

## Geocaching in education – a review of international experiences Part 3. Organisation of classes

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**Abstract:** This article discusses the organization and conduct of educational activities using geocaching. In the scientific literature, the organization of geocaching classes is divided into three main stages: preparation, field work and evaluation. The preparation stage includes issues such as the role of the educator, the scenario itself, the duration of the classes, the length and course of the route, the number and location of caches, the coordinates and type of caches, potential descriptions of caches or the preparation of hints as well as the content of caches, necessary aids and preparing the students. In terms of the implementation of the fieldwork, the following issues need to be addressed: the role of the educator, introduction to classes, division of participants into teams, locating and working with caches as well as a summary of the activities. The evaluation stage should include an evaluation of the participants' performance, the activities/thematic trails by the participants and the educational effect by the organizers. Additionally, other educational possibilities for using geocaching, such as tasks based on internet geocaching services, the use of existing caches and the establishment of caches by students are also briefly discussed.

Due to the universality of the recommendations presented in the literature, educational geocaching can be implemented in every country, including Poland, both in formal and informal education, e.g. in the State Forests, national parks and landscape parks. Although this innovative teaching method involves a lot of initial work, its positive educational and social effects more than compensate for the invested time.

**Keywords:** Adventure education, educaching, field education, forest education

### 1. Introduction

In the basic, classical version, geocaching is a recreational game with two elements of great importance. First element is a cache/box, hidden in some interesting location – most frequently, it is a sealed box with a list of visits (so called logbook) and sometimes small objects for exchange (Sherman 2004; Schneider, Jadczyková 2016). The second element is internet site of the cache, where, next to the geographical coordinates and type of cache, instant hints on how to find it and text and graphic information on given location can be found (Schneider Jadczyková 2016). Internet sites are created on global geocaching service (www.geocaching.com) or on local (for instance in Poland: www.geocaching.pl; http://opencaching.pl).

There are several number of cache types (www.geocaching.pl), inter alia traditional, multi-cache, puzzle cache and cache in trash out event (CITO event). Traditional cache is the oldest type of cache, for which coordinates defying its actual localization are given. Multi-cache is a system of at least two caches, in which at least in the latter one, a container can be found. There may be different ways of dealing with multi-cache, but most often, in the first cache (for which coordinates are given on cache's internet site), tips for finding the second one are hidden; in the second one – tips for finding the third one and so on. To find a puzzle cache, one has to solve several puzzles, often difficult, to define the coordinates of its location. Cache in trash out event is of a different nature than the others. It is a large action for cleaning the environment, set on specific day/hour in specific localization. It means, that

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after that day, the cache becomes no longer current. Care for the environment is one of the geocaching rules; it does not only relate to the mentioned actions, but to every search for caches during which collection of garbage should also take place (mentioned CITO) ([www.geocaching.pl](http://www.geocaching.pl)).

To find a cache, the geocachers (participants of this game) need to own a GPS receiver, for instance GPS, smartphone or tablet. After finding it, the participant should sign into the paper logbook and may collect an object for exchange (if it is present), leaving one himself, of at least equal value. Then, on the cache's internet site, the participant should confirm his/her discovery or even add a comment or relation from the search, but without releasing the secret of where the box is hidden (Staszak 2016).

In education, the kind of geocaching used can be of different variants or deviations from the mentioned above scheme of action. For instance, instructional geocaching is intended only for students and does not require sharing caches' localization with other geocachers (Christie 2007; Mayben 2010). However, the general idea remains – the search for hidden 'treasures' connected with the subject of education on the basis of GPS coordinates or other hints. Emotions, motivation and direct experience of being in the field, which are connected with the search, bring better educational effects than in the case of classes run indoor (Mayben 2010; Ring 2014).

The aim of the following publication – third and the last in the cycle – is the presentation of foreign experience in organization and course of educational classes using traditional geocaching. They can be useful during the implementation of such an innovative method of education in Poland.

## 2. Methodology

Detailed description of the methodology for whole cycle of articles was presented in the first part about advantages and challenges of using geocaching in education (Referowska-Chodak 2020a). An attempt to answer a question why is it worth while dealing with this method of education and what possible problems may occur was presented. In the second part, answers to questions: for whom, where and what about the classes should be run while using geocaching were searched (Referowska-Chodak 2020b).

In this article, an attempt to answer the last question will be presented, that is: how? How to prepare for such classes? How to run them in the field? What are the possible variants of its organization? How to evaluate them? The results were elaborated on the basis of 35 foreign publications sought for in March, 2019 in Scopus scientific publications' base ([www.scopus.com](http://www.scopus.com)) and in Google Scholar base (<http://scholar.google.pl>).

Detailed description of preparation and field realization of classes concern the most labour-consuming version,

when everything is organized 'from the scratch', and already existing caches/experience are not used. It was assumed that this version is the most probable in Poland in the State Forests. Particular actions within those stages were written out chronologically to facilitate the planning of such meetings. Some of them – in dependence on the cited publication – had a different course, that is why, in the results, they were all set together as possible variants of proceeding.

Developing and improving education should result, among others, from its evaluation – that is why, in the results, a separate subsection dedicated to the evaluation of geocaching classes from different perspectives was included. In the results, additional options for the educational use of geocaching were also included as interesting alternatives for basic scenario presented in the subsection 'Preparation stage' and 'Stage of classes realization in the field'. They are less labour-consuming (from the educator's perspective), and in some cases, do not require going out to the field.

## 3. Results

### 3.1. Preparation stage

#### The role of educator – assumptions

An educator should be a coach or a moderator in the process of education using geocaching (Christie 2007; Harvainen et al. 2013 after: Heikkinen, Maliniemi 2015; Ihamäki 2015b; Blažek et al. 2016; Zemko et al. 2016; Grau Martinez 2017), with maximum commitment and own work of the recipients (Schaal, Lude 2015; Zecha 2016; Grau Martínez 2017). In case of classes dedicated to natural environment, the educator should be at the same time 'the interpreter of nature', that is a person that translates 'the language of nature' to the 'language of people' (Zecha 2014, 2016). Additionally, good relations between the educator and the recipients of education are desirable (Heikkinen, Maliniemi 2015; Ihamäki 2015a).

