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Achieving competencies with grammar school students through utilisation of selected didactical principles in traditional and active teaching – geography class case study: "Hydrography of Serbia"

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Abstract

Lecture-based teaching is still the prevalent form of teaching in almost all secondary schools in Serbia. Although active teaching cannot eliminate all the shortcomings in the teaching of Geography, this particular form gives the best opportunities for understanding individual abilities and preferences of students. The principal aim of the study was to explore which way of teaching (modern-active or traditional-passive) is more beneficial for motivating students' learning and acquiring competencies (knowledge, skills, and abilities) in Geography. Research was conducted to analyse competencies acquired by selected high school students through the application of certain didactic principles in the third grade of Grammar school "Laza Kostić" (Novi Sad, Serbia) with the topic "Hydrography of Serbia". Fieldwork investigation was comprised of conducted survey questionnaire (with pupils evaluating motivation and participation in the process of teaching Geography, as well as activities and learning/acquiring certain geographical content through selected didactic principles, forms, methods, and tools) and the competency test. Descriptive statistics was used for calculating the percentage and average values. The independent *t*-test was used in order to determine whether there is a statistically significant difference between the experimental and control group regarding the self-evaluation of motivation, participation in teaching, and learning. The difference in terms of acquiring competencies between experimental and control groups was explored by the Chi-square test ($\chi 2$). In order to determine whether there is a correlation between self-evaluation in terms of motivation, cooperation, and learning, as well as in the knowledge test between the experimental and control groups, Pearson's correlation coefficient (r) has been calculated. The results indicate that the students have higher level of motivation, and are more interested in learning and acquiring knowledge when the teacher organises the lecture through active learning techniques. The knowledge and skills resulting from these kinds of classes are higher. Also, the results obtained from this type of experimental classes, showed that with an increase of skills and abil-

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ities, there is no increase in knowledge implying that modern (active) teaching presented better results than the traditional teaching format, but not in all analysed segments.

Keywords: geography, didactical principles, teaching styles, motivation, students'competencies, grammar school, Serbia.

Introduction

In almost all secondary schools in Serbia, lectures still seem to be performed in a traditional way, with students passively absorbing the given information. Teachers rarely make significant changes in the passive nature of the learning process, providing incentives to learn only at passive rather than active level (Marton, Saljo, 1976). Lecture-based teaching is therefore still the prevalent form of teaching, with students sitting, listening and watching, while the teacher has the major role (teacher-centered teaching) (Matijević, Radovanović, 2011). Active learning, on the other hand, refers to "experiences in which students are thinking about the subject matter" while they interact with the teacher and each other (McKeachie, 1999; Gamson, 1991). Instead of just memorising large quantities of information, this way of teaching stimulates thinking, exploring, searching for clues, etc., encouraging students to not only gain knowledge, but also to acquire different skills and competences (Montgomery, et al., 1997).

However, active learning is not more beneficial in all situations. DeNeve and Heppner (1997) reported that research by the Educational Resources Information Center (ERIC) analysed twelve studies involving a direct comparison between active learning and other teaching methods. The majority of these studies reported no significant differences between active and passive teaching techniques in terms of student performance. Based on their study, DeNeve and Heppner (1997) concluded that "these results agree with recent research that suggested that active learning techniques are more effective for achieving some goals, while lectures are more effective for achieving other goals". If we consider that one of the main goals in teaching Geography is that students acquire permanent knowledge and applying it to new teaching and life situations, while minimising the process of forgetting, then active learning seems to be more beneficial than traditional learning. In classical forms of teaching, individual differences between students are ignored, leading to reduced productivity and motivation to work and learn. Although active teaching cannot eliminate all the shortcomings in the teaching of Geography, this particular form gives the best opportunities for understanding individual abilities and preferences of students. Based upon this, the principal aim of the study is to explore which way of teaching (modern-active or traditional-passive) is more beneficial for motivating students' learning and acquiring competencies (knowledge, skills, and abilities) in Geography. The main hypothesis for this study is that "active learning will result in better motivation, better activity and learning/mastering certain geographical content by students, as well as more positive results in terms of students acquiring knowledge, skills, and abilities, in comparison to traditional teaching". To explore this hypothesis, research was conducted to analyse competencies acquired by selected high school students through the application of certain didactic principles in the third grade with the topic "Hydrography of Serbia". Experimental lessons were conducted with pupils in the third class of Grammar school "Laza Kostić" (Novi Sad) during November in the school year 2015/2016. This project was implemented within the framework of the university course in "Application of didactic principles in the teaching of Geography", an obligatory master level course at the Department of Geography, Tourism and Hotel Management, Faculty of Sciences, in Novi Sad (Vojvodina, Serbia).

The research process was conducted in 6 classes of the 3rd grade, establishing two types of experimental classes. The first class type was conducted in the traditional manner, with an emphasis on the didactic principles of intuition and scientific validity by applying frontal forms of work and monologue – dialogue method (control group), while the other class type was conducted through active (contemporary) teaching, with emphasis on the didactic principle of interesting and attractive teaching and active participation by students, with group work, dialogue, and illustrative-demonstrative methods (experimental group).

