



## Practical Implementation of Differentiated Teaching during School Age

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### Author's contribution

*The sole author designed, analyzed and interpreted and prepared the manuscript.*

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### ABSTRACT

In the context of continuously increasing social changes and demands the urgent need to seek for effective alternative teaching methods emerges. To this end, it seems that differentiated teaching may have positive results as far as the aforementioned situation is concerned, which leads to the existence of students of mixed abilities. The applicable functionalism of differentiated teaching provides the learning context with the multilevel activation of the psychospiritual potential of each student, their active involvement in the teaching process and the development of incentives to build the newly acquired knowledge while at the same time it takes into account the level of preparedness of each student, the specific individual interests and the learning profile. On this basis, the purpose of this paper is to present an indicative teaching example with the implementation of differentiated instruction at the fifth class of elementary school in which 20 students of mixed abilities participated. The results of the teaching scenario concerning the application of differentiated instruction showed maximization at learning results and gave the chance of considering an alternative way of teaching. The results of the experimental group of students that had received differentiated instruction were compared by graded difficulty worksheets and a questionnaire for the participation and cooperation demonstrated by the students during the scenario with the results of the control group at the other fifth class at the same school that had not

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received differentiated instruction. The main conclusion showed that differentiated instruction has the potential to treat students equally while functioning as a mean for students' activation, substantial participation during teaching in order to better acquire knowledge.

*Keywords: Differentiated teaching; teaching process; alternative teaching.*

## **1. INTRODUCTIVE CONCEPTUAL DETERMINATION OF "DIFFERENTIATED TEACHING"**

The social and cultural pluralism of modern reality revealed the different expressions of school potential, disputing the formal picture of the "average" student [1]. We all should realize that the modern society consists of a population in which each individual is different from each other [2]. The monodimensional and standardised way of teaching and learning is rendered insufficient for achieving the modern expectations of the instructive process. So Differentiated Teaching appears to be able to effectively confront the continuously increasing diversity of multilevel mixed school potential [3,4]. Differentiated teaching does not constitute "another" instructive strategy, but is more "another" way of thinking, that influences the teachers' way of approaching the instructive process, the management of time, the application of program and the evaluation of teaching to a more significant extent [5,1]. Hopf [6] gives the meaning of "differentiation" as a technique of integration of students in teams according to one or more criteria, with the condition of achieving the established objectives of education and learning. According to Tomlinson Differentiated Teaching creates the conditions of correspondence in the individual and inter-individual needs of each student and it strengthens the capacity, in order to achieve the best and-most effective learning experience [7].

## **2. BASIC PRINCIPLES AND STRUCTURAL ELEMENTS OF DIFFERENTIATED TEACHING**

A specific formula for the application of differentiation in teaching that can solve the problem of the complexity of the different degrees of students' learning may not be easily accessible. It is however possible to formulate the basic principles governing the differentiation of teaching and its application in practice:

- *The teacher focuses teaching on essential points [1].*

- *The teacher perceives the students' diversity and corresponds to this [1,8].*
- *Evaluation constitutes a basic factor of the teaching configuration [1].*
- *The teacher differentiates the content, the process and the final product of learning*
- *All students participate actively in the learning process according to their dynamic [9].*
- *In teaching differentiation applied in the classroom relations of collaboration amongst the students and between the students and the teacher prevail in the classroom where differentiated teaching is applied [1].*
- *Differentiated teaching promotes not only individual but also team work [10].*

## **3. PREREQUISITES OF EXPLOITING DIFFERENTIATED TEACHING**

The conditions of differentiated teaching that can have a positive effect on the educational process are many and are of particular value for all members that compose the educational community [11,12]. Also, the teacher who intends to implement differentiated teaching in practice should renew the pedagogical and didactic way of thinking and be willing to devote enough time and to make considerable effort to face the resulting requirements [13,14].

