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METHODOLOGICAL CONTRIBUTION IN THE FIELD OF MOUNTAIN LEISURE ACTIVITIES PRACTICING CASE STUDY: SCRAMBLING IN HIGH TATRAS

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ABSTRACT. Mountain leisure activities attract many participants because they are beneficial for health, maintain fitness, induce the feeling of performance and are spectacular. Among these activities, stands scrambling, which is part of the mountaineering and it is practice on the rock exposed surfaces (walls, ridges, chimneys, gully). One of the areas that offer excellent conditions for practicing scrambling is High Tatras (Vysoke Tatry) in Slovakia, where granite and gneiss rocks have created an attractive and favorable microrelief for this activity. This study aims at carrying out experimental methodological researches on the route Velička Dolina-Velicky zlab-Gerlachovský peak- Dolina-batizovsle Žlab-Batizovska Dolina-Batizovske Pleso-Sliezsky Dom regarding scrambling organization activity and mentation of specific climbing techniques in correlation with geologic factors (rocks, landforms). The subjects of this experiment were a group of students from the Faculty of Geography, from Babes-Bolyai University Cluj-Napoca (Romania), Tourism Geography specialization, without previous mountaineering experience on stony ground.

Keywords: *outdoor leisure activities, scrambling, climbing, mountaineering, Gerlachovsky peak*

REZUMAT. ***Contribuții metodologice în domeniul practicării activităților agrementale montane. Studiu de caz: Scrambling în Tatra Înaltă.*** Activitățile agrementale montane atrag numeroși participanți, deoarece sunt benefici pentru sănătate, mențin condiția fizică, induc sentimentul de performanți și sunt spectaculoase. Dintre aceste activități, se remarcă scramblingul, care face parte din mountaineering și se practică pe suprafețe cu roci expuse (pereți, creste, hornuri, gullys). Unul dintre arealele care oferă condiții deosebite pentru practicarea scramblingului este High Tatras din Slovacia, unde rocile granitice și gnaisice au creat un microrelief atractiv și favorabil acestei activități. Studiul de față are ca obiectiv efectuarea unor cercetări experimentale metodologice pe traseul Velicka Dolina-Velicky zlab-Gerlachovsky peak-Batizovske zlab-Batizovska Dolina-batizovsle Pleso-Sliezsky Dom privind organizarea activității de scrambling

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și aplicarea tehnicilor specifice de cățărare în coreleație cu factorul geologico-geografic (rocă, microrelief). Subiecții acestui experiment au fost un grup de studenți de la Facultatea de Geografie a Universității Babeș-Bolyai din Cluj-Napoca (România) specializarea Geografia Turismului, fără experiențe montane anterioare pe terenuri stâncoase.

Cuvinte-cheie: *activități agrementale active, scrambling, escaladă, turism montan, Gerlachovsky*

Introduction

Scrambling is an recreational activity that involves walking on stony ground (slopes, couloirs, gullys, chimneys, rock walls, ridges, rock formations), to reach a higher point (peak, peak, summit, scenic points), with hands and feet, without using climbing equipment (ropes, harness, belay devices). By the techniques used and by requests, scrambling can be considered the first stage of climbing in all leisure activities that take place on exposed rock surfaces (bouldering, free climbing, rock climbing, mountaineering). As difficulty, scrambling routes specified in the various systems of classification, as follows:

- by Yosemite Decimal System (YDS), which has five classes of difficulty, the scrambling routes are classified in 2 and 3 classes, as a simple scrambling, with the occasional use of hands, and low potential hazard, or scrambling with increased exposure, when the hands are necessary, and the dangers are great;

- by British climbing system, the scrambling routes are considered as mild (E, grade 1), moderate (M, grade 2) or difficult (D, grade 3);

-by UIAA, scrambling routes are I, II, III and IV classes difficulty.

Some scrambling guides evaluate the routes as follows:

- generally easy routes, with a minimal exposure and opportunity to use one's hands (class I, according to UIAA);

- moderate routes, where it is necessary to use hands frequently (class II UIAA);

- difficult routes, requiring the use of hands constantly, and even an insurance rope, on shorter sections, with high exposure to hazards (falls, collapses of stones) (class III, according UIAA class 3, 4 and possibly 5 after YDS).

In Tatra, scrambling routes is included in I, II and III classes, and the climbing routes have the degrees of difficulty between IV and VI (according to UIAA).