After each lesson (experimental and control group), students responded anonymously to the survey, which was aimed at examining their attitudes in terms of motivation, participation, activities, and learning/mastering certain geographical content in the teaching of Geography, by means of selected didactic principles, forms, methods, and tools. On the other hand, the knowledge test was aimed at examining the competence of students after processing the new material, with the control questions being divided into three segments: knowledge, skills, and abilities.

The paper will also provide a theoretical overview of the applied teaching styles that were used in experi-

mental classes, with a brief description of their implementation. In addition, the results of the research will be presented (the results of the questionnaire and testing of the students' competencies), accompanied by a discussion which aims to explain the efficiency and effectiveness of given didactic principles when applied in the process of teaching Geography through different techniques.

Theoretical background

Traditional Teaching Styles vs Active Learning Techniques: differentiations and effectiveness in teaching process

Effective teaching and learning requires the application of appropriate methodologies and pedagogies that meets the demands of the students and the changing events in their educational environments (Nardos, 1999). Both traditional teaching methods and alternative (active) learning techniques are continuously used in the teaching-learning-evaluation process of Geography, with all their limitations and advantages, as they are intertwined and complete one another (Gica, Aurora-Cătălina, 2013). In the standard lecture format, the teacher is the sender or the source/knowledge transmitter, the educational material is the information or message, and the student is the receiver of this information. In terms of delivery medium, the educator can deliver the message via the "chalk-and-talk" method, overhead transparencies or digital projector presentations. This directed instruction model has its foundations embedded in the behavioural learning perspective (Skinner, 1938), which is a widely used technique that has been used for decades as an educational strategy in all institutions of learning. In the traditional lecture approach, the teacher controls the instructional process, the content is delivered to the entire class, and the teacher tends to emphasise factual knowledge. Thus, the learning mode tends to be passive and the learners play almost no part in the entire process (Orlich, et al., 1998). Opposite to that, the group's role and collaboration in the teaching process is an exciting way of diversifying high school students' classroom experience and incorporating active learning into the teaching mechanism. At many high schools in Serbia, the standard lecture format (traditional) still seems to be the central point of instruction, with students passively absorbing pre-processed information and then regurgitating it in response to periodic exams and examination periods. This work environment provides incentives to learn only at the surface (passive) level rather than deeper (active) when it comes to the different cognitive domain levels of learning (Marton, Saljo, 1976; Prince, 2004; Ivanović Bibić, et al., 2015). Various authors point out that the traditional format of teaching encourages students to concentrate mostly on superficial indicators, rather than on fundamental underlying principles, thus neglecting deep (active) learning (e.g. McCarthy, Anderson, 2000; Marić, Krunić, 2003; Scheyvens, et al., 2008; Milošević, 2010; Babić-Kekez, Tasić, 2012; Anderson, 2013; Đukičin, et al., 2014; Ivanović Bibić, et al., 2015; Milošević, et al., 2016).

The concept of active teaching refers to a didactic-methodical model of organising educational processes which has been conceived on the natural tendency of students of a certain age to explore the world around them on their own (Firdissa, 2005; Babić-Kekez, Tasić, 2012). Thus, certain strategies have to be applied. Active learning strategies refer to a variety of collaborative classroom activities, ranging from long-term simulations to five-minute cooperative problem-solving exercises (Bonwell, Eison, 1991; Sutherland, Bonwell, 1996; McCarthy, Anderson, 2000; Firdissa, 2005). Very little research examines the actual effectiveness of active learning in relation to traditional teaching formats. Regardless of the evident benefits of activities, the above-mentioned techniques may not be the most efficient for imparting information or for enhancing the retention of knowledge.

This investigation strives to give a clear answer on several important questions - *what are the costs, as well as the benefits when using active learning techniques over traditional teaching formats in the Geography classroom in terms of self-evaluation on the level of motivation, participation, and on the different levels of cognitive domains of learning in Geography teaching.*

Methodology

Study sample and procedure

The research was conducted in the form of two experimental classes – one following the traditional manner and the other a contemporary manner (through active teaching) – in six third grade classes at the Grammar school "Laza Kostić". The sample size for this study was 227 pupils. A total of 120 pupils participated in a traditional type of experimental class, while 107 pupils were involved in a class conducted in a modern manner, with active teaching techniques. The research was conducted to analyse the acquiring of competencies by selected high school students through applying didactic principles in the third grade when discussing the topic "Hydrography of Serbia". Experimental lessons were carried out during November in the school year 2015/2016.

The first type of class was conducted in a traditional manner, with an emphasis on the didactic principle of intuition and scientific validity by applying the frontal form of teaching and monologue - dialogue

method, while the other experimental type of class was conducted through active teaching, with emphasis on the didactic principle of interesting and attractive teaching and active participation by students, with group work, dialogue, and illustrative-demonstrative methods.

In the last 10 minutes of each class, students were asked to fill in the questionnaire and the competency test. After completion of the lectures (experimental and control group), students responded to the survey anonymously. This was done to examine their attitudes in terms of motivation, participation, activities, and learning/mastering certain geographical contents in the teaching of Geography through the chosen didactic principles, forms, methods, and means of work. On the other hand, the knowledge test was aimed at examining the competencies of students after processing the new material, with the control questions being divided into three segments: knowledge, skills, and abilities.

