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THE EFFECTIVENESS OF THE TEACHING METHOD OF INQUIRY IN RELATION TO EMPIRICAL IN THE COURSE OF GEOGRAPHY[i]

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Abstract:
Throughout his life, man observed the plastic formation of the earth, the climatic conditions, the variety of living beings, the human settlements, as well as the material and spiritual creations of his ancestors. Through observation, he ascertained the interactions of these elements and made sure to interpret and exploit them. Knowing the great importance of the course, it is necessary to diagnose why students do not manage to obtain a broader representation of space with the various forms of the earth's surface and realize the mutual dependence of man on the geophysical and cultural environment. A catalytic influence on students mastering geographical concepts is their teaching approach. This is achieved through various teaching methods used as means of learning and practice, such as the empirical method, comparative, abduction-induction-synthesis-analysis, constructive, and exploratory. With the empirical teaching method, students achieve empirical understanding, learning and retention. With the exploratory teaching method, they climb the stairs of the learning hierarchy, achieving understanding, distinction and generalization. First of all, teachers must be convinced through training seminars of the importance of the method, the goals we set for it, and the positive results resulting from its application. This is a basic prerequisite for achieving the objectives of the curriculum, because without the voluntary participation of teachers in this program, we will not have the desired results. On the threshold of the twenty-first century, when scientific research has offered great achievements to man, the introduction of this way of thinking through the exploratory teaching method is considered necessary and imperative.

Keywords: Geography, didactic approach, empirical method, exploratory

[i] Η ΑΠΟΤΕΛΕΣΜΑΤΙΚΟΤΗΤΑ ΤΗΣ ΔΙΕΡΕΥΝΗΣΗΣ ΣΕ ΣΧΕΣΗ ΜΕ ΤΗΝ ΕΜΠΕΙΡΙΚΗ ΣΤΟ ΜΑΘΗΜΑ ΤΗΣ ΓΕΩΓΡΑΦΙΑΣ

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1. Introduction

Throughout his life, man observed the formation of the earth, the climatic conditions, the variety of living beings, human settlements, as well as the material and spiritual creations of his ancestors. Through observation, he ascertained the interactions of these elements and took care to interpret and exploit them.

In this effort, he made subjective interpretations, later theoretical analyses and then systematic observations, comparisons and scientific investigations. In this way, the science of geography was progressively created (Kitsou, 1982:210). Today, geographers study not only the natural areas of the earth but also the interactions of natural and biological phenomena and human activities on the earth's surface.

The findings of the science of Geography are taught in primary and secondary schools. Specifically, in primary schools, the study of the natural world in general and geography as the main subject is taught. In this way, children learn about the natural and anthropological phenomena of the earth and practice thinking geographically. They find that man's activities are influenced by the natural environment, and man in turn influences the environment.

The necessity and importance of the subject of geography can be seen from the following (Kitsou, 1982):

- The mental functions of the child are cultivated. Pupils adopting scientific observation develop "by feel" perception, imagination, the concept of wider space, reasoning and judgement.
- A more complete knowledge of the human species is achieved. Pupils become aware of the variety of human types and groups and see their dependence on the environment in which they live.
- A moral education is provided for pupils, as they acquire a political and national awareness through knowledge of the immediate and wider geographical area of their home country.
- Cultural and intercultural interaction is developed. By studying the economic, political, and cultural data of people from all over the world, pupils make comparisons of similar data for their own country and learn from the achievements of other countries.
- Cultivating the spirit of mutual understanding between people. UNESCO stresses that by leading students to think geographically, we are leading them to think globally. In other words, we help them to go beyond their narrow local horizons and to understand that they and their country are but one part of a larger community that spans the world.

Knowing, therefore, the great importance of the subject of geography, it is necessary to diagnose why pupils do not always achieve the objectives of the syllabus. That is, students fail to acquire a broader vision of space with its diverse forms of the earth's surface and to realize the mutual dependence of man on the geophysical and cultural environment.

It is important to mention that the intelligence and interest of children aged 6 to 11 years are not favourable conditions for deepening their knowledge of geography. The progressive awareness of the world and life begins systematically at school with the lesson called the Study of the Environment and continues with the lessons of Geography, Science and History. Geography achieves a progressive awareness of space, while History achieves a progressive awareness of time. Piaget holds that the concepts of time and time are progressively created in human consciousness and in close interaction and interdependence with each other, and in dependence and interdependence with the also basic concepts of object and causality. This requires structuring the curriculum and writing a student textbook in such a way that it responds to the cognitive skills of children of this age (Rapti, 1976).

