of the surveyed nature reserves. According to almost 50% of the respondents, the Jaskinia Raj is the most attractive. They pointed out that the cave has interesting, well-preserved geological formations that are rarely seen and is easily accessible. The second most frequently selected site was Krzemionki Opatowskie, and 12% of respondents considered it to be unique and one of a kind, difficult to find in the rest of the country. The main advantages of the others, according to the respondents, are their uniqueness, naturalness, and the awe they inspire in both older and younger tourists.

As sources of information about studied geosites, most people indicated tourist guides (25%). The next most common answer with 24% was lessons at school. An equal number of people, 20%, said that their main source of information about geotourist sites were their friends. According to the respondents, the biggest problem for the educational and touristic use of the surveyed geotourism sites is the lack of information about the sites in question, hence their low awareness among tourists. Approximately 16% of the respondents indicated that factors that reduce the potential of the sites are the poor communication accessibility and low attractiveness of the sites.

5. Discussion

5.1. Educational Context of Field Classes

Field activities are a mandatory part of school activities. At the same time, conducting field activities is very helpful for school education. Activities outside the usual classroom environment inspire students and teachers. It is a more engaging and self-directed teaching method, stimulating, inspiring, and improving students' motivation; developing the ability to cope with new situations; developing thinking skills to formulate conclusions based on direct observations of nature; developing the ability to search, select, and analyse information; and developing teamwork skills. Swietokrzyskie Province is one of the areas with outstanding geoheritage and thus geoeducational potential. Nature reserves are well accessible, which creates opportunities for organizing classes in the field. This study was conducted to determine whether this potential is used during school education, how students perceive the Earth's heritage, and whether geoheritage sites arouse their interest. The range of content that can be covered during field activities on the Earth's heritage can be implemented primarily in geography lessons. The realized content may include the ability to read a map, conduct field observations of geology and geomorphology, identify relationships between these components of the environment, document environmental features, and determine human–environment relations. In particular, this may include identifying rocks in the immediate area, describing geological and soil exposures, and making simple geological and geomorphological maps. This allows a better understanding of environmental changes in the past, determining future scenarios of environmental

changes and their impact on humans. The surveys allowed us to determine how much teachers and students take advantage of the opportunities provided by lessons in the field.

5.2. Geoheritage Knowledge

The studies carried out indicate that the geoeducational use of the studied geosites (reserves) varies, but this is not always related to the objective geotourism potential of these sites. The most important factor seems to be the lack of education at school level. The majority of respondents claimed not to have encountered the term geotourism or to have had any particular interest in it. Nevertheless, almost all made an attempt to define it, and interestingly most of the answers were correct. Almost all respondents recognised that geoheritage sites can be a tourist attraction and a magnet for travellers. However, young people have little knowledge of the geoheritage values of their city and region. Although some of the sites with unique values were known to them (Jaskinia Raj, Kadzielnia), others, also unique (Ślichowice, Krzemionki Opatowskie), were not. At the same time, those who had visited them rated these sites as very valuable. Despite their uniqueness on a national and European scale, the studied reserves were also not discussed in geography lessons. They can not only be a destination but also a mine of knowledge, which, however, is not used. The students admitted that their schools do not attempt to organise excursions or geology lessons within them. This is despite their fairly good accessibility to the reserves and the availability of numerous scientific publications. Many of the valuable reserves are within walking distance of a large number of schools and could be used for field lessons. Pupils are more likely to know and visit sites that are either the most recognisable or close to where they live. But even in this case, only 20–30% of the respondents visited them. Only a small proportion of respondents knew the value of the geodiversity of the nearest area. At the same time, they do not receive theoretical knowledge in this area during lessons at school and do not get to know it during field classes and excursions. The most well-known ones turned out to be those recognised nationally, i.e., the Jaskinia Raj and Krzemionki Opatowskie, with an established position on the school excursion market. This is certainly the result of the tourist development of these sites and the extensive geoeducational offer (<https://jaskiniaraj.pl/>, accessed on 17 November 2023, <https://muzeumostrowiec.pl/krzemionki/>, accessed on 17 November 2023). They themselves are already a geotourism product. School excursions offered by tourist offices are a separate problem. There is also a lack of knowledge of local heritage among teachers, or a lack of willingness to discuss geological issues on their own in geosites that are not prepared for geoeducation.