For differentiated teaching to bring the desirable results, it should be operated in a balanced frame and there should be a good level of communication between teacher and students and amongst the students themselves. The existence of respect for the time required for the completion of each student's work, equal opportunities, encouragement, motivation, clarity in the formulation of objectives and the correspondence to the needs and interests of each student leads more safely to the achievement of learning and teaching objectives. Alternative learning through exploratory, discoverable and participative teaching processes increases the possibilities for maximizing learning outcomes [10].

#### **4. ADVANTAGES AND INNOVATIVE IDEAS OF DIFFERENTIATED TEACHING**

The differentiation of teaching in the context of the theory of constructivism, whose positive impact on students' academic knowledge has been proved in research, may be the solution to the problem of diversity in the classroom and school failure [15,16]. Through differentiated teaching each student achieves maximum performance and high achievements depending on his/her dynamics as it is shown from the researches [17,18,19,20]. Differentiation can be effective for all students regardless of their learning readiness, gender or socio-economic level [21]. Differentiated teaching allows both active acquisition of knowledge and an exploratory and experiential way of learning. Furthermore, through teaching differentiation continuous and creative interaction between students is achieved and conditions of cooperation are formed [22]. Also, differentiated teaching formed the conditions for cognitive and metacognitive development of students [10]. Students practise independent work and communicate together with prudence, respect and mutual feelings [23]. Moreover, differentiated teaching promotes the students' active involvement in problem solving, the development of critical thinking and cooperation skills [24,25]. Differentiated teaching provides quality feedback to students and this is another key feature of effective use of formative assessment because the students are dedicated to their learning goals, they are focused to the current task and they know what to do. The formative assessment is frequent, positive and tailored to each individual [2].

#### **5. PLANNING DIFFERENTIATED TEACHING**

Differentiation does not mean a different program for each student, or separation of the class of mixed ability levels into homogeneous groups to reduce differences. This qualitative distinction of working steps and activities, is based on good design and includes evaluation as a means of feedback on student progress, and reflection as a tool for adjusting the course [26]. Teachers generally understand the concept of differentiated teaching and its benefits even if they often experience difficulty integrating content, process, and product differentiation in their classrooms [27]. The design assumes familiarity with the philosophy of differentiated

teaching and research data on multiple intelligences, learning profile and evaluation [28]. The following steps are required for the suitable planning of differentiated instruction:

- (1) Become familiar with the students;
- (2) Take into consideration various instructive strategies;
- (3) Choose various instructive activities;
- (4) Select ways of evaluation of progress [29].

#### **6. PRESENTATION OF INSTRUCTIVE PLANNING OF TEACHING DIFFERENTIATION**

In the context of differentiated teaching the teacher must choose a variety of ways and teaching techniques each time in order to influence positively the process of learning for each student, making him/her an active participant in this process, in order to produce the knowledge himself. The main objective is to make the student an autonomous entity and through personal processes driven to solving problems and the acquisition of knowledge [10]. The example that will be presented below aims at demonstrating the element of alternative teaching methods regarding students' way of thought and course of action. Teacher differentiates in the classroom towards two basic parts the student and the curriculum. Taking into account the student's functional abilities the differentiation towards the curriculum will be done in three levels, the first level has to do with the definition and introductory approach of the teaching material, the second with the process of integration and the third with the achievement of learning result. The differentiation in student's promptness needs differentiation towards the curriculum at the first level as expansion of existing knowledge, at the second as reference to students' existing knowledge and relation and adaptation to the new one and at the third as evaluation of the final achievements and feedback. Differentiating student's tendencies and inclinations the teacher differentiates the curriculum in the first level by students' interest on teaching material, at the second by the activation in the teaching material and adaptation on it and in the third by the control of the level of influence and interests in the learning result. Using differentiated instruction towards the student by his/her potential the teacher should differentiate the curriculum in the first level by the speed and the pace of learning (How approachable is the content of learning?), in the second by the prospects of developing

collaborations and dynamic interactions and in the third level by the expansion of the quality and the effectiveness of communication [29,5].

## 6.1 Instructive Application

**Class taught:** Fifth Class of Elementary School

**Number of Students:** twenty (20) students in the experimental class where differentiated teaching used and twenty (20) students in the control class.