One of the two factors mentioned above, a catalyst for students to master geographical concepts, is the didactic approach to them. This is achieved through various teaching methods used as means of learning and practice. Specifically for geography, they are distinguished in the following (Petroulakis, 1981: 99):

a) **Empirical Method (Traditional or Presentation).** This method is based solely on experience. Since the scientific element is missing, the student cannot face a new problematic situation, distinguish the essential from the unessential and adapt his/her work to different circumstances presented.
b) **Comparative Method.** It is used in parallel with other teaching methods, and its characteristic feature is the juxtaposition of objects, phenomena, situations, persons and their co-examination. Thus, the teacher and students find existing contrasts, differentiations and make comparisons.
c) **Abduction - Induction - Synthesis – Analysis.** By combining these methods, we create teaching approaches. With the method of abduction, we start from the cause and arrive at the effect using axioms, laws, definitions, and causes. We have a synthetic course, since we synthesize phenomena into a given law. We use the method of induction when we make generalizations from special cases (phenomena, properties, events). So, we start from the result and find the cause, following an analytical path.
d) **Constructive Method.** With this method, we confront students with the problematic situation (new knowledge). When they find that their knowledge is insufficient or incorrect, a social-cognitive conflict occurs. Thus, the students get trapped in the problem and try to transform their previous actions, reorganize them, using sequencing, classification and matching, and in this way construct the new knowledge.
e) **Exploratory Method (Heuristic or Dialectical or Midwifery).** With this method the teacher and students jointly explore an area and try to find a solution to a problem. Its aim is that instead of memorizing knowledge, they learn how to learn. The teacher teaches students to use disciplined research methods to study the world around them.

As teachers, they must choose the method that is most effective in achieving the lesson objectives. The modernization of curricula and textbooks also requires a change in teachers' philosophy and attitude towards modern teaching methods. For this reason, we will attempt to investigate the problem of teaching science, which concerns the effectiveness or otherwise of the modern exploratory method of teaching versus the traditional empirical method.

2. Location and analysis of the problem

Our intention is to examine the effectiveness of the teaching method of inquiry in the Geography classroom compared to the traditional empirical method in terms of the level of cognitive learning and the activation of procedural, analytical and critical thinking in the classroom. We believe that if the exploratory method of teaching is used in the Geography course, we will have better results than the traditional one in terms of cognitive learning level.

We all know that in our country, for decades, geography was taught according to the associative-experiential method. This implies the transmission of knowledge in small steps, in modules that are independent of each other. The empirical method of teaching refers to a memory level (retention of events and execution procedures) that aims to retain knowledge using direct "transfer" of knowledge and proceeds cumulatively and continuously with closed questions (Salvaras, 1996:59).

The content of the Geography course was Physical and Political Geography. Its organization was based on principles of arrangement of the material, such as from "*near to far*" and "*in concentric circles*" (Christias, 1991:8). The teaching approach was monotonous, and the principle of supervision had only the meaning that the student acquires knowledge with the help of the senses. The purpose of education and teaching was declarative knowledge that defines what things are. The aim of teaching was the accumulation of a lot of encyclopaedic knowledge, the knowledge of rules and definitions and the reproduction of maps. The role of the teacher was to transfer knowledge to the students who accepted it passively.

According to the new curricula (Christias, 1991:7) the teaching hours of the course remained one per week and the basis of the Geography course is: the distribution and organisation of human activities and characteristics in space, by regions and on a global scale, the understanding of the interdependencies and interactions of geophysical and social factors and the introduction of students to corresponding ways of thinking, methods and techniques.

The course is based on physical geography, the methods and techniques by which geographical data are described, analysed, systematised and visualised; knowledge necessary for the student to become familiar with space, to grasp its continuity and to be able to place various human activities in it. For this reason, a large part of the lesson in the fifth grade is devoted to physical geography (geomorphology, climate, soil, water,

flora and fauna) and to the learning and use of methods and techniques related to the science of geography (maps, graphs, etc.).

The methods and techniques of processing and presenting geographical data are part of the content and teaching. The way it is organised is based on the principle of ordering the material from the simple to the complex and on the principle of exemplary presentation and analysis of geographical data. Teaching is aimed at understanding the laws governing things rather than simply providing information. In other words, it is based on the dynamic structure and presentation of the material (reduction of situations to their processes of generation).

The role of the teacher in the teaching and learning process is an auxiliary one. The teacher's task is to organise teaching and prepare material to move children towards active and investigative learning. This is best achieved by using the inquiry method of teaching. By inquiry, we mean the phases in which students learn to systematically use the rules of logic and science to verify their ideas.

In exploratory work (Petroulakis, 1981:134), concepts are defined and classified, and ideas are differentiated, positions are clarified, relevant material is collected, the position (version) supported is evaluated with this material, a logical conclusion is formulated, the truth is generalized, and the logical consequences of the positions are explored.