The results of other studies indicate a generally high interest of young people in geotouristic values. Miraj and Moskwa [35] surveyed secondary school students (288 persons) from the Małopolskie and Dolnośląskie Provinces. The majority of young people considered field activities and lessons as interesting forms of geoeducation, because they allow them to learn about geology in situ, within geosites. They were most eager to acquire knowledge through games and plays. When perceiving new geological knowledge, the most important sense was sight, which allows one to see and observe geological objects, phenomena, and processes. An important aspect was the appropriate preparation of the guide. Additionally, the active participation of young people in the educational process, supported by interesting geoproducts and modern forms of tourist development, was a valuable element. In another study, Moscow and Miraj [36] wanted to know the opinion of geography teachers about geotourism. Teachers declared that they use geological objects located in the immediate vicinity in education or discuss geological objects and phenomena during excursions. They also appreciated the opportunities offered in geoeducation by geoparks, although not even half of them have been there. According to the teachers, 25% of students were interested in geology. In order to promote geotourism in school education, it is advisable to prepare professional educational materials for teachers, scenarios, or ready-made field lessons. According to the 2016 survey, 75% of the teachers conducted field classes at least once a semester. The most common topics during field classes were

(a) regional geography (68% of cases) and (b) geomorphology classes (also implemented by 68% of respondents). This was followed by topics in hydrology (63% of cases), meteorology (60%), and geology (55%) [37].

Wójtowicz [38] conducted a study whose main aim was to find out the opinions of university students regarding their knowledge of geoparks and their development in terms of geotourism in the Kielce area. The majority of the students showed great interest in this issue. In their opinion, investments such as the creation of new tourism products, didactic paths, and hiking trails can bring positive results when it comes to the development of geotourism in the Kielce area. Referring to their experience, they acknowledged that the best form of conveying information and education in the field of geology, geography, and ecology, or shaping and protecting the natural environment are field classes. As examples of well-adapted facilities for this type of education, the respondents pointed to sites such as the Kadzielnia, Ślichowice, or Wietrznia nature reserves. It is therefore worth investing in these and other sites to make them more accessible and interesting for tourists, which will certainly also translate into interest in the whole region.

Wójtowicz [39] also conducted a survey among the inhabitants of Kielce and the Świętokrzyskie region (560 people). The initial questions concerned the respondents' knowledge of geoparks; more than half (66%) of the respondents had encountered the term before. However, only 13% were able to define it correctly or fairly correctly. The remaining 34% stated that they have never heard of the term and do not even attempt to define it. When asked to give examples of geoparks, 5% were able to give urban geoparks and only 2% those in the region. The most frequently mentioned were Kadzielnia, Karczówka, and Wietrznia. Residents believed that geotourism is a great opportunity for the economic development of the city, but unfortunately they did not see the opportunity to create new jobs. They considered the most important functions of geotourism to be the protection of the natural environment, the preservation of geological heritage, and the creation of a new tourism product. Respondents considered the Świętokrzyskie nature reserves to be very well preserved, and ideal for leisure, tourism, or educational purposes, such as holding didactic classes for pupils or students. The survey shows that the local community is interested in the development of the region and is aware of the great resources at its disposal. Residents rated the tourist attractiveness of the facilities very highly, which is worth taking advantage of.

5.3. Geoproducts and Geoeducation

From the point of view of increasing interest in geotourism among a wide range of audiences, geotourism potential should be fully recognised and geotourism assessment should be carried out. This allows to gather comprehensive information and assess the suitability for conducting geoeducation, which will allow adaptation to the level of the audience [40]. Methods for the assessment of geosites are primarily based on point boning, the subjectivity of which can be reduced by properly defining criteria and describing the principles of boning. In the case of educational criteria, Chrobak [41] proposes the so-called expert triangulation, in which, apart from the author, the same analyses are carried out by other researchers, which gives more objective results.

As research has shown, pupils show an interest in natural hazards and palaeontology, which should be an important factor in reinforcing the importance of geological heritage and the need to protect it [42]. However, this knowledge is not always acquired at the appropriate level during school education [43]. The preservation of geodiversity can be a matter of public concern, provided that the younger generations are properly educated and that information activities are carried out in local communities [24]. In order to better promote and increase interest in geotourism, it is advisable to recognise geodiversity more widely and propose a network of geodiversity sites, with different scientific potential and good accessibility, and with prepared educational material for different audiences [44]. From the point of view of geoheritage conservation, the traditional attitudes of geotourists who like to collect geological specimens as souvenirs are of concern. Undoubtedly, this is a

‘basic need’ especially for children and young people. As Clary and Wandersee [45] state, the “education of the geotourist is always a good investment”. Another way is to prepare geoproductions in the form of “geo-memorabilia” directly related to the place and the nature of the heritage.