Since outdoor activities attract more people who need theoretical and physical potential for different types of recreational mountain, in this case the scrambling, has started this study with methodological character and experiments, that followed a series of items relevant to the topic proposed (appropriation of geographical knowledge, acquiring skills walking on stony ground, acquiring methodological and organizational skills).

Research subjects

Working Group established to carry out this study consisted of 10 students (3 girls and 7 boys) in the second year of the Faculty of Geography, Babes-Bolyai University Cluj-Napoca, Geography of Tourism, aged 20 to 21 years, clinically healthy, with no previous mountaineering experience on stony ground. Participation in the event was voluntary.

Materials and Methods

To achieve this study we chose an experimental route in High Tatras, which was followed by scrambling technique between the Sliezsky Dom and Gherlachovsky peak (2655 m).

Before starting the study, it was established an initial protocol, which included the following elements: information about the route, climbing techniques, geographic and tourist elements, targets proposed, program, physical and theoretical preparation, setting items or tasks on each phase of the experiment.

To the initially protocol was allocated four days, distributed as follows:

- one day traveling from Romania to Slovakia (Bistrita-Baia Mare-Vasarosnameny-Kosice-Poprad-Nova Lesna);
- one day rise to the top of Gerlachovský peak (12 hours);
- one day for visiting the Tatras Piedmont resorts (Tatranska Lomnica, Stary Smokovec, Tatranska Polianka, Stribske Pleso);
- one day move from Slovakia to Romania;

Through this route has several objectives, such as:

- making of direct observations on which it was moving surface (rock type, hardness of rocks, fissures, micro-relief, slope), the demands imposed on the route and tourist flows;
- the application of different scrambling techniques, based on the ground features;
- organizing and management of activities, natural resources and time.

Theoretical advance was made by consulting the literature in mountain leisure activities and scrambling (Suman, Babadag, 1987; Chauvin, Coppolillo, 2017), in field of petrology (Davis, Reynolds, 1996; Gridan, 1983; Pârvu, 1983), and for the area of Tatras (Földváry, 1988; Grecula et al., 1997; Gaweda et al., 2012). Also, established the necessary equipment (backpack, clothing, footwear, accessories, food), risks were analyzed and settled the first aid measures.

Physical training to carry this experimentally study was the widening conditions that must be met for the practice of scrambling, such as strength in arms and shoulders to pull up the body, uphill rocky path, ability to sustain an extended physical and mental effort, body balance and flexibility. Therefore, training began a month before the start of the study, during June-July, and included cardio, fitness exercises, deployed in indoor and outdoor, indoor climbing exercises, outdoor running, indoor climbing, bike ride, hiking, all serving to strengthen the body and create specific skills to this activity.

Strength workout for rock scrambling presumed three days a week, performing three to four sets of each of the following strength exercises in a circuit: finger planks, lateral pillar bridge with lat pull, lateral pillar bridge with overhead press with band, pull-ups, push-up with single arm row, dyno step-up jump-to-squat landing, hanging leg lift, arm dip, wheelbarrow walk, oblique knee raise plank, kettlebell figure eight etc.

The items set for each stage of the study were: the organization, and adjusting the necessary equipment, the establish of the route and the collection of specific data for each stage of the route which is important for our study, application of the of acquired movement techniques, the appropriate dosage of effort by controlling the rate of movement and pauses in a pre-exercise volume effort for each stage, and also recording the impressions for each stage and at the end, the well being generated, the response and the motors, physiological and psychological effects on the subjects of this study.

Study Area

Tatra Mountains are located in Slovakia (610 km^2) and Poland (175 km^2), and are part of the Carpathians chain, stretching over 1200 km long, between Vienna basin and Timok valley. It is divided into three distinct sections: Tatra, Easthern Beskids, and Romanian Carpathians (fig. 1).