Questionnaire design

The questionnaire consisted of two main parts:

1. Self-evaluation of students in terms of motivation and participation in the process of teaching Geography through the chosen didactic principles, forms, methods, and means of work;
2. Self-evaluation of students in terms of learning/mastering certain geographical content through the chosen didactic principles, forms, methods, and means of work.

More precisely, the questionnaire included 15 claims, with pupils evaluating motivation and participation in the process of teaching Geography, as well as activities and learning/acquiring certain geographical content through selected didactic principles, forms, methods, and tools.

The first part of the questionnaire consists of questions related to the attitudes of students in terms of motivation and participation in the process of teaching Geography through selected didactic principles, forms, methods, tools, and activities and learning/acquiring certain geographic content by using selected didactic principles, forms, methods, and tools.

The second part represents the examination of students' competencies after teaching the new material, with the acquisition of knowledge, skills, and the students' abilities being determined.

The answers for the first part of the questionnaire were measured on a five-point Likert scale (1 - I strongly disagree; 2 - I disagree; 3 - I don't know; 4 - I agree; 5 - I strongly agree) (Likert, 1932). The questions in the second part of the survey were closed questions. The participants were given the task of recognising some geographical content on the map and circling the right answers. The closed questions were used due to the time limitation (the teachers had 45 minutes to conduct the lecture and to perform the test with pupils). The traditional manner of teaching was used in a control group, while active teaching was used in an experimental group.

Apart from the questionnaire, the pupils also completed the knowledge test. The knowledge test consisted of nine questions on different cognitive domain levels of learning - knowledge, skills, and abilities. The questionnaire for this study was adapted from the model developed by Borić and Škugor (2014). The knowledge test, however, was designed by the authors of this paper, with the model by Borić and Škugor (2014) and the questionnaire by Ivanović Bibić et al., (2015) serving as basis.

Hypothesis and methods

The main hypotheses of this research can be defined as follows:

1. H_1: Application of active teaching in presenting certain lessons serves to improve students' motivation in terms of participation in the teaching of Geography more than traditional teaching.
2. H_2: Application of active teaching in presenting certain teaching units contributes to better activity and learning/mastering certain geographic content by students, more than traditional teaching.
3. H_3: Application of active teaching in presenting certain teaching units gives more positive results in terms of acquiring knowledge, skills, and abilities of students than traditional teaching.

Descriptive statistics was used for calculating the percentage and average values.

The independent *t*-test was used in order to determine whether there is a statistically significant difference between the experimental and control group regarding the self-evaluation of motivation, participation in teaching, and learning. The difference in terms of acquiring competencies between experimental and control groups was explored by the Chi-square test (χ^2).

In order to determine whether there is a correlation between self-evaluation in terms of motivation, cooperation, and learning, as well as in the knowledge test between the experimental and control groups, Pearson's correlation coefficient (r) has been calculated. The statistical analyses in this study were carried out using SPSS 20.

For the purpose of statistical analyses that were used in this study, we applied the following guidelines for the interpretation of the size of the correlation (r):

- from 0.10 to 0.29 - small correlation;

- from 0.30 to 0.49 - medium correlation;
- from 0.50 to 1.0 - high correlation (Cohen, 1988).

The statistical software package SPSS version 20, was used for processing the data obtained by the questionnaire.

Results and discussion

The first part of the questionnaire explored attitudes regarding motivation and participation of students in teaching Geography. The answers were obtained by using the Likert scale and their mean values are presented in Table 1. The results refer to the first experimental class presented in the traditional way. The teaching unit that was presented in class was "Rivers of Serbia". Table 1 shows the mean values obtained by the survey after presenting new material in the traditional and active format of teaching.

In Table 1, the questions start with question two, because the first question concerns the manner in which the class was conducted (traditional or contemporary/active teaching). There was 120 pupils in the classes held in traditional way, and 107 pupils in experimental classes performed in the active teaching format.

In terms of the class held in traditional way, the table shows that the highest mean value has a statement under number 3, i.e. "*Creatively organised and conducted Geography class much more encourages my active participation in class*" with the mean value of 4.34. On the other hand, the lowest average grade of 2.78 has a question (statement) under number 14: "*I like the Geography lessons where you do not have to be active and participate*".

Based on the results, it can be concluded that pupils prefer the creatively organised class that encourages their activity and participation, in comparison to the class where the teacher and his oral presentation are prevalent.

Table 1. The mean values of the survey results for the traditional and classes conducted in the active teaching format