Field trips are seen as an effective way of learning [46]. Exploring geodiversity in situ reinforces the cognitive dimension of geoeducation, as it allows direct observations [47]. At the same time, however, the over-exploration of geo-sites can lead to their destruction [48]. Increasingly, modern 3D visualisation techniques are therefore being used in geoeducation to present geosites. Such virtual tours have great potential. They are seen as an interactive way of increasing interest in geodiversity and improving learning efficiency, and at the same time, they can encourage people to go to these sites [49,50].

Studies indicate the great importance of geoeducation for the promotion of geodiversity. The aim of geoeducation is to raise public awareness of its value and responsibility for preserving these values, and thus the need for protection [24,51]. The demand for information about geodiversity is increasing. As part of geoeducation, it is very important to carry out an interpretation of geodiversity according to the target group. Education can be carried out via websites and on site in the form of geotrails and educational trails equipped with boards (supplemented, for example, by information in the form of mobile phone apps), exhibitions in geocentres, workshops and hands-on activities, or traditional field guides and maps. To be attractive and effective, the geoeducation offer should be presented using a variety of devices, media, and platforms in a form adapted to the audience [49,52]. For younger participants, it is advisable to combine education with entertainment—games and experiments, or, for example, searching for fossils or minerals [51]. Interactive team games can be an important instrument for teaching geology and palaeontology [53], and confrontation with reality can reinforce the message. Geoeducation is a tool to increase knowledge not only in students, but in entire local communities [24,54]. A separate form of promoting geoheritage is lapidaries, which allow for the enrichment of the geoeducational offer [55], even in areas without outstanding geosites [56]. Finally, the development of geoeducation and geotourism needs to be considered in the spatial planning process [57].

Geoeducation needs diverse tools to facilitate the transfer of geological knowledge, and the content should be tailored to the audience [58]. The basis is the preparation of geoproductions [18] which are “innovative, new or reinvented traditional shopping products that are closely linked to or inspired by the geodiversity of the territory” [59]. Geoproductions—the geological symbol of an area—are a link between geological heritage and regional traditions and culture, because they are made from local materials [9]. They are usually an important tool for promoting geoparks and include the following categories: 1. handicrafts and merchandising, 2. food, cosmetics, and other products, 3. tourism infrastructure facilities, and 4. tourism services [60]. Some of these can also be commonly applied to other areas of high geodiversity value or in their immediate surroundings. Specific geoproductions—handicrafts combining traditional products with geology, in the production of which local communities will be involved—may also be an important element of this education [61]. A geotourism product is characterised by “a focus on geodiversity and geological heritage; an enhanced educational function and the need for strong audience involvement; impressions, emotions and new experiences combined with learning about geoheritage; the specificity of communicating difficult geological knowledge to a wide audience” [20]. In the case of geotourism, a hands-on activity strategy should be applied in the interpretation of geological heritage [62], which allows for the active and direct involvement of geotourists [63], which is of great importance in the education of children and young people. As the survey research in this article has shown, sites with well-established tourism events and a rich educational offer are commonly known, and these are mainly held by the educational facilities of geoparks and other museum sites. Another direction that can enhance the development of geotourism is the use of natural and cultural values in promoting geodiversity [64–73].

In Poland, more and more papers presenting the geotouristic potential of various areas and the geoeducational role of geosites are published [65–72]. Based on the assessment of educational values, they include proposals for geoeducational activities and detailed solutions dedicated to various audiences and the concept of wide promotion. Among the most interesting proposals are local initiatives for the promotion and development of the geotourism offer. The educational offer of the Land of Extinct Volcanoes Geopark (<https://www.gorykaczawskie.pl/>, accessed on 19 November 2023), which is in the process of evaluation, stands out here, with its educational centre “Sudety Educational Farm” and an offer of broad cooperation for the scientific community. The idea of a geopark is being implemented by the Kaczawskie Partnership Local Action Group. Another example is the proposed Glacial Land Geopark on the Oder River with the educational pathway Pleistocene Promenade in Moryń, which attracts the interest of visitors of all ages (in May 2023, the number of visitors exceeded 10,000, <https://www.moryn.pl/art,3215,ponad-10-tys-zliczen-osob-na-alei-gwiazd-plejstocenu-w-maju>, accessed on 19 November 2023), or the lapidaries in Moryń and Trzcińsko-Zdrój. Such geoproducts will contribute to a better use of geological sites in geoeducation.