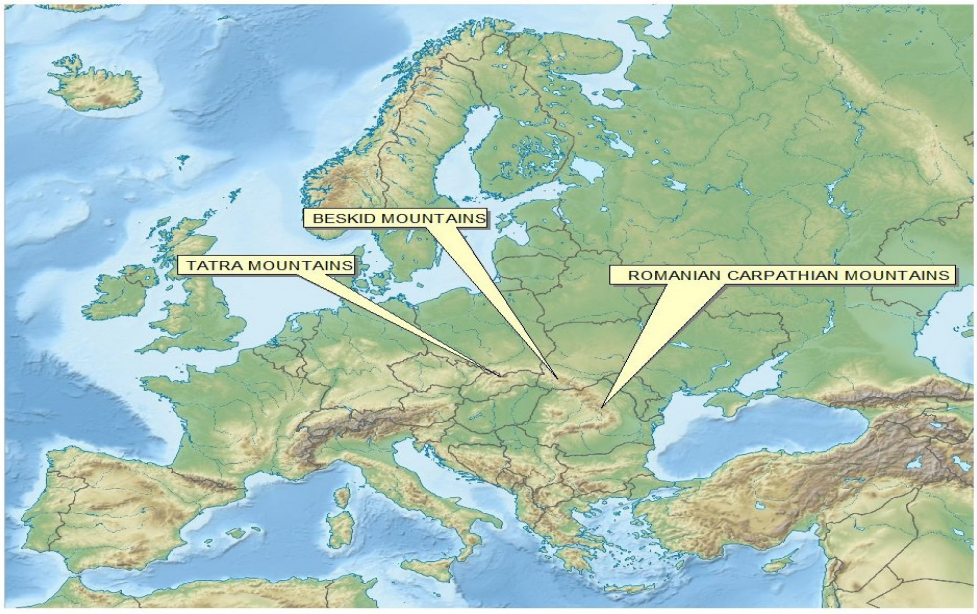

Fig.1. The major subunits of Carpathian Chain
(*source: https://geology.com/world/europe-physical-map.shtml-with changes*)

Tatra is the highest sector, and is divided, in turn, into two subunits:

1) High Tatras/Vysoke Tatry, north of Vah and Poprad valley;
2) Low Tatras, south valleys of Vah and Poprad (Dumbier peak, 2042 m).

The High Tatras sector is divided into three parts (Western Tatras, Central Tatra and Easthern Tatra or Belianske Tatra), and is distinguished by its alpine character, being considered the smallest alpine mountains in Europe (Fig. 2).

This is because the petrography constitution, represented by hard rocks (granite, gneiss), and glacial and periglacial chiseling that shaped spectacular landforms, with great attractiveness for tourism and leisure (glacial basins and valleys, ridges and peaks, steep slopes). The highest point of the High Tatras is Gerlachovský peak (2655 m).

From geomorphological perspective, the High Tatras massif has a main summit, held arched, with convexity to south side, of that fall secondary summits, like giant buttresses, separated by short and deep glacial valleys (dolina).

The main summit has a length of 80 km, and includes more than 25 peaks exceeding 2,500 m, of which 9 peaks are located at more than 2600 m: Gerlachovský, 2655 m; Lomnicky, 2634 m; Ladovy, 2627 m; Pysny, 2623 m; Zadny, 2616 m; Lavinovy, 2606; Ladovy Maly, 2602 m; Kotlovy, 2600 m).

The High Tatras mountain territory is covered by Tatra National Park, which covers the territory of Slovakia (Tatransky Narodny Park), and Poland (Tatrzanski Park Narodowy), with an area of 949 km^2. Slovakian sector of the park has 600 km of hiking trails, of which 16 trails marked and maintained for bicycles.

At the base of High Tatras massif, between 1000-1500 m, runs Tatra Piedmont, built from glacial materials in the form of long and large summits coated of forest that, is lost in the valley of Poprad. Gerlachovský Peak, which is the subject of this case study, is a secondary suumit located between Velička Dolina and Batizovska Dolina, being oriented NW-SE. The front of these summit is marked by a tremendous glacial basin (Gerlachovský kotol), opened to the Tatras Piedmont (fig. 3).

Fig. 2. Study area: High Tatras in Slovkia
(*source: http://www.freeworldmaps.net/europe/slovakia/map.html-with changes*)