Survey question		Traditional teaching format			Active teaching		
		N	Mean	Std. Deviation	N	Mean	Std. Deviation
2.	The desire to learn new contents in Geography is higher when the teacher organises class in a more interesting way (presentation of specific geographical topic with the possibility of discussion by pupils, use of pictures, presentations, films, models, etc.).	120	4.33	1.006	107	4.42	.825
3.	Creatively organised and conducted Geography class much more encourages my active participation in the class itself.	120	4.34	.957	107	4.22	.904
4.	I found it much more interesting when I, with teachers help, acquire knowledge by myself.	120	3.89	.994	107	3.83	1.120
5.	I am more satisfied with participation in the Geography class when the lecturer divides us into learning groups.	120	3.21	1.243	107	3.82	1.302
6.	I am satisfied with the level of my activity.	120	3.47	1.084	107	3.85	1.219
7.	I found it more interesting to acquire knowledge on class when teacher is holding a lecture.	120	3.28	1.217	107	3.36	1.298
8.	I prefer when the class is taught only by teacher.	120	3.39	1.259	107	3.42	1.244
9.	Cooperation with other students is good when learning new material.	120	3.66	1.088	107	3.80	1.077
10.	Cooperation with other students improves my work during the class.	120	3.40	1.226	107	3.79	1.125
11.	My ideas contribute to team work.	120	3.45	1.129	107	3.72	1.172
12.	It is easier for me to memorize contents that I have explored on my own.	120	3.05	1.289	107	3.60	1.235
13.	Learning through searching, discovering and exploring improves my participation during the class.	120	3.32	1.188	107	3.53	1.084
14.	I prefer the Geography lessons where you do not have to be active and participate.	120	2.78	1.361	107	3.29	1.401
15.	It is easier for me to memorize contents lectured by the teacher.	120	3.28	1.231	107	3.31	1.224
16.	I find it more interesting when lessons are taught by teacher.	120	3.34	1.293	107	3.39	1.203

The structure of the answers shows that pupils gave the highest ratings to those statements related to classes where teachers are presenting lectures. In contrast, pupils gave the lowest scores to statements that relate to those lessons where students independently acquire new knowledge.

The scores on the Likert scale resulting from the control group (active teaching), indicate that the highest average grade has question number 2: "*The desire to learn new contents in Geography is higher when the teacher organises class in a more interesting way (presentation of specific geographical topic with the possibility of discussion by pupils, use of pictures, presentations, films, models, etc.)*". The mean value for this question is 4.42.

The students gave the lowest rating to question number 14: "*I like the Geography lessons in which I do not have to be active and participate*" (the same as in the class conducted in the traditional way) with the mean value of 3.29. This indicates that students generally do not have a very definite opinion about the statement mentioned.

In analysing the mean values of responses in classes conducted through modern, active teaching ("Lakes, thermo-mineral waters of Serbia and the economic importance of the hydrological resources" teaching unit), it can be seen that pupils found it more interesting and easier to learn and acquire knowledge when the teacher manages to organise the class in some interesting way, including the higher level of pupil participation in the teaching process.

Analysing the mean values of the answers in the control (traditional) and experimental group (active teaching), it is noticed that the pupils' attitudes in the class conducted in the traditional manner are quite similar to the attitudes of pupils in the class involving active teaching. However, it is evident that there are also some discrepancies.

A comparison of the responses regarding pupils in both types of experimental classes is shown in the following graph (Figure 1).

If we analyse the mean values of the answers in Figure 1, it can be noticed that the pupils are much more ready to participate in the class when the teacher presents lectures in an interesting way. The major discrepancies between the control and experimental groups can be noticed in statement number 5: "*I am more satisfied with participation in the Geography class where we learn and the lecturer divides us into groups*". In the first experimental class, the pupils gave much lower rankings to this statement in comparison to the second class (active teaching), meaning that they have changed the previously stated attitudes after the second class, involving group work.

Based on the comparative analysis of the answers in the control and experimental groups, it can be concluded that pupils find it more interesting and easier to learn and acquire new knowledge when the teacher organises the class in a non-conventional way by using pictures, graphs, maps, and other visual aids.

Test results for examining the cognitive domain level of learning

After the survey, students completed a test for establishing acquired competencies following both experimental lessons.

Test for examining the level of cognitive learning domain consisted of three parts:

1. *Knowledge* (3 questions);
2. *Skills* (3 questions);
3. *Abilities* (3 questions).

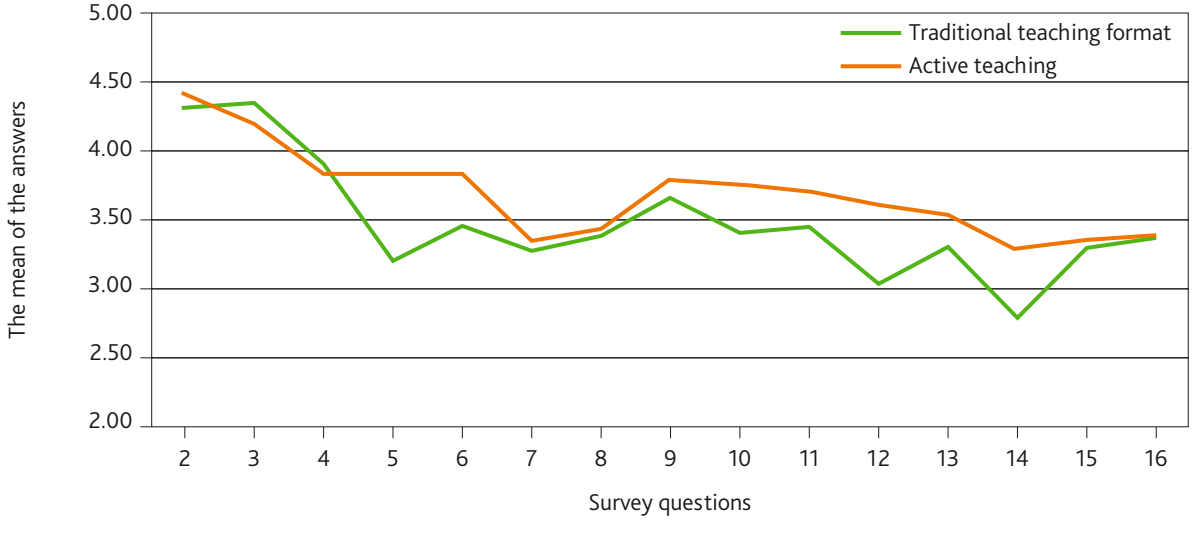

Figure 1. The comparative analysis of the answers in the control and experimental group