For children and young people, geoeducation in the form of field activities and excursions is of the utmost interest. It allows the active and independent observation of geological and geomorphological objects, phenomena, and processes in the natural environment. Direct acquaintance with geological objects in situ, using skilfully prepared didactic materials, increases the effectiveness of teaching [35]. From a didactic point of view, pathways to the objects and visual materials are essential: information boards with texts, figures, photographs, and explanatory diagrams. The development of geotourism is necessary, and comprehensively prepared routes and geosites are an important element in planning trips [36]. Making a geotourist site accessible should allow for tourist traffic, the preservation of geodiversity, and the preparation of geo-interpretation facilities with infrastructure for knowledge acquisition [73,74].

One of the effects of geoeducation is to sensitise the audience to geodiversity and raise their awareness, resulting in geo-protection. Well-prepared programmes carried out in the field by experts allow for a better understanding of geosites with a full understanding of the processes by which they were created [75]. Geosites are seen as one of the most important geoeducational resources [76].

6. Conclusions

The Świętokrzyskie region is one of the most valuable regions in Poland in terms of geoheritage value. There are numerous exposures and geomorphological sites here, providing an excellent training ground for field lessons. At the same time, a large part of them is located in close proximity to schools, allowing them to organize lessons in the field.

The majority of surveyed students had a moderate knowledge of valuable geoheritage sites located in their region of residence. In the case of the most well-known ones, 20–30% of the respondents declared to have visited them, mainly during private trips. The educational potential is poorly exploited at school. Field classes are generally not organised. This is despite the need to organise them being introduced in the programmes of schools in Poland. The next step should be a survey of teachers about their perceptions of field classes—their own experiences, difficulties, and expectations of scientists.

The students were better acquainted with geosites in the immediate vicinity and those located further away but are characterised by an extensive tourist offer. Scientific and educational value does not play a role here. Geosites that are unique in the country remain unknown. Organisational difficulties, but also the lack of wide promotion among teachers and the preparation of adequate didactic materials, result in the fact that even in the case of geosites located close by, they are not fully used in field geoeducation. This indicates the need for the further promotion of geological and geomorphological values and the activation of teachers in this field.

Schools play a very important role in the development of geoeducation and geotourism, as this is when cognitive needs are formed. A large proportion of students indicated geotourist values as important for undertaking tourism activities. An opportunity to increase the knowledge of the geoheritage values of the region among young people and to develop geoeducation is certainly the establishment of a geopark. Its educational offer is interesting and is still being developed based on the Geoeducation Centre in Kielce.

In Poland, geotourism is in its infancy, with two UNESCO Global Geoparks and two national geoparks established to date. They are better known for their form of legal protection than as geosites. Much more popular are mines that showcase natural geoheritage features or document mineral exploitation. Geosites are of lesser importance as tourist attractions. Although some geosites have a high potential, they are not always properly used in geoeducation, often due to a lack of knowledge about them. A number of geosites do not lack adequate educational infrastructure, which could result in more geotourism traffic in the future.

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References

1. Reynard, E. Geosite. In *Encyclopedia of Geomorphology*; Goudie, A.S., Ed.; Routledge: London, UK, 2004.
2. Dowling, R.K. Geotourism's Global Growth. *Geoheritage* **2011**, *3*, 1–13. [CrossRef]
3. Hose, T.A. 3G's for modern geotourism. *Geoheritage* **2012**, *4*, 7–24. [CrossRef]
4. Newsome, D.; Dowling, R.K. Setting an agenda for geotourism. In *Geotourism: The Tourism of Geology and Landscape*; Newsome, D., Dowling, R., Eds.; Goodfellow Publishers Limited: Oxford, UK, 2010; pp. 1–12.
5. Brilha, J. Inventory and Quantitative Assessment of Geosites and Geodiversity Sites: A Review. *Geoheritage* **2016**, *8*, 119–134. [CrossRef]
6. Herrera-Franco, G.; Carrión-Mero, P.; Montalván-Burbano, N.; Caicedo-Potosí, J.; Berrezueta, E. Geoheritage and Geosites: A Bibliometric Analysis and Literature Review. *Geosciences* **2022**, *12*, 169. [CrossRef]
7. Gajek, G.; Zglobicki, W.; Kołodyńska-Gawrysiak, R. Geoeducational Value of Quarries Located within the Małopolska Vistula River Gap (E Poland). *Geoheritage* **2019**, *11*, 1335–1351. [CrossRef]
8. Štrba, L.; Vravcová, A.; Podoláková, M.; Varcholová, L.; Kršák, B. Linking Geoheritage or Geosite Assessment Results with Geotourism Potential and Development: A Literature Review. *Sustainability* **2023**, *15*, 9539. [CrossRef]
9. Farsani, N.; Coelho, C.; Costa, C. Geotourism and geoparks as novel strategies for socio-economic development in rural areas. *Int. J. Tour. Res.* **2011**, *13*, 68–81. [CrossRef]
10. Zouros, N. The European Geoparks Network. *Episodes* **2004**, *27*, 165–171. [CrossRef]
11. Ólafsdóttir, R.; Dowling, R. Geotourism and Geoparks—A Tool for Geoconservation and Rural Development in Vulnerable Environments: A Case Study from Iceland. *Geoheritage* **2014**, *6*, 71–87. [CrossRef]
12. Frey, M.L. Geotourism—Examining Tools for Sustainable Development. *Geosciences* **2021**, *11*, 30. [CrossRef]
13. Centralny Rejestr Geostanowisk Polski (CRGP). Available online: <https://geoportal.pgi.gov.pl/portal/page/portal/geostanowiska> (accessed on 15 August 2023).
14. Alexandrowicz, Z.; Miśkiewicz, K. Geopark—Od idei do realizacji, ze szczególnym uwzględnieniem Polski. *Chrońmy Przyr. Ojczystą* **2016**, *72*, 243–253.
15. Sygar, S.; Zglobicki, W. Geoheritage Resources in Polish Landscape Parks as a Basis for Developing a Network of Geoparks. *Land* **2022**, *11*, 2277. [CrossRef]