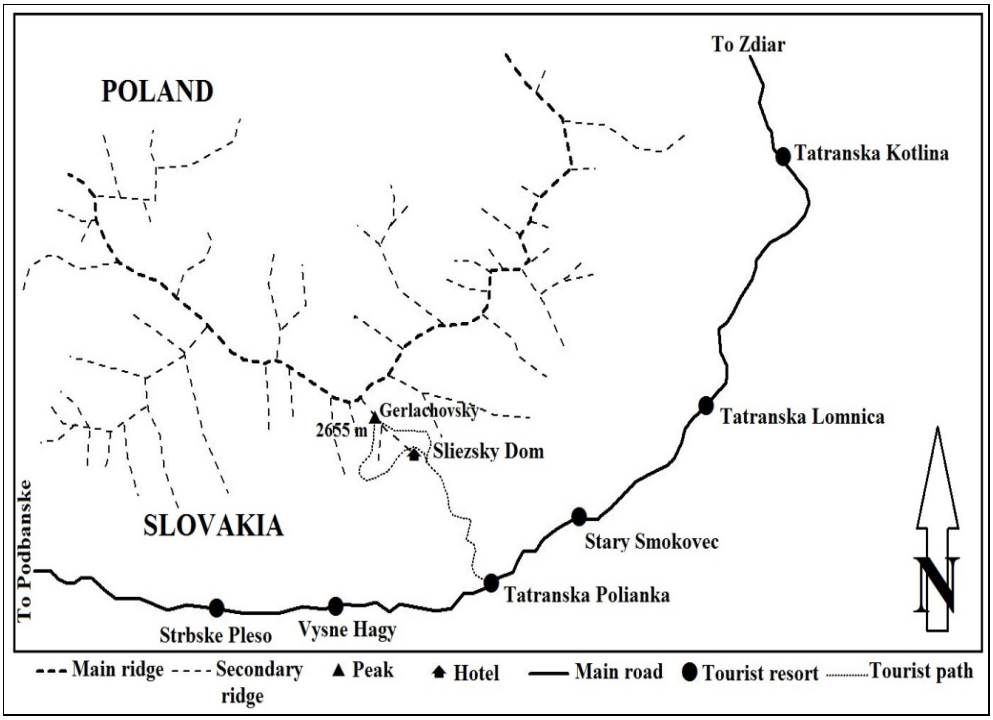

Fig. 3. The orographic map of High Tatras

Results and Discussions

a) Organization of tourism activities in the High Tatras

Because of high attractive potential, mountain tourism is well developed in the High Tatras Mountains, being represented by the numerous activities, such as: hiking, cycling, skiing, scrambling, rock climbing, dry tooling, paragliding, ecotourism. 2016 year recorded 3.5 million tourists in Tatra National Park, mostly coming from Slovakia, Poland and Hungary. Depending on the deployment of the relief, tourist facilities and recreational activities are arranged in steps, as follows:

1) in Poprad Valley:

- settlements with tourist functions: Poprad town (hotels, aquaparks, airoport), Podskalka Matejovce, Romska Osada, Maly Slavkov etc.;

2) in Tatra Piedmont:

- tourist major route 537;
- narrow railway (Tatranská elektrická železnica) on the route Poprad-Starý Smokovec-Štrbské Pleso (29.1 km), and Stary Smokovec-Tatranská Lomnica (5.9 km);
- tourist resorts at1000-1200 m altitudes: Tatranska Kotlina, Tatranska Lomnica (ski area), Tatranska Lesna, Stary Smokovec (ski area), Tatranské Zruby, Tatranska Polianka, Nova Polianka, Strebske Pleso (ski area), Podbanske;
- ski slopes, tourist roads and marked trails, shelters, huts and mountain hotels (Zelenom, Teryho, Zbojnicka, Sliezsky Dom, Popradské Pleso Rysmi, Soliskom);

3) in high nontain area, over 1200 m:

- hiking and climbing market routes, unmarked trails, ski slopes, cable cars (Tatranska Lomnica-Lomnicky peak);

b) Route segmentation according to the request and ground features:

The substrate on which was worked the scrambling activity in the High Tatras is represented by intrusive igneous rocks (granites) and metamorphic rocks (gneiss). These rocks are very hard, which has a rich fissures. The intersection of cracks systems were developed slabs, banks, block and prismatic separation. Crack and fractures systems, and rock separations are particularly important for climbing mountainous exposed sectors (slopes, walls, boulder fields, chimneys, gullys, ridges), because they are hand and footholds, favoring practicing climbing activities that require the use of fingers, hands and feet, and the location of belay devices (bolts, nuts, feathers, cams, tricame).

The resulting fragments by cracks intersection can be deployed by weathering and can accumulate at the base of walls and steep slopes, at the base of gullys, corridors and chimneys or within them, sometimes facilitating the movement, sometimes hindering it, because they are often mobile.