In the following tables, test results are given for the material covered in traditional lessons with the frontal method and with emphasis on didactic principles of intuition and scientific validity. The first experimental-type classes covered the topic "Rivers of Serbia". Most of the correct answers by students were given to questions regarding skills acquisition.

The percentage of correct answers to the first question (*The largest drainage basin in an area that covers 92% of the territory in Serbia is: a) Adriatic Sea drainage basin b) Black Sea drainage basin c) Aegean Sea drainage basin*) was 83.33% (i.e. 100 students from 120 gave correct answers). The least correct answers by students were to questions regarding abilities acquisitioning. Only 58.33% of students knew the correct answer to question 7 (*Danube river passes through or touches ten countries - according to the title of the map presented*), while question 8 (addressing the distribution of depressions and gorges within the Đerdap gorge area) was correctly answered by 14.17% of the students (i.e. 17 students from 120).

The percentage of correct answers according to acquired knowledge, skills, and abilities is shown in Table 2.

Table 2. Percentage of acquired knowledge, skills, and abilities for the traditional teaching format

Acquired competencies	Percentage (%) of correct answers
KNOWLEDGE	67.50
SKILLS	69.72
ABILITIES	43.33

According to the results, it is noted that students acquired skills (69.72%) best, and abilities least (43.33%).

When all results of the test examining students' competencies are considered, it is concluded that students successfully acquired knowledge and skills, but achieved somewhat poorer results regarding abilities. This would mean that didactic principles of intuition and scientific validity were successfully applied during the experimental lessons.

In the next table (Table 3), we can see test results from the material taught in classes involving active learning, group work, and emphasis on didactic principles of interesting and attractive teaching, as well as active participation by students. At this stage of the research, 107 students were included in the experiment. The mean number of participants was 18 students per class, with six 3rd grade classes in total. Students were divided into three or four work groups, with the lesson being taught in these classes referring to lakes and thermo-mineral waters of Serbia, with special emphasis on the economic importance of the hydrological resources.

Most students gave the correct answers to questions regarding knowledge acquisitioning. The percentage of correct answers to the first question (*Waters with a mineralisation larger than 1000 mg/l and a temperature higher than 20°C are characterised as: a) mineral waters b) thermo-mineral waters c) thermal waters*) was 72.90%. The least correct answers were to the question referring to abilities acquisitioning. For instance, only eight out of 107 students gave the correct answer to question 8, which referred to water-quality classes in Serbia.

The percentage of correct answers according to acquired knowledge, skills, and abilities is shown in Table 3.

Table 3. Percentage of acquired knowledge, skills, and abilities for the active teaching format

Acquired competencies	Percentage (%) of correct answers
KNOWLEDGE	70.09
SKILLS	55.14
ABILITIES	45.48

According to this research (test), students acquired knowledge (70.09%) and skills (55.14%) the best, while achieving somewhat weaker results in abilities acquisitioning (45.48%). The correct answers from students to questions regarding knowledge acquisitioning were relatively equal in both lessons, although students achieved better results during the active learning experimental classes (70.09%). The traditional teaching method with the principle of intuition and scientific validity provided better results regarding skills acquisition. Acquired abilities in both types of experimental classes were weaker, with 43.33% and 45.48% correct test answers respectively (Figure 2).

In conclusion, it can be said that students showed better results by applying active learning techniques through the group method, with emphasis on didac-

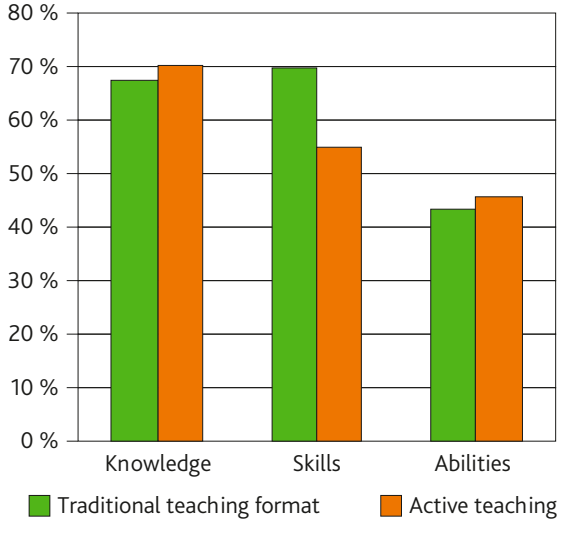

Figure 2. Comparative overview of acquired knowledge, skills, and abilities in experimental lessons (in %)