16. Drápela, E. Assessing the Educational Potential of Geosites: Introducing a Method Using Inquiry-Based Learning. *Resources* **2022**, *11*, 101. [\[CrossRef\]](#)
17. Welc, E.; Miśkiewicz, K. The Concept of the Geotourism Potential and Its Practical Application: A Case Study of the Prządki (the Spinners) Nature Reserve in the Carpathians, Poland. *Resources* **2020**, *9*, 145. [\[CrossRef\]](#)
18. Drygas, D.; Miśkiewicz, K. Construction of the geotourism product structure on the example of Poland. In Proceedings of the GeoConferences on Ecology, Economics, Education and Legislation, 14th International Multidisciplinary Scientific Geoconferences SGEM 2014, Albena, Bulgaria, 17–26 June 2014; Volume 2, pp. 155–162.
19. Miśkiewicz, K. Promoting geoheritage in geoparks as an element of educational tourism. In *Geotourism: Organization of the Tourism and Education in the Geoparks in the Middle-Europe Mountains*; Szponar, A., Toczec-Werner, S., Eds.; University of Business in Wrocław: Wrocław, Poland, 2016; pp. 37–48.
20. Miśkiewicz, K. Produkt geoturystyczny jako narzędzie geoedukacyjne i metoda promocji dziedzictwa geologicznego Polski. *Przegląd Geol.* **2023**, *71*, 314–320.
21. Venturini, C.; Pasquaré Mariotto, F. Geoheritage promotion through an interactive exhibition: A case study from the Carnic Alps, NE Italy. *Geoheritage* **2019**, *11*, 459–469. [\[CrossRef\]](#)
22. Zgłobicki, W.; Szalewicz, A.; Gajek, G.; Baran-Zgłobicka, B. Underground tourist routes as an element of Poland's cultural heritage. *Museol. Cult. Herit.* **2023**, *11*, 81–109. [\[CrossRef\]](#)
23. Grant, C. Towards a typology of visitors to geosites. In Proceedings of the Second Global Geotourism Conference, Making Unique Landforms Understandable, Mulu, Malaysia, 17–20 April 2020.
24. Migoń, P. *Geoturystyka*; PWN: Warszawa, Poland, 2012.
25. Brocx, M.; Semeniuk, V. The '8Gs'—A blueprint for Geoheritage, Geoconservation, Geo-education and Geotourism. *Aust. J. Earth Sci.* **2019**, *66*, 803–821. [\[CrossRef\]](#)
26. Zafeiropoulos, G.; Drinia, H.; Antonarakou, A.; Zouros, N. From Geoheritage to Geoeducation, Geoethics and Geotourism: A Critical Evaluation of the Greek Region. *Geosciences* **2021**, *11*, 381. [\[CrossRef\]](#)
27. Alexandrowicz, Z. Framework of European geosites in Poland. *Nat. Conserv.* **2006**, *62*, 63–87.
28. Alexandrowicz, Z.; Poprawa, D.; Rączkowski, W. The regional network of geosites in the Polish Carpathians. *Przegląd Geol.* **1998**, *46*, 775–780.
29. Wimbledon, W.; Ishchenko, A.; Gerasimenko, N.; Alexandrowicz, Z.; Vinokurov, V.; Liscak, P.; Bevins, R. A first attempt at a geosites framework for Europe—an IUGS initiative to support recognition of World Heritage and European Geodiversity. *Geol. Balc.* **1998**, *28*, 5–32.
30. Zgłobicki, W.; Kołodyńska-Gawrysiak, R.; Gawrysiak, L. Gully erosion as a natural hazard: The educational role of geotourism. *Nat. Hazards* **2015**, *79* (Suppl. 1), 159–181. [\[CrossRef\]](#)
31. Warowna, J.; Zgłobicki, W.; Kołodyńska-Gawrysiak, R.; Gajek, G.; Gawrysiak, L.; Telecka, M. Geotourist values of loess geoheritage within the planned Geopark Małopolska Vistula River Gap, E Poland. *Quat. Int.* **2016**, *399*, 46–57. [\[CrossRef\]](#)
32. Zgłobicki, W.; Kukielka, S.; Baran-Zgłobicka, B. Regional Geotourist Resources—Assessment and Management (A Case Study in SE Poland). *Resources* **2020**, *9*, 18. [\[CrossRef\]](#)
33. Wróblewski, T. *Ochrona Georóżnorodności w Regionie Świętokrzyskim: Z Mapą Chronionych Obszarów i Obiektów Przyrody Nieożywionej 1:200,000*; Państwowy Instytut Geologiczny: Warszawa, Poland, 2000.
34. Słomka, T. (Ed.) *Katalog Obiektów Geoturystycznych w Obrębie Pomników i Rezerwatów Przyrody*; Akademia Górniczo-Hutnicza: Kraków, Poland, 2012.
35. Miraj, K.; Moskwa, K. Jak zainteresować młodzież geologią?—Czyli geoedukacja i geoturystyka w opinii uczniów szkół średnich. In *Geo-Produkt od Geoedukacji do Innowacji. Geopark Przedgórze Sudeckie*; Jawecki, B., Tarka, R., Eds.; Ocean: Piława Górna, Poland, 2017; pp. 55–64.
36. Moskwa, K.; Miraj, K. Geoturystyka w pracy dydaktyczno-wychowawczej nauczyciela geografii. *Geotourism* **2018**, *3–4*, 3–10. [\[CrossRef\]](#)
37. Angiel, J.; Hibszer, A.; Szkurlat, E. Zajęcia terenowe—Szansa dla szkolnej edukacji geograficznej i wyzwania dla nauczycieli. *Pr. I Stud. Geogr.* **2021**, *66*, 7–18. [\[CrossRef\]](#)
38. Wójtowicz, B. Możliwości rozwoju turystyki i edukacji na obszarach geoparków w opinii studentów geografii UJK Kielce. *Probl. Ekol. Kraj.* **2011**, *29*, 133–140.
39. Wójtowicz, B. Postawy i oczekiwania społeczności lokalnej wobec rozwoju geoturystyki na obszarach chronionych miasta Kielc i regionu świętokrzyskiego. *Probl. Ekol. Kraj.* **2011**, *29*, 123–132.
40. Welc, E.; Miśkiewicz, K. Geoturystyka i geoedukacja w rezerwacie przyrody nieożywionej „Prządki” im. Prof. Henryka Świdzińskiego. *Geotourism* **2019**, *1–2*, 11–42. [\[CrossRef\]](#)
41. Chrobak, A. Przegląd metod waloryzacji obiektów przyrody nieożywionej wykorzystywanych w geoturystyce. *Stud. Ind. Geogr. Comm. Pol. Geogr. Soc.* **2021**, *35*, 116–145. [\[CrossRef\]](#)
42. Fermeli, G.; Meléndez, G.; Koutsouveli, A.; Dermitzakis, M.; Calonge, A.; Steininger, F.; D'Arpa, C.; Di Patti, C. Geoscience teaching and student interest in secondary schools—preliminary results from an interest research in Greece, Spain and Italy. *Geoheritage* **2015**, *7*, 13–24. [\[CrossRef\]](#)