#### Classes scenario

The classes should be conducted according to the prepared earlier scenario, with defined goals, methodology, timetable (Lo 2010; Alabau Subich 2014; Donadelli, Rocca 2014; Blažek et al. 2016), including effective problem-solving approach with the use of local resources/places for learning (*problem based and location-based learning*) (Zecha 2014), but also breaks in classes (Lo 2010). Worth considering is also including into course of classes garbage cleaning, what fits in with the principle of geocaching connected with environment protection (CITO) (Adanali, Alim 2017; Freiermuth 2017). Such additional activity is positively evaluated by the recipients of education (Freiermuth, 2017). Worth implementing are also elements of rivalry between groups of students (Ramirez

Davies 2015; Pombo et al. 2017, 2018). Only sometimes, the students are being asked to create class independently or to cooperate with the teacher in this matter (Ring 2014).

### **Duration of classes**

Classes may be conducted in the form of whole-day trips (lasting 6–8 hours) (Blažek et al. 2016), half-day trips (3–4 hours) (Größ 2010; Alabau Subich 2014; Blažek et al. 2016) or independent work, which may take place and be evaluated during 1–2 hours (Größ 2010; Alabau Subich 2014; Donadelli, Rocca 2014; Ihamäki 2015a; Ramirez Davies 2015; Blažek et al. 2016).

### **Length and course of the trail**

Shorter educational geocaching trails for families and longer for students (Zecha 2014) are proposed. Recommended average length of the trail is from 2 to 4 km (Megerle 2003 after: Zecha 2014); however, found can be some propositions of longer trails: around 5 km for the students of first stage of education (Ihamäki 2014) and 8 km for students of second/third stage of education (Blažek et al. 2016). Attention should be paid to landform (differences in height to overcome on trail), so it is not too burdening and overwhelming to the educational goal of the trip (Zecha 2014). Optimally, the trail should have a shape of a loop (Zecha 2014; Blažek et al. 2016; Donadelli 2017), or possibly end in other location than the beginning (Zecha 2014). The beginning of educational trail should be easily-accessible, situated close to the parking spot or bus stop, possibly equipped in benches (Megerle 2007 after: Zecha 2014). The end of the trail on the other hand (the last point) should be clearly marked both from the surrounding, and substantive content. It should allow (in terms of spatial organization and peace) for summary of the topic and sharing the experiences (Böing, Sachs 2007 after: Zecha 2014; Zecha 2016). Instead of the trail, the collection of points located in certain space is also possible, for example, in the school's neighbourhood (Mayben 2010; Alabau Subich 2014; Donadelli, Rocca 2014).

### **Number of caches**

Exemplary number of caches proposed for 3 km long trail is 10–15 (Engelschall 2012 after: Zecha 2014) – the purpose is to get as many students as possible to participate in the classes at the same time (Donadelli, Rocca 2014). It is also proposed the creation of such number of caches for every team to get a possibility to discover at least three of them (Mayben 2010). Other solution is creating several caches, which individual teams reach according to the specified order (Alabau Subich 2014; Donadelli, Rocca 2014; Heikkinen, Maliniemi 2015; Ramirez Davies 2015).

### **Location of caches (distance)**

Caches should be located at a distance at least 100 m from each other (Christie 2007), 161 m – a requirement from www.

geocaching.com service (Heikkinen, Maliniemi 2015), and even at least 500 m (Freiermuth 2017), but still not too far from each other (Mayben 2010; Dvořák 2014 after: Blažek et al. 2016). Distance should be possible to cover during around 10 minutes (Engelschall 2012 after: Zecha 2014). Too large distance between caches may additionally hamper the educator's control and reduce safety of students (Shaunessy, Page 2006 after: Mayben 2010; Alabau Subich 2014). Distances can be adjusted according to the special code to show, for instance, proportions between discussed objects/phenomena (Stephens 2009 after: Hamm 2010).

### **Location of caches (camouflaging, safety of the environment)**

Places where caches are hidden should be selected in such way, so that the remaining caches would not be visible from those locations. It is of great meaning when the same caches are supposed to be found by other teams in the class (Donadelli, Rocca 2014). Model places for hiding caches are hollows, trunks of old trees, fork formation of branches, holes (Größ 2010; Heikkinen, Maliniemi 2015). Caches should be described as 'geocache' on the outside or inside (Freiermuth 2017) and masked in a way that does not affect the environment (Donadelli, Rocca 2014; Heikkinen, Maliniemi 2015; Hubackova 2018). Location of caches should also include sensitivity of environment to pressure from people searching for them (Zecha 2012).

### **The location of caches (people's safety)**

Caches should be situated in a safe place, of small traffic (Größ 2010; Lo 2010; Ihamäki 2014; Donadelli 2014 after: Adanali, Alim 2017; Dvořák 2014 after: Blažek et al. 2016; Heikkinen, Maliniemi 2015; Zemko et al. 2016; Donadelli 2017; Freiermuth 2017).