tic principles of interesting and attractive presentation, as well as active participation by students. Traditional teaching gave somewhat better results in the domain of skills acquisitioning. On the other hand, some goals could only be achieved partially through active-participation teaching, but the majority of important educational goals as shown by Ivanović Bibić et al., (2015) could not be achieved. This stems from the fact that active teaching cannot be reduced to group work only, but should be based on cooperative learning as one of the key methods in an active-participation school. Furthermore, students in Serbian schools are used to the traditional teaching styles, resulting in better results in certain segments of competencies (such as skills) (e.g. Ivić, et al., 2001a, b; Ivanović Bibić, et al., 2015; Milošević, et al., 2016). Recognition should also be given to the fact that students differ from each other regarding physical, emotional, and cognitive traits, especially in the level of education, development of work habits, and motivation for learning. Active learning techniques should fit the individual and not just the age characteristics of students, with the teacher dealing with the abilities of each student and distancing the lessons from the demands of the "average student". One of the potential ways of overcoming these problems in Geography lessons could be the application of a differentiated instruction method and the principle of individualised teaching (e.g. Milošević, 2010; Milošević, et al., 2016). In this way, didactic activities would be modified for each student, taking their individual abilities into account.

Above-mentioned facts are in accordance with the necessity for conducting similar investigations and pedagogical experiments, as well as demands for the improvement of the educational system in Serbia by applying diverse monitoring instruments on local, regional, and international level (e.g. Programme for International Student Assessment - PISA). Monitoring key knowledge and skills essential for full participation in modern societies, is imperative to this approach. In other words, it reflects the fact that modern societies strives to appreciate individuals not for what they know, but for what they can do with what they know. This is very important in the field of geosciences. The findings from investigations presented in this study, can set targets for the improvement of certain areas of Geography teaching in the Serbian education system, and create policies and practices for curriculum implementation and improvement.

The results of the *t*-test, χ^2-test and correlations of the answers from the knowledge test

The independent *t*-test was used in order to analyse if there is a difference between the control and experimental groups in terms of motivation and participation of the pupils in the Geography classes.

In terms of pupils' self-evaluation regarding motivation in the teaching of Geography through selected didactic principles, types, methods, and tools, the *t-test* of independent samples indicated that there is a statistically significant difference (t=-1.824, p<0.05) between the two analysed groups – the pupils that participated in the class conducted in the traditional way (control group) and those who participated in the class conducted through active teaching (experimental group). The results indicate that the experimental group obtained higher scores in terms of motivation (MD=-.14529). The given results indicate that hypothesis 1 (H_1: *Application of active teaching in presenting certain lessons serves to improve students' motivation in terms of participation in the teaching of Geography*) can be accepted.

In terms of pupils' self-evaluation regarding participation and learning/mastering some geographical content through selected didactic principles, types, methods, and tools, the *t*-test of independent samples also showed that there is a statistically significant difference (t=-3.388, p<0.01) between the two analysed groups – the pupils that participated in the class conducted in the traditional way (control group) and those who participated in the class conducted through active teaching (experimental group). The results indicate that pupils from the experimental group, who participated in the class conducted through active teaching, obtained higher scores in terms of participation (MD=-.28588), indicating that hypothesis 2 (H_2: *Application of active teaching in presenting certain teaching units contributes to better activity and learning/mastering certain geographic content by students*) can be accepted.

After the analysis of differences between the control and experimental groups in terms of motivation and participation, the differences in the results of the competence test (knowledge, skills, and abilities) were also analysed.

For this purpose, the Chi-square test (χ^2) was used. The results of the test indicate that there is a statistically significant difference between the two analysed groups only in terms of their skills (χ^2=12.001, df=3, p<0.05), while Cramers' V coefficient (0.25) indicates medium effect.

The test showed that pupils from the control group (traditional teaching) scored higher in terms of skills, compared to pupils in the experimental group (active teaching). The results showed no statistically significant difference in terms of knowledge and abilities. According to these findings, hypothesis 3 (H_3), stating "*Application of active teaching in presenting certain teaching units gives positive results in terms of acquiring knowledge, skills, and abilities of students*" can also be accepted.

Table 4. The results of the Pearson test of correlation (*r*) –traditional class

		Knowledge (1st class)	**Skills** (1st class)	**Abilities** (1st class)
Knowledge (1st class)	Pearson Correlation	1	**.282****	**.268****
	Sig. (2-tailed)		.002	.003
	N	120	120	120
Skills (1st class)	Pearson Correlation	**.282****	1	**.326****
	Sig. (2-tailed)	.002		.000
	N	120	120	120
Abilities (1st class)	Pearson Correlation	**.268****	**.326****	1
	Sig. (2-tailed)	.003	.000	
	N	120	120	120

***. Correlation is significant at the 0.01 level (2-tailed).*

Table 5. The results of Pearson test of correlation (*r*) – active teaching class

		Knowledge (2nd class)	**Skills** (2nd class)	**Abilities** (2nd class)
Knowledge (2nd class)	Pearson Correlation	1	.146	.101
	Sig. (2-tailed)		.134	.300
	N	107	107	107
Skills (2nd class)	Pearson Correlation	.146	1	**.310****
	Sig. (2-tailed)	.134		.001
	N	107	107	107
Abilities (2nd class)	Pearson Correlation	.101	**.310****	1
	Sig. (2-tailed)	.300	.001	
	N	107	107	107

***. Correlation is significant at the 0.01 level (2-tailed).*

The presented results differ from results obtained from more simple methods of descriptive statistics. This certainly emphasises the need for more adequate statistical methods (such as *t*-test and χ^2-test), which are widely used and accepted in educational research. Although descriptive statistics generally represents the first step in data analysis (used to describe the collected data), it is usually preceded by statistical inference and prediction, and should not be the final goal of statistical analysis.