The teacher presents the problem in springboard form. The purpose of the teaching is to clarify the problem and suggest various hypotheses about it. The general role of the teacher is to create conditions in which a problem can develop: to have materials and resources available for students to explore the topic and to encourage students with questions to point out additional issues, make hypotheses, and then clarify, explore, and resolve conflicting ideas and positions.

According to B. G. Massialas, the activities of the teacher in inquiry teaching are (Massialas, p.331): the teacher as a planner, as a facilitator, as a guide of disciplined inquiry, as a pedagogue and as an evaluator. Students practice logical and scientific processing of answering, confirming and using knowledge. They are encouraged to arrive at their own opinions through free discussion and exchange of views. They are also trained in methods and techniques interwoven with the subject matter of science.

These methods and techniques belong to procedural knowledge (Salvaras, 1996:69), i.e. the knowledge that defines the 'how' of things. Such knowledge is the student's ability to use the map as a source of information, to know its conventional points, which are orientation on the map, longitude and latitude, and the use of scale. They should also learn to refer to sources of learning relevant to the subject matter, such as climatograms, informative texts, articles in magazines and newspapers, photographic material, the student's book, geographical encyclopaedias, etc. In this way, the activation of the internal functions and processes that take place during learning, such as attention, selective perception, internal repetition, semantic encoding, the organization of reactions, feedback and executive control processes, is achieved (Koliadis, 1997:226). With these, the student "*learns how to learn*".

According to Gagne, learning is a change in behaviour that is not simply attributable to the process of maturation and is cumulative in nature. For the acquisition of a skill-ability by the learner, there are always prerequisite cognitive elements. That is, learning is distinguished in phases (Salvaras, 1996:66). Each of them performs a separate role.

a) Comprehension, requires students to say what they have learned in their own words and explain "why".
b) Learning, requires students to perform tasks quickly and accurately, given an example.
c) Retention, requires students to use the skill they have learned without the teacher's help.
d) Discrimination, requires children to distinguish the skill from others, such as where the old knowledge is the same and where the old knowledge is different from the new knowledge.
e) Generalization, requires students to apply the skill they learned to new situations with the teacher's help, e.g. from exemplary teaching in one place, they come to conclusions that they apply to other areas.
f) Modification or adaptation, requires students to apply on their own the skill they have learned in new situations by making a partial reorganization of it.

All phases of the learning hierarchy are necessary because they are closely related to the instructional objectives of empirical understanding, reproductive recall, performance, recognition, analysis, and reflective understanding. Depending on the type of instructional objectives we set, we achieve different levels of learning. With the empirical teaching method, students achieve empirical understanding, learning and retention. With the exploratory method of teaching, they move up the rungs of the learning hierarchy, achieving both reflective understanding and discrimination and generalization. At the same time, the development of these cognitive processes is sought by activating analytical and critical thinking.

Analytical thinking (Koliadis, 1997:152) is thinking that proceeds in gradual steps. It is based on elements and functions of which man is fully conscious. It is based on reasoning and uses logic in a clear process. It still works by a process of induction and experimentation, using the principles of research and statistical analysis. The main characteristic of critical thinking is that the thinking person constantly checks and tries many solutions to reach the right result. It examines existing solutions and ideas to identify errors and mistakes.

By the term exploratory method of teaching, we mean teaching at the level of "simple abstraction" (relationships between things), which aims at the discovery of knowledge, using comparison, the organization of relationships by grouping, arrangement and coupling, the analysis of the parts of a whole, the calibration of relationships, the verification of versions and explanation (causal or telological) (Salvaras, 1996:60).

At the current stage of development of the school institution, with the creation of new curricula, it is necessary to diagnose the effectiveness of the inquiry method of teaching and integrate it into the school curriculum. This method (Massialas, p. 332): a) ensures the assimilation of the methods of scientific knowledge in the process of searching for these methods of their application; b) forms the traits of creative activity; c) fosters interest, search for such activity; and d) provides useful, well-conscious practical and usable knowledge.

The essence of the exploratory method can be defined as a way of organising students' creative activity to solve problems that are new to them. However, the prevailing view in the educational field and beyond is that the traditional way of teaching geography was more effective, because the pupils were ultimately in possession of a wealth of encyclopaedic knowledge. It is therefore necessary to investigate which view is valid, i.e. which teaching method ultimately achieves its objectives and to what extent.

3. Applications of the exploratory teaching method

The process of investigation is a method of teaching and learning. In a broader context, inquiry can be described as an intellectual scheme interested in helping students to move step by step from hypothesis to data collection, verification, generalisation, etc. The association of the inquiry method of teaching with modern curricula is a given.

There are specific models and applications of this method in the classroom, both in American and Soviet schools. One of the important treatises on inquiry is the work of John Dewey, published at the turn of the century. According to Dewey, investigation is the active, persistent and careful consideration of any concept or supposed scheme of knowledge in the light of the evidence on which it is based and the further conclusions to which it leads.