### **The location of caches (substantive value)**

Caches should be placed in important, special places (White-Taylor, Donellon 2008; Zecha 2012; Ihamäki 2014, 2015a; Heikkinen, Maliniemi 2015; Hubackova 2018), including those connected with natural phenomena (Zecha 2014), but also with some problems, such as illegal landfill (Zemko et al. 2016). Those places should fully meet the needs of established subjects and aspects/perspectives, from which one wants to present them (Zecha 2012, 2016) and allow for asking questions and starting the thought process (Zecha 2014). A trail/thematic route can also be created (Zecha 2012, 2016; Ihamäki 2014; Ring 2014; Hubackova 2018) – in such a situation, following caches should be dedicated to present the main assumption from different perspectives, without repeating the matter, and building some kind of dramaturgy (Zecha 2012, 2014, 2016), with the use of small didactic units (Zecha 2016). Additionally, in every next cache, there should be less information due to the decreasing concentration of recipi-

ents (Zecha 2014) and greater need for relax (Zecha 2016). The first and the last cache are considered to be especially important (Zecha 2014). In case of instructional geocaching, realized for instance by school, localization of points (their surrounding in terms of presented matter) has smaller meaning (Mayben 2010; Ramirez Davies 2015).

### **Location and type of caches**

After placing the cache in the field, coordinates should be properly defined (Donadelli, Rocca 2014; Dvořák 2014 after: Blažek et al. 2016; Ramirez Davies 2015; Freiermuth 2017) and revealed to the recipients. In case of the traditional caches, coordinates of all locations are revealed (Christie 2007; Alabau Subich 2014; Albach 2014; Donadelli, Rocca 2014; Ring 2014; Heikkinen, Maliniemi 2015; Ihamäki 2015a; Ramirez Davies 2015; Schaal, Lude 2015; Freiermuth 2017). The other variant is also possible to use – hiding coordinates of the next cache in the one currently found (rule of multi-caches), which is a method often used especially in education using geocaching (Lary 2004 after: Hamm 2010; Ihamäki 2007b; Stephens 2009 after: Hamm 2010; Größ 2010; Cardwell 2013; Alabau Subich 2014; Albach 2014; Ring 2014; Heikkinen, Maliniemi 2015; Ramirez Davies 2015; Schaal, Lude 2015). A little less often used are puzzle caches (Alabau Subich 2014; Albach 2014; Ring 2014; Heikkinen, Maliniemi 2015; Ihamäki 2015a; Schaal, Lude 2015), where the coordinates of the cache are given indirectly – finding the coordinates requires solving additional tasks (Stephens 2009 after: Hamm 2010; Größ 2010; Albach 2014; Zemko et al. 2016). Rarely used are earth caches, which are harder to handle by students because they lack the container (Zecha 2012). Additionally, those caches focus only on the geological subjects (Hamm 2010). The use of different types of caches to diversify the knowledge transfer process is possible. It includes combining the idea of multi-cache with puzzle cache: multi-mystery cache (Größ 2010; Alabau Subich 2014; Albach 2014). Caches prepared exclusively for the needs of classes do not have to be revealed on official internet services of geocaching (Mayben 2010; Alabau Subich 2014; Donadelli, Rocca 2014; Ramirez Davies 2015), what may increase the safety of students and caches themselves (Shaunessy, Page 2006 after: Mayben 2010).

### **Description of caches**

In classes that use task-based education, it is worth to formulate the title of cache as a question, to interest the recipients and encourage them to participate actively in classes (Zecha 2014, 2016). If the cache is placed in geocaching services, it should not repeat already existing name (Heikkinen, Maliniemi 2015). Description of cache (on dedicated internet site) includes most often text with pictures, although there may be a film or animation (Zecha 2014; Ihamäki 2015b; Schaal, Lude 2015; Zemko et al. 2016; Freiermuth

2017). It is recommended for the text to be written in simple language and consist of 170–250 words, and be similar in style to press articles (with the most important information in the beginning of the text) or to a tale (Ludwig 2005 after: Zecha 2014). It should refer to the recipients' life and address them directly (Ludwig 2005 after: Zecha 2014; Zecha 2016). If those caches are mystery-caches, the tasks to solve should also be hidden, which allow to determine the coordinates (Größ 2010; Albach 2014; Heikkinen, Maliniemi 2015). Other version of description may be oral narration/tale of the teacher connected with the cache (Ihamäki 2014, 2015a; Zemko et al. 2016). In the literature, a proposition to prepare application with so called augmented reality for smartphone can be also found (Pombo et al. 2017, 2018). In geocache points, QR codes can be placed, which allow to enter the sites with illustrations and information on the given place (Zecha 2014; Ihamäki 2015a, 2015b; Zemko et al. 2016), and also tasks on this subject (Zecha 2014).

### **Preparation of hints**

Due to small accuracy of GPS localization, hints are usually prepared, which makes it easier to find the cache – direct or indirect ones, requiring solving additional tasks (Donadelli Rocca 2014; Zemko et al. 2016; Freiermuth 2017; Grau Martínez 2017; Hubackova 2018). In simplified version of classes (especially for younger kids), it is the only information that guides the search, without GPS coordinates – in such situations, caches may also be hidden in buildings (Grau Martínez 2017).

### **Content of caches**

Original version of cache's content is logbook, which should be there, if the created cache is publicly available (Heikkinen, Maliniemi 2015). However, for educational needs, the content of cache may be changed in different ways. One of the possible changes is the insert of short texts on the given subject (Cardwell 2013; Donadelli, Rocca 2014; Adanali, Alim 2017) and questions/quizzes prepared for them, which should be solved (Cardwell 2013; Adanali, Alim 2017), possibly a list of additional sources of information (Cardwell 2013; Adanali, Alim 2017). Second one – insert of representative and interesting elements. Objects, which will be the sort of 'hints stimulating thought process and discussion among recipients on subject being the matter of education (Christie 2007; Zemko et al. 2016). Third one – especially often proposed – is inserted in geocache points instructions for active action (challenges) to perform on the spot in the field (Ihamäki 2007a, 2007b, 2015a; Lawrence Schleicher 2008 after: Ihamäki 2015a; Mayben 2010; Zecha 2012, 2014; Albach 2014; Donadelli, Rocca 2014; Dvořák 2014 after: Blažek et al. 2016; Ramirez Davies 2015; Zemko et al. 2016; Adanali, Alim 2017; Donadelli 2017). They should be varied between the following caches (Zecha