Depending on their physical characteristics, the cracks in the High Tatras, the Velicka Dolina-Gerlachovský kotol-Batizovska Dolina-Gerlachovský peak are several types:

- by length: long cracks, short cracks;
- by width: large cracks, narrow cracks;
- after plan deployment: parallel cracks, branched and intersected cracks;
- after depth: surface cracks, deep cracks.

In climbing, the fractures are classified according to their width, reported at the climber dimensions:

1) finger cracks: allow insert fingers inside them;

2) off-finger cracks: cracks are wider than the finger, but not wide enough to allow the introduction in the hand inside them;

3) hand cracks: allow the hand entering inside their;

4) off-widt cracks: cracks are wider than the rest, but not wide enough to allow the legs or upper body come inside them;

5) large cracks, horn-crackes, chimney cracks: they are large enough to allow their penetration into the whole body.

The hardness of the rock and the cracks lead generated a micro-relief of walls, steps, teeth, chimneys, couloirs, ridges and gullys. The walls are up to 900 meters, with an average of 2-300 meters, and is spread between 1800-2300 m.

Given these considerations, the expedition route was divided into the following sectors and technical activities (fig. 4):

a) Trekking: Tatranska Polianka-Sliezsky Dom (1670 m)-Velicky zlab (1900 m);

- features of the route: tourist path with grass and stone;

- required aptitudes: skills of walking, fitness;

- items to accomplish: the walking, choosing appropriate equipment (flexible boots, soft shell pants, shirts, fleece, backpack, poles), making observations on the organization of the High Tatras National Park (trails, lookout points, resting areas, indicators, route marks), setting the amount of effort, expressed in km (8 km) and elevation (680 m), keeping away a uniform rate of walking (about 4 km/h), recording important data for our study (geodiversity, biodiversity, tourism), the registration of impressions, of well being generated, of the response of the motor, psychological and physiological effects for the subjects of study for this stage;

-time of travel: 2h30min;

b) Scrambling:

1) Sliezsky Dom (1670 m)-Velicky zlab-Kvetnicova veza (2400 m)-Gerlachovsky kotol-Urbanova veza-Batizovka Dolina-Gerlachovky peak (2655 m);

2) Gerlachovsly peak-Batizovsky zlab-Batizovska Dolina-Batizovske Pleso (1884 m):

-features of the route: exposed walls, steps, ridges, chimneys, rocky protrusions;

- necessary aptitudes: walking skills on the rock, fitness:

- items to accomplish: displacement techniques to the rock and via ferrata (use of hands and feet), the use of appropriate equipment (flexible boots, breathable pants, shirt, climbing gloves, helmet), carrying out observations of the substrate (cracks, micro-relief, handholds), and of the glacial and periglacial landforms (fig.5), setting the amount of effort expressed in the difficulty of the route (I-III UIAA), length (4 km climb, 3 km descent), and the level difference (980 m), in compliance with movement of a uniform rate of approximately 1 km/h/300 m above sea level climb, registration of impressions, of well being generated, of the response of the motor, physiological and psychological effects upon the subjects of the study for this stage;

- travel -time: 3 h 30 minutes to climb, 3 hours to descent = 6 h 30 min total;

c) Trekking: Batizovske Pleso-Tatranska Magistrala-Sliezsky Dom-Tatranska Polianka:

- features of the route: tourist path with soil and stone slabs;
- required aptitudes: walking skills, fitenss;

-items to accomplish: walking, using specific equipment (flexible boots, soft shell pants, fleece, windstoper blouse, backpack, poles), making of observations to glacial landforms, mountain vegetation and on the organization of tourism activities in the National Park High Tatras (paved path, markers, signs), fixing the amount of effort expressed in km (5 km), keeping away a uniform way (about 4 km/h), registration of impressions, well being generated, response and motor, mental and physiological effects upon the subjects of this study, for this stage;

- travel time: 3 h.

Technicaly, some methodical steps were agreed:

- identify the optimal route, which will be safe and sufficient handholds for scrambling;
- check stability of handholds, by tapping with hands and feet;
- free walking only with hands and feet;
- stationary points, relaxation, configuration/reconfiguration of the route;
- touching the peak (fig.5).