43. Georgousis, E.; Savelides, S.; Mosios, S.; Holokolos, M.-V.; Drinia, H. The Need for Geoethical Awareness: The Importance of Geoenvironmental Education in Geoheritage Understanding in the Case of Meteora Geomorphes, Greece. *Sustainability* **2021**, *13*, 6626. [\[CrossRef\]](#)
44. Habibi, T.; Ruban, D.A.; Yashalova, N.N. Complex Geosites as a Unique Resource and Challenge for Management: Evidence from an Exposed Salt Diapir. *Geoheritage* **2022**, *14*, 11. [\[CrossRef\]](#)
45. Clary, R.M.; Wandersee, J.H. Lessons from US Fossil Parks for Effective Informal Science Education. *Geoheritage* **2014**, *6*, 241–256. [\[CrossRef\]](#)
46. Fuller, I.C. What is the value of fieldwork? Answers from New Zealand using two contrasting undergraduate physical geography field trips. *N. Z. Geogr.* **2006**, *62*, 215–220. [\[CrossRef\]](#)
47. Singtuen, V.; Vivitkul, N.; Junjuer, T. Geoeducational assessments in Khon Kaen National Geopark, Thailand: Implication for geoconservation and geotourism development. *Heliyon* **2022**, *8*, e12464. [\[CrossRef\]](#)
48. Berrocal-Casero, M.; Arribas, M.; Moratalla, J.J. Didactic and divulgative resources of the middle Triassic vertebrate tracksite of Los Arroturos (province of Guadalajara, Spain). *Geoheritage* **2018**, *10*, 375–384. [\[CrossRef\]](#)
49. Magagna, A.; Ferrero, E.; Giardino, M.; Lozar, F.; Perotti, L. A selection of geological tours for promoting the Italian geological heritage in the secondary schools. *Geoheritage* **2013**, *5*, 265–273. [\[CrossRef\]](#)
50. Bonali, F.L.; Russo, E.; Vitello, F.; Antoniou, V.; Marchese, F.; Fallati, L.; Bracchi, V.; Corti, N.; Savini, A.; Whitworth, M.; et al. How Academics and the Public Experienced Immersive Virtual Reality for Geo-Education. *Geosciences* **2022**, *12*, 9. [\[CrossRef\]](#)
51. Palgutová, S.; Štrba, L. Geoheritage of the Precious Opal Bearing Zone in Libanka Mining District (Slovakia) and Its Geotourism and Geoeducation Potential. *Land* **2022**, *11*, 2293. [\[CrossRef\]](#)
52. Mikhailenko, A.V.; Zorina, S.O.; Yashalova, N.N.; Ruban, D.A. Promoting Geosites on Web-Pages: An Assessment of the Quality and Quantity of Information in Real Cases. *Resources* **2023**, *12*, 61. [\[CrossRef\]](#)
53. Reuss, R.L.; Gardulski, A.F. An interactive game approach to learning in historical geology and paleontology. *J. Geosci. Educ.* **2001**, *49*, 120–129. [\[CrossRef\]](#)
54. de la Cita, L.; Llandres, M.; Buscalioni, Á.D. Heritage Outreach, Fossils, Dinosaurs and Sites: How Locals' Perception Changes After 10 Years of Actions in Historic Urban Villages (Cuenca, Spain). *Geoheritage* **2021**, *13*, 53. [\[CrossRef\]](#)
55. Górka-Zabielska, M. O niektórych zasobach geoturystycznych planowanego geoparku Kraina Polodowcowa nad Odrą. *Tur. I Rekreac. Stud. I Pr.* **2016**, *18*, 9–26.
56. Górka-Zabielska, M. New Geoeducational Facilities in Central Mazovia (Poland) Disseminate Knowledge about Local Geoheritage. *Sustainability* **2023**, *15*, 16115. [\[CrossRef\]](#)