2012; Donadelli, Rocca 2014), connected with surrounding environment (Größ 2010; Zecha 2014), and planned in such way, so that their realization would not take too long (Zecha 2014). Adjusting the level and attractiveness of caches to a given age group is also extremely important (Dvořák 2014 after: Blažek et al. 2016; Ihamäki 2015a; Pombo et al. 2017, 2018), remembering that the older the age group is, the more critical it becomes (Ihamäki 2014). From classes' effectiveness point of view, preparation of tasks that speaks to different senses – sight, hearing, smell, touch – is favourable (Zecha 2012; Albach 2014), including for instance observing the elements of the nature (Sherman 2004; Christie 2007). Sometimes tasks require additional time and effort and are meant to be realized after having finished searching for caches (Größ 2010; Adanali Alim 2017; Freiermuth 2017; Grau Martínez 2017), for instance, preparing the presentation in foreign language on own achievements in searching for caches (Hubackova 2018) or a poster connected with the subject of classes (Grau Martínez 2017). Content of caches can also be different, joining for instance the chosen elements of the ones described above. Rarely used is the scenario assuming the recipients' independent invention of actions/tasks matching given localization (Schaal, Lude 2015).

### Needed resources

For the needs of the classes, a paper map of the area can be prepared with localization of caches (or one on which the participants of classes will mark the caches' localization) (Alabau Subich 2014; Donadelli, Rocca 2014; Ring 2014; Grau Martínez 2017). Preparation of shorter instructions or longer guides for classes is also possible (Mayben 2010; Donadelli, Rocca 2014; Ramirez Davies 2015; Adanali, Alim 2017; Grau Martínez 2017; Pombo et al. 2017, 2018), containing – for instance – number of group, coordinates of caches assigned to the group, terms to acquire, space for notes and conclusions, and instructions (Mayben 2010; Ramirez Davies 2015). Care should be taken to ensure that one GPS or device with application needed for conducting classes falls on at least 3–4 people (Christie 2007; Lo 2010; Mayben 2010; Alabau Subich 2014; Heikkinen, Maliniemi 2015; Ramirez Davies 2015; Pombo et al. 2017, 2018), or possibly 4–5 people (Donadelli, Rocca 2014; Adanali, Alim 2017). However, it should be remembered that the more people fall on one device, the smaller is the commitment and level of achievements from classes (Mayben 2010). There is no need, however, for every participant of the team to own a device (Lo 2010; Ring 2014). It is also proposed to use compass and a map during the classes (Donadelli, Rocca 2014). For increasing the motivation of participants of classes, small presents/chocolates may also be needed, which can be placed inside the sought caches (Adanali, Alim 2017; Donadelli 2017) or given to the winning teams (Ramirez Davies

2015). Mentioned chocolates may be used as a gift only in case of caches created for specific classes, after which they are being collected (i.a., instructional geocaching); therefore, the chocolates are hidden in caches for less than a day and are not publicly available (there is no information on them on the internet). It should also be stressed that such a solution was proposed in anthropogenic landscape, which limited the access of game to sweets.

### Additional organizational issues

Attention should be paid to the availability of toilets (Lo 2010). adjusting some of caches for the needs of handicapped people can also be considered, for instance, on wheelchairs (Heikkinen, Maliniemi 2015).

### Preparation of students for classes

Theoretical introduction to geocaching and course of classes may be told by the teacher in the form of discussion or class presentations before going outdoor (Größ 2010; Alabau Subich 2014; Ramirez Davies 2015), or – on geocaching itself – by the recipients of education (Freiermuth 2017). Usually, at least some of the students have no experience in geocaching, that is why, some solutions are proposed, so that the classes can be conducted efficiently and effectively. Therefore it is recommended organizing earlier meeting (Größ 2010; Vitale et al. 2012; Zecha 2012; Alabau Subich 2014; Adanali, Alim 2017; Grau Martínez 2017), preparing one/two empty 'starting' caches close to the point where classes begin (Größ 2010; Freiermuth 2017) or reserving time at the beginning of main classes (Donadelli, Rocca 2014; Heikkinen, Maliniemi 2015; Ramirez Davies 2015), so that the participants can get acquainted with the rules of using the equipment (for instance, working with map and compass, handling GPS receiver) and with the process of searching for caches. Earlier training for some students with technical predispositions is also proposed, so that they can help other students during the field classes (Lo 2010). Also, an area may be presented to the students (in classroom) on Google Maps or Google Earth, on which the search will take place, and before the classes' coordinates of the caches can be passed to students (via internet) (Alabau Subich 2014). The students should be informed about the need for having appropriate outfit, shoes, water so that they are prepared for a longer stay in the field (Lo 2010; Freiermuth 2017; Grau Martínez 2017).

## 3.2. Stage of classes' realization in the field

### The role of educator in the field – assumptions

Educator's role is to support students, encourage them to make an effort and sensitize them to nature (Grau Martínez 2017). Educator should also repeat conception of classes, clarify students' doubts, or possibly give some hints (Heikkinen, Maliniemi 2015; Grau Martínez 2017). The aspect of

controlling student's behaviour during classes is also important (Heikkinen, Maliniemi 2015) and making them aware that geocaching is not only entertainment, but also classes with a specific didactic purpose (Grau Martínez 2017).