Numerous authors of teaching programs have used or connected the frameworks of Dewey's theory to develop their own models of inquiry-based teaching. Joyce and Weil (1980) identified six such models, all closely related, based on Dewey's original conception. These models are: "Group Research" (Thelen, 1960; Dewey 1933), "Social Inquiry" (Massialas Cox, 1966), "Laboratory Method" (National Training Laboratory, NTP), "Nomology" (Oliver Shavr, 1966), and "Social Simulation" - (Boocock and Schild, 1968).

An example of the application of these models for exploration in the social studies course is given by Massialas and Cox. The classroom in which this model is presented is psychologically open to discussion. It is also possessed of a clear sense of purpose.

The process of knowledge exploration has been the basis for textbooks and materials in the United States and other countries of the world since the 1960s, 1970s and beyond. That is why the core subjects in the curriculum were radically revamped in the so-called "New Math", "New Science", "New Social Studies" and "New English". Many of these programmes became known by their initial letters: a) ISCS-Intermediate Science

Curriculum Study (Study of the Science Curriculum in Secondary Education) and BSBS-Biological Science Curriculum Study (Study of the Biology Curriculum).

In addition to these lessons, the process of inquiry was used in the teaching of reading, art, home economics, music, archaeology, etc. The inquiry method was used with gifted students, adults, urban, rural, youth, disabled and preschool children. The main features of these programs are. The focus on ideas and concepts rather than on conceptually disconnected chunks of information; b. A strong emphasis on activities and participation, where students were given triggers to "learn by doing"; c. An emphasis on learning methods of confirming and testing hypotheses in each discipline; and d. The idea that content and processes are inseparable components of learning.

From the early years of the Soviet school, which aimed to connect school with life, the investigative method was widely used in the practice of education. However, some educators gave a very broad interpretation to this method: they associated with investigative work any action of the pupil related to the object of reality. Thus, the exploratory method lost its basic function: the independent realization of the cognitive process (Massialas, p. 333).

In Greece, Massialas' ideas are still at the theoretical level (Petroulakis, 1981:166). Experimental work is necessary to show whether and to what extent the exploratory method is applicable in Greek schools. It is a fact that students and teachers need to get rid of the stress of curriculum, memorization, barren examinations and absolutism. This will be achieved by applying the exploratory method, which will help the Greek teacher to get rid of the quagmire of traditional teaching.

4. Conclusions

After presenting the data, we believe that we should look for some general conclusions, which will be the most important element of our paper. The most obvious finding is that in the Geography course, the exploratory teaching method is more effective than the traditional one in terms of learning. Through the teaching, we found out how much the students were activated to find information, research for the foundation of their theses, as well as discovering the right answer to the problem through the dialogue and collaborative classroom atmosphere. For students, this method is a source of moods, emotions and specific reactions from the motivation given to them to acquire knowledge. It gives the teacher the opportunity to become the "director" of the classroom, to escape the boredom and routine of traditional teaching that withers the natural appetite for teaching and learning. This method helps mediocre and good students to become better. The number of students with excellent performance increases, and as a result, the average level of the class becomes higher. However, this method does not favour the very weak students, as shown by the data. Our view is that weak students are not favored because the exercise of logical and scientific processing required in research is the result of cognitive functions based on analytical and critical thinking, which require mental and emotional maturity. Nevertheless, even in culturally deprived groups, the investigative

method contributes to the promotion of knowledge because it creates motivation for new learning by activating students.

5. Proposals

The main purpose of the paper is not just to establish the effectiveness of the inquiry method of teaching compared to the traditional method, but to make findings about the importance of the problem in school learning. Therefore, the essential thing to do is to consider what decisions we might consider upon school practice, based on our new data. The most important and at the same time the simplest thing that we propose is to teach the subject of geography by the method of investigation, as provided for in the curriculum. First of all, teachers must be convinced through training seminars of the importance of the method, the objectives we set by it and the positive results that result from its application. This is an essential prerequisite for the objectives of the curriculum to be achieved, because without the voluntary participation of teachers in this programme, we will not achieve the desired results.

On the threshold of the twenty-first century, when scientific research has offered great achievements to man, the introduction of this way of thinking through the investigative method of teaching is necessary and imperative. However, even the most perfect form and method of teaching, which should ultimately be applied, depends on the consideration of the various factors that take part in the event of learning, namely, the psycho-spiritual maturity of the students, the purpose of teaching, the subject matter and the means of teaching, as well as the personality of the teacher (Dervisi, 1981:204). It is important to note that continuous application for a long period of time of even the best method causes boredom and reduces students' interest in learning. For this reason, a combination of teaching methods that are appropriate for the course of geography is suggested by educators.

Conflict of Interest Statement
The authors declare no conflicts of interest.

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