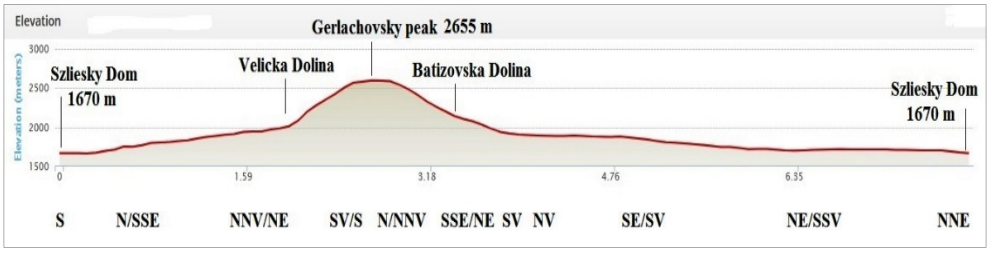

Fig. 4. Profile of the route
(*source: map myhike.com-with changes*)

Fig. 5. Gerlachovsky summit

In the process of displacement they were committed fingers, hands and feet in order to facilitate vertical and lateral movement and to ensuring stability and balance to the body. Therefore, techniques have been applied differently according to the micro-relief and slope, as follows:

a) fingers techique:
- catching the handholds with all fingers;
- catching the handholds with 2-3 fingers;
- introducing the hands/punch in the cracks;

b) hands technique:
- hands support;
- catching the handholds with the fingers;
- release a hand;
- hands synchronization;
- use alternate hands to maintain balance and seeking the handholds;

c) foot technique:
1) stepping/smearing:
1.1) climbing up:
- step the entire sole, where the rock surface was large, slightly sloping and relatively smooth;

- step the tip of the boot (edging), where the footholds were formed of the rock protrusions and cracks, and the rock surface was inclined;

- step the edge of the boot, internal or external, on the inclined surfaces, with the footholds formed by rock protrusions, rocky edge or cracks;

1.2) climbing down:

- step with the heel, on the areas with rock protrusions, which permit this action;

- step the entire sole, where the rock surface was not too inclined;

- step the tip of the boot (edging), and facing the rock wall, where the inclination of the route has been very high (ex. Batizovsky zlab);

2) legs movement:

- pushing the body vertically;

- tranzition of the legs by crossing;

- the change of the foot on the same foothold;

- the rotations of the foot/of the foot and the body on the same foothold;

- the tranzition of the pressure on one foot to another, each foot being on an foothold;

- rotation and transition of the pressure, with the possibility of release and the relaxation of one leg;

- distancing the legs for stability, and for support on the distance foothold (bridging);

d) body tchnique:

- balancing with hands and feet;

- leading the body by balance to a particulary foot/handhold;

- the vectorization/orientation of the body to a particulary foot/handhold;

- pushing the body outside the rocky surface, to redistribute the weight on the feet, and to catching a particulary foot/handhold with the finger or foot;

- closing the body inside the rocky surface, to redistribute the weight on the feet, and to catching a particulary foot/handhold with the finger or foot;

e) walking techniques:

- uphill;

- downhill: facing the rocky surface, back on rocky surface;

- traverse;

- leaping;

- rock hopping (ex. on the surfaces with boulders or large cracks).

Conclusions

High Tatras Mountains offers ample possibilities for extreme leisure, such as scrambling, by virtue of the geological surface, represented by the granite and gneise (rock walls, ridges, chimney, gullys, cracks and separations). The experimentally route chose for this study, running between Velička Dolina-Velicky Žlab-Gerlachovský peak-Batizovke Žlab-Batizovske Pleso favored analysis and application of scrambling specific methodological techniques for fingers, hands and feet, so that the results complete with reaching the peak and return to base safely. The data thus obtained will be used in similar leisure tourism activities for students and tour guides in any area with exposed surfaces.

At the end of this experimental expedition was found that all items have been completed, as follows:

- organizing the expedition: the route and every segments of the route was respected, and each member of the expedition was part of the group;
- setting and compliance program: each stage was run as scheduled without incident;
- the application and learning trekking and scrambling techniques: all members of the expedition managed to move away and scrambling techniques, reaching safely on top of Gerlachovský peak;
- making observations on the organization of the High Tatras National Park, and of the glacial landscape in the studied area: analytical observations were made on tourist infrastructure, tourist flows, leisure activities and the landscape shaped by glacial and periglacial processes in the High Tatras;
- successfully learned by the subjects of this study of methodological skills on organizing outdoor activities;
- the feedback generated by the experience accumulated by the subjects during the study, materialized by motor, psychological and physiological positive immediate effects, and long term will provide a stock of basic knowledge and experience necessary to practice and organizing various forms of mountain leisure.

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