### **Introduction to classes**

Classes may begin for instance in a place defined as entrance zone for educational geocaching trail, which should be separated in spatial and content terms (Zecha 2014, 2016). On this stage, a purpose of classes should be explained (Ring 2014), course of classes, work with GPS device (or proper application on smartphone, map, compass) – if it was not discussed earlier in a separate meeting – and tasks to perform (Mayben 2010; Vitale et al. 2012; Donadelli, Rocca 2014; Zecha 2014, 2016; Heikkinen, Maliniemi 2015; Blažek et al. 2016; Zemko et al. 2016; Freiermuth 2017; Grau Martínez 2017; Pombo et al. 2017, 2018). Following points to be discussed concern dealing with the cache. Students' attention should be focused on the necessity of discretion, while taking out the cache from the cover, so that they would not become an object of interest of bystanders (Freiermuth 2017; Hubackova 2018) and on the necessity of hiding the cache with its content back to its original place (Heikkinen, Maliniemi 2015; Ramirez Davies 2015). Students' must be informed about the necessity of obeying all safety rules (Lo 2010; Adanali, Alim 2017) and a rule of maximum limitation of negative influence of search on environment (Zecha 2012; Alabau Subich 2014).

### **Division of classes' participants into teams**

Teams of students should be composed at most of 4 people (Christie 2007; Lo 2010; Mayben 2010; Alabau Subich 2014; Heikkinen, Maliniemi 2015; Ramirez Davies 2015; Zemko et al. 2016; Freiermuth 2017; Pombo et al. 2017, 2018), 5 people (Größ 2010; Donadelli, Rocca 2014), if necessary up to 6–8 (Cardwell 2013; Blažek et al. 2016). The roles in the team should be divided (Lo 2010; Donadelli, Rocca 2014), for instance: leader, student responsible for compass, student responsible for covering the distance, student responsible for GPS and student responsible for writing down the observations (Donadelli, Rocca 2014). If more than one cache is sought for, then the roles in the team should change in rotation after finding each cache (Lo 2010). Such a rotation is recommended even in case of one cache; if for finding it, several hints are prepared, then a change should take place after the realization of every hint (Donadelli, Rocca 2014). It is also recommended for the teams to be composed of students of different levels of knowledge (Mayben 2010). Students may possibly localize caches individually, but team work brings additional advantages in students' development (Donadelli, Rocca 2014; Ring 2014).

### **Search for caches**

In case of educational GPS trail (geocaching), this stage of classes takes place in the area known as the main zone (Zecha

2016). Usually, the classes run according to a predefined order of points/trails; only sometimes the decision about choosing the points is up to the participants of classes (Donadelli, Rocca 2014; Schaal, Lude 2015). Finding caches in the field is realized by students divided into, as mentioned earlier, teams (Lary 2004 after: Hamm 2010; Lo 2010; Mayben 2010; Vitale et al. 2012; Donadelli, Rocca 2014; Ramirez Davies 2015; Schaal, Lude 2015; Blažek et al. 2016; Donadelli 2017; Grau Martínez 2017; Pombo et al. 2017, 2018) on the basis of GPS coordinates and/or tasks and hints.

### **Work with caches**

There are two basic variants of work with caches. First is collecting the caches with its content and discussing it during chamber works, where individual teams can perform in the role of experts sharing collected by the team information with other teams (Christie 2007). It refers to some situations where the teacher prepares temporary caches in the surrounding of the school only for the needs of the given classes, not sharing them publicly. The second variant assumes work with caches in the field. It means, for example, discussing their content together (Mayben 2010) or filling up by students exercises/notebooks/worksheets on the base of the following caches/tasks connected with them (Mayben 2010; Zecha 2012; Donadelli Rocca 2014; Ihamäki 2014; Ramirez Davies 2015; Blažek et al. 2016). Filling up exercise book may be a result of educator's story connected with the object, for which the given cache is dedicated (Ihamäki 2014). Possible additional task may be plotting on map the landmarks established by students (in case of multi-caches) and/or places where caches are hidden (Donadelli, Rocca 2014). If the logbook is present in the cache, then after finishing work with the given cache, the students should log themselves into this book (Donadelli, Rocca 2014).

### **Summary of the classes**

In case of educational GPS trail, summary takes places in the so called exit zone (Zecha 2014, 2016). In this stage, a summary in the form of joint discussion should take place, summary of classes in reference to the acquired knowledge, possibilities of its use and a conversation on the students' experiences and their emotions (Böing, Sachs 2007 after: Zecha 2014; Alabau Subich 2014; Donadelli, Rocca 2014; Heikkinen, Maliniemi 2015; Ihamäki 2015a; Grau Martínez 2017).

### **3.3. Evaluation stage**

#### **Assessment of work of the recipients of the classes**

This assessment can be conducted even during the classes –scoring the realization of tasks from given cache is proposed, to limit the situations where students leave for another

cache without completing the exercise book (Adanali, Alim 2017). More often, however, evaluating groups at the end of classes is practiced (Größ 2010; Alabau Subich 2014; Donadelli, Rocca 2014; Ramirez Davies 2015), with regard to commitment to work, relations between class participants and relations with natural environment (Alabau Subich 2014). Additional possibility is running tests on acquired knowledge (Alabau Subich, 2014). For winners (the best teams), prizes may be provided – for instance, sweets (Ramirez Davies 2015).

#### **Assessment of classes/thematic trails by recipients**

Their subjective feelings are assessed, preferably right after classes (Vitale et al. 2012; Alabau Subich 2014; Heikkinen, Maliniemi 2015; Adanali, Alim 2017; Freiermuth 2017; Grau Martínez 2017; Pombo et al. 2017, 2018). It can be in the form of casual conversation, interview or a survey. In the latter, its anonymity should ensure honesty of opinion (Heikkinen, Maliniemi 2015). Also, the comments on caches' internet sites may be checked (if they are publicly available) in terms of impressions and remarks from people who have found them (Heikkinen, Maliniemi 2015). Other option is organizing by caches' author, so called event cache, which is the meeting of geocachers, during which they may assess the previous educational caches of the meeting organizer, and also define what they would like to find out next (Albach 2014).