**Subject-object of teaching-learning:** The volcano

**Main references of teaching object:** The process that evolves within the Earth and is manifested on its surface as a volcano, the Earth's interior (mantle-processed materials), and the survival of people in volcanic regions.

**Required knowledge and earlier perceptions or ideas of students:** It is expected that students have some relative familiarity of related videos, or the media.

**Purpose:** To acquaint the students with the phenomenon of the volcano.

## 6.2 Specific Objectives

### Cognitive

- To explain the concepts: volcano, ash, volcanic regions, active and non-active volcano.
- To ascertain the way in which the volcano is created
- To identify the role of volcanoes in shaping the Earth's relief.
- To determine the composition of volcanic soils.

### Emotional

- To visibly appreciate the feelings of people living in volcanic regions.
- To express their feelings about the results of the volcano.

### Social

- To show team spirit and cooperation while practically organise team work.

## Psycho-kinetic

- To practise the creation of volcanic clay.

**Duration:** 2-3 Hours

## 6.3 Materials

Desks arranged in such a way as to favor the students working in groups, PC with Internet connection, projector, clay, plasticine, cardboard, soda, vinegar, tempera and corresponding textbooks, worksheet, educational software from the Ministry of Education (Geography & Fifth-Sixth Class) - Text processing software (word) - Software presentation (PowerPoint) - Internet search Engines (Google search) & visualization (Google earth).

## 6.4 Methodology

The development scenario is based on the theories of constructivism and Vygotsky's and his descendants' sociocultural considerations, where special emphasis is placed on the learning process, the cognitive tools to mediate [12], the interaction between the parties involved and the socio-cultural environment where learning occurs. Students, teachers, teaching tools, classroom environment, teaching modules, etc., are part of a business system interaction. The same activity is the mediating tool and the unit of analysis of the learning process. Some of the most important differentiated instruction's techniques are presented to the scenario below. At the first steps of the scenario and as the teacher knows very well the students' interests and readiness gives them the *choice to choose activities*, a technique that gives the chance to students either individually or in groups to learn what they want and make them feel happy. The teacher gives options based on student interest or learning style and this is a great motivator. The technique of *flexible grouping* is applied during the scenario as it allows students to work in groups with peers whose learning abilities are different to them. All the students have the opportunity to work with peers who are dissimilar to learning styles, readiness, or interests. The groups are not static and the teacher continually conducts assessments throughout the scenario. Also during the teaching scenario, the technique of *learning centers* is applied which are stations that contain a variety of materials where students can explore the topics or practice skills on their own. The presented centers are designed for different levels of complexity and for different

subject areas as they are working in their group. The same information for volcanoes is presented in a variety of different ways (images, videos, a model made by clay, in the PowerPoint, etc) that engage all students. The students as they are working in groups they are involved also in *Independent study*, a technique that is based on a student's personal interest. The teacher is sure that the student or students are proficient in the skills that are required to complete into their group. The activities for each group are related to the students' readiness level and key skills that they need to acquire. This technique is called *Tiered assignments* which are a series of related tasks varying in complexity and are designed in this scenario for the small students' groups. This differentiated instructional strategy is a great way for students to reach the same goals by taking into account each student's individual needs. The most common technique that teacher use to help students meet with success is to *adjust discussion questions* according to the students' readiness or ability level. The teacher adjusts his/her questions and level of complexity based on what fits that particular child. He/she uses Bloom's Taxonomy to develop queries from the very basic to the more advanced [30,1]. This learning scenario aims to make teaching interesting, with the active participation of the students, so that students can discover, explore, and eventually learn (discovery learning). Students work together in order to find the key concepts-axis phenomenon. During the teamwork of teaching and learning, students discuss, analyze, express doubts, and engage in problem solving.