57. Németh, B.; Németh, K.; Procter, J.N. Visitation Rate Analysis of Geoheritage Features from Earth Science Education Perspective Using Automated Landform Classification and Crowdsourcing: A Geoeducation Capacity Map of the Auckland Volcanic Field, New Zealand. *Geosciences* **2021**, *11*, 480. [\[CrossRef\]](#)
58. Somma, R. The Inventory and Quantitative Assessment of Geodiversity as Strategic Tools for Promoting Sustainable Geoconservation and Geo-Education in the Peloritani Mountains (Italy). *Educ. Sci.* **2022**, *12*, 580. [\[CrossRef\]](#)
59. Rodrigues, J.; Neto de Carvalho, C.; Ramos, M.; Ramos, R.; Vinagre, A.; Vinagre, H. Geoproductions—Innovative development strategies in UNESCO Geoparks: Concept, implementation methodology, and case studies from Naturtejo Global Geopark, Portugal. *Int. J. Geoheritage Parks* **2020**, *9*, 108–128. [\[CrossRef\]](#)
60. Torabi Farsani, N.; Mortazavi, M.; Bahrami, A.; Kalantary, R.; Khosravi Bizhaem, F. Traditional crafts: A tool for geo-education in geotourism. *Geoheritage* **2017**, *9*, 577–584. [\[CrossRef\]](#)
61. Caulton, T. *Hands-on Exhibitions: Managing Interactive Museums and Science Centres*; Routledge: London, UK, 1998.
62. Brzezińska-Wójcik, T. Strategia hands-on activity w kreowaniu geoproduktów w kontekście edukacji, interpretacji i promocji geodziejstwa na Roztoczu (środkowo-wschodnia Polska). *Zesz. Nauk. Univ. Szczecińskiego Ekon. Probl. Tur.* **2015**, *29*, 169–193.
63. Świerkosz, K.; Koźma, J.; Reczyńska, K.; Halama, M. Muskau Arch Geopark in Poland (Central Europe)—Is it Possible to Integrate Geoconservation and Geoeducation into Biodiversity Conservation? *Geoheritage* **2017**, *9*, 59–69. [\[CrossRef\]](#)
64. Pijet-Migoń, E. Geoturystyka—Nowe możliwości wykorzystania dziedzictwa ziemi w turystyce. Studium przypadku Krainy Wygasłych wulkanów w Sudetach Zachodnich. *Ekon. Probl. Tur.* **2016**, *1*, 301–312. [\[CrossRef\]](#)
65. Górka-Zabielska, M.; Dobracki, R. Petrographic Garden in Moryń—A New Geotouristic Attraction in Western Poland. *Landf. Anal.* **2015**, *29*, 73–80. [\[CrossRef\]](#)
66. Chrobak, A.; Witkowski, K.; Szmańda, J. Assessment of the educational values of geomorphosites based on the expert method, case study: The Białka and Skawa rivers, the Polish Carpathians. *Quaest. Geogr.* **2020**, *39*, 45–57. [\[CrossRef\]](#)
67. Wolniewicz, P. Beyond Geodiversity Sites: Exploring the Educational Potential of Widespread Geological Features (Rocks, Minerals and Fossils). *Geoheritage* **2021**, *13*, 34. [\[CrossRef\]](#)
68. Głowacki, W. Newly Emerging Geosites in the Polish Western Outer Carpathians as an Asset for Geoeducation and Geotourism. *Geoheritage* **2019**, *11*, 1247–1256. [\[CrossRef\]](#)
69. Gałka, E. The Development of Geotourism and Geoeducation in the Holy Cross Mountains Region (Central Poland). *Quaest. Geogr.* **2023**, *42*, 19–27. [\[CrossRef\]](#)
70. Jewuła, K.; Fijałkowska-Mader, A.; Salwa, S. Walory geoedukacyjne i geoturystyczne kamieniołomu Zygmuntówka na Czerwonej Górze (Góry Świętokrzyskie). *Przegląd Geol.* **2022**, *70*, 25–33. [\[CrossRef\]](#)