#### **Assessment of educational effect by sender (organizers of education)**

Assessing the educational effect of the conducted classes/geocaching trail created by the educator, may serve their improvement (Buck 2009 after: Mayben 2010; Zecha 2012; Alabau Subich 2014; Ihamäki 2014, 2015b) or comparison of their effectiveness with education run in classrooms (Mayben 2010; Kisser 2016). The number and wording of questions in test should be adjusted to the age and possibilities of the recipients (Pombo et al. 2017). Those tests are not for giving students grades, unless they realize at the same time the assumptions of the first, as discussed in this subsection assessments. Other or additional option is also running, by observer or group leader; observations of the course of classes (Größ 2010; Alabau Subich 2014; Donadelli, Rocca 2014; Pombo et al. 2017, 2018).

### **3.4. Other possibilities of educational geocaching use**

#### **Internet services on geocaching**

On the basis of literature review, the following possibilities of pupils/students commitment were extracted: analysis of internet geocaching forums in terms of the given problem (Ihamäki 2007a, 2007b; Größ 2010); writing on the forums'

descriptions of own experience from classes/found caches (Zecha 2012; Donadelli, Rocca 2014); translating descriptions of caches to a foreign language (Hubackova 2018); independent choice of a cache from geocaching service, which the student would like to visit someday; and preparation of comprehensive presentation on this place, which then is assessed by other students (Donadelli, Rocca 2014).

#### **Use of existing caches**

An example option for classes is searching for caches created by other geocachers under the supervision of the teacher. It is recommended in the case of use of geocaching for physical education classes' purposes (Größ 2010). Within cyclical classes of such type, it is suggested to grade the difficulty of the following caches/trails (Größ 2010). Other option is independent visit by older recipients' (students') several caches, and then analysis on the basis of own experience of advantages of this form of spending time (Fenech et al. 2017).

#### **Creation by students' their own caches**

It is the most common proposition for involving students among all discussed in this subsection (Webb 2001 after: Ihamäki 2015a; Shaunessy, Page 2006 after: Mayben 2010; Ihamäki 2007a, 2007b, 2015a, 2015b; Matherson et al. 2008 after: Mayben 2010; Größ 2010; Zecha 2012; Alabau Subich 2014; Donadelli, Rocca 2014; Schaal, Lude 2015; Adanali, Alim 2017). They can be single caches, but also thematic trails (Größ 2010; Zecha 2012; Ihamäki 2015a, 2015b). Their preparation is recommended within group work of students (Größ 2010; Zecha 2012; Donadelli, Rocca 2014; Ihamäki 2015a, 2015b), in direct meetings (Größ 2010; Ihamäki 2015a, 2015b) and/or through social services like Facebook (Ihamäki 2015a, 2015b). Students – beside caches' description – may also come up with tasks to solve what is connected with a given place, and share the location of the cache with other teams from their class. Those teams – as a part of work – should find a cache and perform the task, and classes should be finished with assessment of matter and creativity of caches (Größ 2010; Alabau Subich 2014; Donadelli, Rocca 2014). Prepared by students, caches/thematic trails may be shared on the internet for a wide group of recipients (Größ 2010; Zecha 2012; Donadelli, Rocca 2014). In such a situation, creators of cache should remain responsible for them (Größ 2010; Heikkinen, Maliniemi 2015). Such an approach to the use of geocaching creates more challenges for the recipients and provides more experience than using caches already created by the educators (Ihamäki 2015a).

## **4. Discussion and summary**

Geocaching is a method or a tool of education that combines theoretical and practical knowledge (Ihamäki 2015a).

Educational geocaching is a part of adventure education, the goal of which is to strengthen the unit by positive experience (Heikkinen, Maliniemi 2015). Such a type of game – as a method of learning – is particularly intended for people who find it difficult to focus on traditional school education (Harvainen et al. 2013 after: Heikkinen, Maliniemi 2015). However, in order for this type of education to bring the expected results (even regardless of the degree of recipient's concentration), it needs to be carefully planned and properly conducted.

In the results, experiences from abroad are presented that introduce step by step preparation and realization of educational classes with the use of geocaching. Dominant in this description are details connected with their preparation. It is a difficult stage and requires from the educator dedicated large amount of time, labour, conceptual and organizational effort, especially at the first attempt of implementing such classes. Worth noting is, however, that once prepared, the classes/caches can then serve many times, and gained experience should speed up elaboration and realization of next initiatives of this type.

It is important to keep a balance in the projected classes between the participants/skills and the tasks to solve; otherwise, the participants would not be able to gain educational experience (Ihamäki 2015a). Gaining such an experience is possible with full commitment of participant to the performed actions (Csikszentmihalyi 1991 and Finneran, Zhang 2005 after: Ihamäki 2015a). It happens when tasks: 1) have specific goals with reasonable rules (in this case searching for caches), 2) allow acting according to players capabilities (i.a., adjusting tasks to them in real environment), 3) provide clear information about how to perform a given action by participants, 4) allow for concentration (focusing on exercises and their successful ending) (Csikszentmihalyi 1993 after: Ihamäki 2015a).

Classes are prepared according to the presented results standards, based on different activities (i.a., reading, writing, making experiments). Therefore, they meet the needs and allow students to prove themselves of different type of intelligence – for instance, logical-mathematical, spatial, linguistic, natural or corporal-kinaesthetic (Ring 2014; Grau Martínez 2017) and different types of learning: visual, auditory, tactile and kinaesthetic (Mayben 2010; Donadelli, Rocca 2014; Ring 2014). Especially emphasized is the value of geocaching for the latter style of learning (McCarthy 2005 after: Ihamäki 2015a).

Also, versatility of the presented recommendations should be stressed – they are possible to be introduced in every country, also in Poland, both to formal and non-formal education, for instance in the State Forests, national parks, landscape parks or urban forests. In case of non-formal education, probably the scheme that works best is the one with comprehensive preparation and conducting classes by fore-

ster/employee of the park, because usually, there is too little time for students to create their own caches during classes. It is however a very valuable alternative that might be used, for instance, on residential school trips during which meetings with non-formal educators would be planned.