Thereafter, the Pearson correlation test (*r*) was calculated in order to determine whether there are correlations between the results in the fields of knowledge, skills, and abilities, and the class being presented in the traditional or modern way (active teaching).

In terms of results obtained in the control group, the test showed significant correlations between all the mentioned variables (Table 4). This means that when knowledge increases, skills and abilities increase accordingly, or vice versa.

Based on results obtained from classes presented by means of active teaching through group work and didactic principles of interesting and attractive teaching, as well as active participation by pupils, we can conclude that there is a statistically significant correlation in terms of skills and abilities (r=.310, p<0.01), but the results also show that skills and abilities do not correlate with knowledge. The results suggest that in the class conducted through active teaching, knowledge does not increase together with the increase in abilities and skills (Table 5).

Conclusion

The basic assumption for this research was that the application of active teaching in the presentation of certain lessons will improve students' motivation in terms of participation in the teaching of Geography (H_1), contribute to better activity and learning/mastering certain geographic content by students (H_2), as well as give positive results in terms of acquiring knowledge, skills, and abilities by students (H_3), more than the traditional way of teaching Geography, where the teacher has the major role. When it comes to students' motivation in terms of participation, activities, and learning/mastering certain geographic content, the results indicate that the students are more interested and learn and acquire knowledge easier when the teacher organises the lecture in a more interesting and attractive manner, using pictures, dis-

playing graphics, maps, etc. Based on this finding, it can be concluded that students prefer the class that is organised in a more interesting way and they are more motivated than in a class where the teacher presents material in a traditional way. Thus, modern (active) teaching presented better results than the traditional way of teaching, which is confirmed by the results of the first part of the survey – that the students are more interested when the teacher organises the class creatively and when they have greater participation. Therefore, the knowledge and skills resulting from these kinds of classes are higher. Based on this, hypothesis H_1 and H_2 have been confirmed.

If we analyse the obtained results by using various methods of descriptive statistics, it can be concluded that the students have acquired the new material better in modern experimental classes presented through active teaching, using group work with an emphasis on the didactic principles of interesting and attractive teaching, as well as conscious participation by students.

Respondents obtained a better performance and acquired knowledge and skills in the second type of class (active teaching) better, while in the first type of experimental class (traditional teaching format) they achieved better results only in the field of abilities. On the other hand, the results of *t*-test and $\chi 2$-test show a certain discrepancy in the results obtained from simple descriptive statistics and indicate in a more detailed way the statistically significant differences between the two classes in terms of students' competencies. These tests showed that students in the first type of experimental class (traditional teaching format) achieved better results in terms of skills than students in the second type of experimental class, with no statistically significant difference in the field of knowledge and abilities. According to the results of Pearson's correlation test (*r*), it was observed in the first type of experimental class that, with an increase of skills and abilities, the knowledge also increases. However, the results obtained from the second type of class (active teaching), showed that with an increase of skills and abilities, there is no increase in knowledge. Therefore, hypothesis H_3 can be partially confirmed, because modern (active) teaching presented better results than the traditional mode, but not in all analysed segments.

The traditional mindset – that the transfer of knowledge in schools should only be done through the teacher as major role player, should be replaced by active and constructive participation by students in the teaching process. Teachers should respect each student with his/her individual characteristics, and should encourage their creativity. Learning through active teaching is not aimed at letting students have fun and enjoying themselves in class, but at making the material they learn more lasting. It should be taken into account that students of the same age differ regarding their physical, emotional, and other characteristics, especially in their level of education, working habits, and motivation for learning. A potential way of overcoming these problems in the teaching of Geography could be the application of the principle of individualisation, which refers to differentiated forms of work and cooperative learning as one of the key forms of work in the active school.

The application of different didactic principles, methods and forms of work, as well as educational tools, is creating an environment in which students of different abilities and affinities achieve better results in education regardless of whether the teaching content is physical-geographic, socio-economic, or regional Geography.

Since one of the basic tasks of teaching Geography is to permanently acquire knowledge, skills, and abilities in order to apply it to new teaching and life situations, thereby decreasing the process of forgetting, the previously summarised results certainly are in line with these needs, with the final aim to improve and advance the educational system by applying different instruments of monitoring on local, national, and international level.

The results obtained by this study are suggestive rather than conclusive, as there are certain limitations to the conducted research. The research was carried out in only one school, which can limit the generalisability of the given results. Thus, future research should be conducted in different schools where Geography is taught and with pupils of different grades in order to gain an average, clearer picture and more conclusive results.