71. Poros, M.; Urban, J.; Ludwikowska-Kędzia, M. Dziedzictwo geomorfologiczne Geoparku Świętokrzyskiego i jego znaczenie dla geoturystyki. *Landf. Anal.* **2021**, *40*, 71–107. [[CrossRef](#)]
72. Błazejowski, B.; Wierzbowski, A. The Owadów-Brzezinki geoeducation area at Sławno. *Geotourism* **2020**, *17*, 39–45. [[CrossRef](#)]
73. Słomka, T.; Mayer, W. Geotourism and geotourist education in Poland. In *Geotourism: The Tourism of Geology and Landscape*; Newsome, D., Dowling, R.K., Eds.; Goodfellow Publishers: Oxford, UK, 2010. [[CrossRef](#)]
74. Hose, T.A. Geotrails. In *The Geotourism Industry in the 21st Century*; Apple Academic Press, Inc.: Burlington, ON, Canada, 2021; pp. 247–275.
75. Fattahi, M.; Khoshraftar, R. Importance of the Public Education and Interpretation in Geoheritage Conservation. In *Book of Abstracts, First National Conference on Tourism and Ecotourism of Iran*; 2012; pp. 1–15. Available online: https://www.researchgate.net/publication/280527586_Importance_of_the_Public_Education_and_Interpretation_in_Geoheritage_Conservation (accessed on 15 August 2023).
76. Martínez-Martín, J.E. Geosites as Educational Key-Elements for Sustainability: The UNESCO Global Geoparks Model. *Proceedings* **2022**, *87*, 22. [[CrossRef](#)]

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