Also, the need and value of assessment of classes/caches/educational trails should be emphasized, especially at first implementations of this method of education. It may be a valuable source of information and reflection that will allow to improve the quality of teaching. In case of caches made available publicly, quantitative control tool is the number of visits, and qualitative control tool – descriptions of experience from people who found the cache.

Described model of education may use creative cooperation, for instance, between university faculties, teachers, companies and social organizations (White-Taylor, Donnell 2008). In Polish realities, the analogical idea for educational cooperation find reflection in the directions of forest education development in the State Forests, which recommend foresters' cooperation with scientific institutions, educational institutions, local governments, non-governmental organizations, administration of areas of great natural interest, but also tourism and leisure organizers, religious associations and media (Ordinance/Zarządzenie 2003 – attachment 1). So far, the cooperation was established rather on the basis of more traditional methods of education, however, there are no obstacles for common initiating education using geocaching.

To summarise, detailed guidelines presented for educational geocaching, based on foreign experience, may be helpful for implementing this method of education in Poland, both within formal and non-formal education – for instance, forest education. Despite the fact that this type of education requires quite a large workload in the beginning, it brings positive educational and social effects (for instance Mayben 2010; Ring 2014; Ihamäki 2015a), which compensate initial difficulties and encourage to take up the challenge.

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The author declares lack of potential conflicts.

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## References

- Adanali R., Alim M. 2017. The views of preservice teachers for problem based learning model supported by geocaching in environmental education. *Review of International Geographical Education Online* 7(3): 264–292.



- Alabau Subich A. 2014. El Geocaching, una eina per al treball competencial en Educació Física i el seu coneixement entre el professorat d'Educació Física al Baix Empordà (Treball Final de Màster). Facultat d'Educació, Traducció i Ciències Humanes Universitat de Vic, Portugal.
- Albach D. 2014. Geocaching as a means to teach botany to the public. *Plant Science Bulletin* 60(2): 1–3. DOI 10.3732/psb.1400001.
- Blažek M., Lána M., Blažek V., Dvořák J. 2016. Information technologies in teaching geography from the teacher's point of view, w: P. Karvánková, D. Popjaková, M. Vančura, J. Mládek (red.) Current Topics in Czech and Central European Geography Education. Wyd. Springer, Cham, Szwajcaria, 169–186. ISBN 9783319436135.
- Cardwell M. 2013. Hide and go geocaching: Technology and history intersect for students at CIM's Harricana Branch event. *CIM Magazine* 8(6): 70–71.
- Christie A. 2007. Using GPS and geocaching engages, empowers and enlightens middle school teachers and students. *Meridian* 10(1).
- Donadelli G. 2017. Outdoor learning and geocaching. *Interaction* 45(2): 45.
- Donadelli G., Rocca L. 2014. Teaching and learning with geocaching, w: T. Jekel, E. Sanchez, I. Gryl, C. Juneau-Sion, J. Lyon (red.) Learning and Teaching with Geomedia. Wyd. Cambridge Scholars Publishing, United Kingdom, 44–58. ISBN 978-1-4438-6213-4.
- Fenech A., Harvey R., Watson E., Sheard N., Stinchcombe E., Short E., Pagett M. 2017. Using technology to play hide and seek. *Occupational Therapy News* 25(11): 24–26.
- Freiermuth M.R. 2017. 'I Found It!' A smartphone GPS treasure-hunting game in a flipped English class. *Innovation in Language Learning and Teaching* 11(2): 101–108. DOI 10.1080/17501229.2015.1066793.
- Grau Martínez S. 2017. La idea del Geocaching como herramienta interdisciplinaria (trabajo final de grado en magisterio de primaria). Área de Ciencias Sociales, Universitat Jaume I, Hiszpania.
- Größ E.M. 2010. Geocaching in der Schule: Eine Trendsportart im jahrgangübergreifenden Projekt (Examensarbeit). Bachelor + Master Publishing (diplom.de), Hamburg, Niemcy, 60 s.
- Hamm B. 2010. Geocaching in Education: A Literature Review (VCT 6010). Bowling Green State University, Bowling Green, Ohio, USA.
- Heikkinen J. Maliniemi P. 2015. Geokätköilyn kehittäminen seikkailu- ja pelikasvatukselliseksi menetelmäksi nuorisokeskus ympäristöön. Degree programme in civic activities and youth work, Humak University Of Applied Sciences, Finlandia.
- Hubackova S. 2018. Geocaching as unconventional method for foreign language teaching. *Lecture Notes in Computer Science* 11284 LNCS: 87–94. DOI 10.1007/978-3-030-03580-8\_10.
- Ihamäki P. 2007a. Geocaching at the Institute of Paasikivi – New Ways of Teaching GPS Technology & Basics of Orientation In Local Geography. New Trends in ICT and Accessibility – Proceedings of the 1st International Conference in Information and Communication Technology and Accessibility, ICTA, 155–158.
- Ihamäki P. 2007b. Geocaching in Primary Schools – New Ways of Teaching GPS Technology & Basics of Orientation In Local Geography. Interactive Mobile and Computer aided Learning Conference, IMCL 2007, Amman, Jordan.
- Ihamäki P. 2014. The potential of treasure hunt games to generate positive emotions in learners: Experiencing local geography and history using GPS devices. *International Journal of Technology Enhanced Learning* 6(1): 5–20. DOI 10.5555/2608743.2608744.
- Ihamäki P. 2015a. User Experience of Geocaching and Its Application to Tourism and Education (doctoral dissertation). *Annales Universitatis Turkuensis* ser. B, tom 404, 249 s. DOI 10.13140/RG.2.1.3202.3205.
- Ihamäki P. 2015b. Design 'the Pori hidden beauties geocaching series': Computer-supported collaborative web-based learning and sharing experiences. *International Journal of Web Based Communities* 11(2): 131–151. DOI 10.1504/IJWBC.2015.068538.
- Kisser T. 2016. Mit geocaching auf dem Weg zu einem verbesserten topologischen Raumverständnis. *Kartographische Nachrichten* 1: 14–20. DOI 10.1007/BF03545181.
- Lo B. 2010. GPS and geocaching in education. Wyd. International Society for Technology in Education (ISTE), Washington D.C., USA, ISBN 9781564842756, 100 s.
- Mayben R.E. 2010. Instructional geocaching: an analysis of GPS receivers as tools for technology integration into a middle school classroom (doctoral dissertation). Department of Educational Leadership, Policy and Technology Studies in the Graduate School of The University of Alabama, USA.
- Pombo L., Marques M.M., Lucas M., Carlos V., Loureiro M.J., Guerra C. 2017. Moving learning into a smart urban park: Students' perceptions of the Augmented Reality EduPARK mobile game. *Interaction Design and Architecture(s)* 35: 117–134.
- Pombo L., Marques M.M., Carlos V., Guerra C., Lucas M., Loureiro M.J. 2018. Augmented reality and mobile learning in a smart urban park: Pupils' perceptions of the EduPARK game. *Smart Innovation, Systems and Technologies* 80: 90–100. DOI 10.1007/978-3-319-61322-2\_9.
- Ramirez Davies E.A. 2015. GPS GeoCaching Y Gramática? (Condiciones en Inglés). Experiencia del uso del GPS para fines educativos en el Colegio Montessori-Medellín. Colegio Montessori-Medellín, Antioquia, Kolumbia.
- Referowska-Chodak E. 2020a. Geocaching w edukacji – przegląd międzynarodowych doświadczeń. Część 1. Wprowadzenie: zalety i problemy. *Leśne Prace Badawcze* 81(1): 29–42. DOI 10.2478/frp-2020-0004.
- Referowska-Chodak E. 2020b. Geocaching w edukacji – przegląd międzynarodowych doświadczeń. Część 2. Odbiorca, miejsce i tematyka edukacji. *Leśne Prace Badawcze* 81(2): 81–90. DOI 10.2478/frp-2020-0009.
- Ring H. 2014. Geocaching för att nå lärandemålen inom Soämnen (Examensarbete). Institutionen för sociologi och arbetsvetenskap, Göteborgs Universitet, Szwecja.
- Schaal S., Lude A. 2015. Using mobile devices in environmental education and education for sustainable development – comparing theory and practice in a nation wide survey. *Sustainability (Switzerland)* 7(8): 10153–10170. DOI 10.3390/su70810153.