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References

Anderson, J. 2013. Active learning through student film: a case study of cultural geography. *Journal of Geography in Higher Education* 37, 3, 385-398.

Babić-Kekez, S., Tasić, I. 2012. Didactics. University of Novi Sad, Novi Sad. (in Serbian)

Bonwell, C. C., Eison, J. A. 1991. Active learning: Creating excitement in the classroom. ASHE-Eric

Higher Education Report 1. George Washington University, Washington, DC.

Borić, E., Škugor, A. 2014. Achieving Students' Competencies Through Research-Based Outdoor Science Teaching. *Croatian Journal of Education* 16, 1, 149-164.

Cohen, J.W. 1988. Statistical Power Analysis for the Behavioral Sciences (2nd Edition). Routledge, Abingdon.

DeNeve, K.M., Heppner, M.J. 1997. Role play simulations: The assessment of an active learning technique and comparisons with traditional lectures. *Innovative Higher Education 21*, 231-246.

Firdissa, J. 2005. Active learning versus the traditional lecture. *The Ethiopian Journal of Education* 15, 1, 49-77.

Gamson, Z.F. 1991. A brief history of the seven principles for good practice in undergraduate education. In A. W. Chickering & Z. F. Gamson (Eds.), Applying the seven principles for good practice in undergraduate education. New Directions in Teaching and Learning 47, 5-12. Jossey-Bass, San Fransico.

Gica, P., Aurora-Cătălina, H. 2013. The Efficiency of Modern Teaching Strategies in the Geography Class. *Journal of Emerging Trends in Educational Research and Policy Studies* 5, 1, 49-54.

Đukičin, S., Ivanović Bibić, Lj., Lukić, T., Dubovina, Z. 2014. Analysis of the utilization of supplementary illustrations - an example of the selected teaching units from the fifth grade geography textbook (Republic of Serbia). *Geographica Pannonica* 18, 4, 89-85.

Ivanović Bibić, Lj., Đukičin, S., Lukić, T., Miljković, Đ., Milanković, J., Babić-Kekez, S., Ivkov Džigurski, A., Dubovina, Z. 2015. Achieving Competencies with Grammar School Students through Utilization of Selected Didactical Principles – Case Study of Geographic Features of Europe. *Geographica Pannonica* 19, 4, 153-161.

Ivić, I., Pešikan, A., Antić, S. 2001a. Active Learning. Institute of Psychology, Belgrade. (in Serbian)

Ivić, I., Pešikan, A., Antić, S. 2001b. Active Learning II. Institute of Psychology, Belgrade. (in Serbian)

Likert, R. 1932. A Technique for the Measurement of Attitudes. *Archives of Psychology* 140, 1-55.

Marton, F., Saljo, R. 1976. On qualitative differences in learning: I-outcomes and process. *British Journal of Educational Psychology* 46, 1, 4-11.

Marić, Đ., Krunić, D. 2003. The System of Didactic Principles in the Teaching of Geography. *Globus* 28, 93-108. (in Serbian)

Matijević, M., Radovanović, D. 2011. Teaching techniques oriented towards students. Školske novine, Zagreb. (In Croatian)

McCarthy, P. J., Anderson, L. 2000. Active Learning Techniques Versus Traditional Teaching Styles: Two Experiments from History and Political Science. *Innovative Higher Education* 24, 4, 279-294.

McKeachie, W. J. 1999. Teaching tips: Strategies, research, and theory for college and university teachers. Houghton Mifflin, Boston.

Montgomery, K., Brown, S., Deery, C. 1997. Simulations: Using experiential learning to add relevancy and meaning to introductory courses. *Innovative Higher Education* 21, 217-229.

Milošević, D. 2010. Application of Differentiated Form of Teachning in Geography in sixth grade. *Researches Review of the Department of Geography, Tourism and Hotel Management* 39, 36-51. (in Serbian with English abstract)

Milošević, D., Ivanović Bibić, Lj., Đukičin, S., Ivkov Džigurski, A., Ristanović, B. 2016. The possibilities of application of programmed instruction in the sixth grade of the second cycle of education in accordance with standards. *Geographica Pannonica* 20, 2, 96-104.

Nardos, A. 1999. Comparative education through distance education. Addis Ababa University, Addis Ababa.

Orlich, D.C., Harder, R.J., Callahan, R.C., Gibson, H.W. 1998. Teaching Strategies: A Guide To Better Instruction. Houghton Mifflin Co., New York.

Prince, M. 2004. Does active learning work? *A Review of the Research Journal of Engineering Education* 93,3, 223-234.

Scheyvens, R., Griffin, A., Jocoy, C., Liu, Y., Bradford, M. 2008. Experimenting with Active Learning in Geography: Dispelling the Myths that Perpetuate Resistance. *Journal of Geography in Higher Education* 32, 1, 51-69.

Skinner, B. F. 1938. The Behavior Of Organisms - An Experimental Analysis. Appleton - Century - Crofts, Inc., New York.

Sutherland, T., Bonwell C. 1996. The active learning continuum: Choosing activities to engage students in the classroom. In T. Sutherland and C. Bonwell (eds.), Using active learning in college classes: A range of options for faculty, New Directions for Teaching and Learning 67, 3-17. Jossey-Bass, San Francisco.