#### **6.4.1 Differentiating the Learning Content**

##### **First phase: Preparation for class teaching with small groups of students**

Students are divided into groups of five students, to promote experiential learning processes that promote the active participation of the student, the liberation of creativity, taking responsibility for the state of learning in the attainment of its collaboration with peers and dealing with potential conflicts. The disposition of the classroom is designed with criteria, to enhance the content (what), the process (how) and / or produced learning outcome. There will be done changes to facilitate and strengthen teamwork in the classroom. The arrangement and rearrangement of classroom requires flexibility and creativity to become the environment pleasant, creative and convenient without

requiring time consuming procedures [29,31]. Then follows the educational presentation of images from the eruption of volcanoes in the world. Specifically, the teacher presents images from the eruption of Santorini's volcano in Greece, Vesuvius and Etna in Italy, Krakatau in Indonesia, Pelee in Martinique etc. The students express their opinions and impressions from the presented images and they ask questions.

#### **6.4.2 Differentiating the Learning Process**

##### **Second phase: Editing within the groups**

Initially students observe images and watch a video with the help of the computer and the projector from a relevant website on the internet (<https://www.youtube.com/watch?v=vCvIct9lpEo>) . The students take and keep notes, which can be useful later in the teaching process. Then they work in their groups, each negotiating a different topic. With the materials, available to them and with the help of textbook they treat their subject. Each team undertakes its work:

*1<sup>st</sup> Group:* Students using clay construct a mountain while on top leaving an opening (Fig. 1).

*2<sup>nd</sup> Group:* This group of students using the textbook constructs a clay volcano in cross section (Fig. 2).

*3<sup>rd</sup> Group:* Students are asked to find information on the volcano of Santorini, the most famous volcano in Greece. On the internet, they look for information connecting the eruption on Santorini with the destruction of the Minoan civilization and then present their findings to the class with the aid of a Power point presentation program.

*4<sup>th</sup> Group:* Students are asked to draw pictures on paper (alternatively using the tool of Windows) of the eruption of a volcano and then describe it in Word, thus leaving the imagination (or personal experiences) free to be expressed.

##### **Third phase: Expanding treatment**

After completing the above tasks entrusted to them, the students display their class projects in conspicuous places so they are visible to all classmates. Then the teacher has a surprise for the students, by mixing vinegar with baking soda inside the volcano built of clay he/she causes a chemical reaction that first impresses the

students but also reflects how a volcano erupts. It explains how to set up the volcano and suggests studying scientific terms and the transverse incision.



**Fig. 1. The volcano made of clay**



**Fig. 2. A clay volcano in cross section**

#### **6.4.3 Differentiating the Learning Outcome**

##### **Fourth phase: Assessment**

Completed worksheets, and more generally the participation and cooperativeness that is demonstrated during the lesson, provide the script evaluation indicators and the degree of achievement of learning objectives.

##### **6.5 Results**

The results of the teaching scenario concerning the implementation of differentiated instruction were compared, by graded difficulty worksheets and by a questionnaire in order to check the participation and cooperation demonstrated in the lesson, with the results of the control group at the other fifth class at the same school that had not received differentiated instruction. Via this

teaching example it was showed that differentiated teaching effected the maximization of each student's achievements and potentials according to both their needs and interests, as well as to function as a driving force for the dynamic forming of knowledge by the students themselves. Also, the creation of non-homogeneous teams involved positive results, as the students' communication prevails, collaborative effort was put toward common work and the acquisition of autonomy and self-activity of students was progressively achieved. Finally, the fact that assessment was used as a means of feedback and the positive confrontation of students' weaknesses and errors was positively perceived as a motive for further effort.

#### **7. CONCLUSION**

Teaching Differentiation is not a technique or teaching strategy or teaching model. It is a way of thinking about teaching and learning that starts from the position that teaching should start from the point at which the students are, not based on a teaching context, which ignores the learning readiness, interest and learning of each student profile. Therefore, the main objective through diversification of the teaching process is to respond to both the similarities and differences in all students. Besides, despite the fact that all students have the ability to learn, they will ultimately learn that which interests them, and at their own pace and in their own way because each student has their own unique characteristics. There may be no standardization of differentiation within a corresponding teaching model.

#### **COMPETING INTERESTS**

Author has declared that no competing interests exist.

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