- Schneider J., Jadczaková V. 2016. Mutual Impacts of Geocaching and Natural Environment. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 64(5): 1739–1748. DOI 10.11118/actaun201664051739.
- Sherman E. 2004. Geocaching – hike and seek with your GPS. Wyd. APress Media LLC, Berkeley, CA, USA, 224 s. ISBN 978-1-59059-122-2.
- Staszak A.M. 2016. Krajoznawstwo a rzeczywistość nie tylko rozszerzona, w: A. Stasiak, J. Śledzińska, B. Włodarczyk (red.) Współczesne oblicza krajoznawstwa. Wydawnictwo PTTK „Kraj”, Warszawa, 85–95. ISBN 978-83-7005-595-0.
- Vitale J.L., McCabe M., Tedesco S., Wideman-Johnston T. 2012. Cache Me If You Can: Reflections on Geocaching from Junior/Intermediate Teacher Candidates. *International Journal of Technology and Inclusive Education (IJTIE)* 1(1): 2–8. DOI 10.20533/ijtie.2047.0533.2012.0001.
- White-Taylor J., Donnellon P. 2008. Geocaching in Education, w: K. McFerrin, R. Weber, R. Carlsen i D. Willis (red.) Proceedings of SITE 2008 International Conference. Wyd. AACE, Chesapeake, USA, 5340–5342.
- Zarządzenie 2003. Zarządzenie nr 57 Dyrektora Generalnego Lasów Państwowych z dnia 9 maja 2003 roku w sprawie wytycznych prowadzenia edukacji leśnej społeczeństwa w Lasach Państwowych. Znak: ZO-733-6/03. Załącznik 1: Kierunki rozwoju edukacji leśnej społeczeństwa w Lasach Państwowych. DGLP, Warszawa.
- Zecha S. 2012. Geocaching, a tool to support environmental education!?!– An explorative study. *Educational Research eJournal* 1(2): 177–188. DOI 10.5838/erej.2012.12.06.
- Zecha S. 2014. Outline of an Effective GPS Education Trail Methodology, w: R. Vogler, A. Car, J. Strobl, G. Griesebner (red.) GI\_Forum 2014. Geospatial Innovation for Society. Wyd. VDE VERLAG, Berlin/Offenbach, Niemcy, 352–361. ISBN 978-3-87907-545-4.
- Zecha S. 2016. ¿Cómo crear una ruta educativa GPS?, w: R. Alcaraz, E.M. Tonda Monllor (red.) La investigación e innovación en la enseñanza de la geografía. Universidad de Alicante, Hiszpania, 915–921. ISBN 978-84-16724-07-9.
- Zemko M., Vitézová Z., Jakab I. 2016. Geocaching as a means for modernization of educational process. Proceedings of the European Conference on e-Learning, ECEL 2016-January: 709–717.

### Websites

- <http://opencaching.pl> – Opencaching.pl website [November 15, 2019].
- <http://scholar.google.pl> – Google web browser service, collecting scientific publications [03/05/2019].
- [www.geocaching.com](http://www.geocaching.com) – the website of the international geocaching portal [November 15, 2019].
- [www.geocaching.pl](http://www.geocaching.pl) – Geocaching.pl website [March 5, 2019].
- [www.scopus.com](http://www.scopus.com) – an online database of scientific publications, kept by the Elsevier publishing house [03/04/2019].