

CLASSIFICATION OF CONTENTS OF GEOSCIENCE IN SECONDARY CURRICULA IN GREECE, 1830 -2015

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Abstract

The educational systems are evolving dynamically reflecting social and economical changes. The Geology has developed and evolved in Greece, based on specific economic and social interactions. This paper attempts to define and interpret the position of the teaching of geosciences in Greek Secondary Education, from 1830 until today, with reference to the educational changes and their historical and social context.

Keywords: Educational Programme, Geology, Secondary Education.

Περίληψη

Τα εκπαιδευτικά συστήματα εξελίσσονται δυναμικά και αντικατοπτρίζουν τις αλλαγές στην κοινωνία. Η Γεωλογία, έχει αναπτυχθεί και εξελιχθεί στην Ελλάδα, με βάση συγκεκριμένες οικονομικές και κοινωνικές αλληλεπιδράσεις. Στην παρούσα εργασία επιχειρείται να καθοριστεί και να ερμηνευτεί η θέση της διδασκαλίας των Γεωεπιστημών στη Μέση Εκπαίδευση, από το 1830 μέχρι σήμερα, με αναφορά στις εκπαιδευτικές μεταβολές και το ιστορικό και κοινωνικό τους πλαίσιο.

Λέξεις κλειδιά: Αναλυτικό πρόγραμμα, Δευτεροβάθμια Εκπαίδευση, Εκπαίδευση Γεωεπιστημών.

1. Introduction

It is dominant perception of the educational researchers that the integration in teaching of the elements of history of science is possible to contribute to the understanding of the content of science, as well as the state of a science. "The use of history can humanize the science, help pupils improve their critical skills, promote a deeper understanding of scientific context and eliminate the usual pupils' misconceptions that often resemble those of earlier time scientists" (Matthews, 1994). The above aspects are the motivation for the writing of this paper.

Curriculum is the formulation of the characteristics of a teaching proposal. It is a type of social program and as such, it constitutes the human invention and creation. The curriculum defines the valid knowledge (Bernstein, 1991) and has the overall aim of achieving specific and predetermined outcome, to improve the problem and meet the needs of specific groups of learners who attend. The study of Curriculum with geological content, aims to detect economic and political effects on the position of Geosciences in Secondary Education.

The Greek Curricula were created by statutory instruments and by individual politicians, and in more details from 1836 until 1937, by the respective education ministers or committees appointed by them, from 1937 until 1964 by the Supreme Education Council (N.767/1937) from 1964 to 2012 by the Pedagogical Institute (N. 4379/1964) and from 2012 until today by the Educational Policy Inst

itute (FEK 372B /2012). The data presented have emerged from the study of legal texts, relating to the teaching of Earth Sciences in Secondary Education for the period 1836 until 2015.

2. Methodology

Learning is a personal process, but differs from the instruction as the second is a social procedure after involves interpersonal interaction among students and between students and the teacher (Psillos *et al.*, 1993). The social and political approach is the subject of sociology and pedagogy, which means that subject Methodology, cannot be entirely applied in this paper works of Geosciences. Because it would not be appropriate to completely absent this dimension chosen to use the tool of classification (Berstein, 1991), to the extent permitted by the nature of the research.

During the preparation and drafting of curricula, the main questions are: "What will be taught, to whom, how, at what level, for how long and how to verify the acquired knowledge" (Bernstein, 1991). The prerequisite of the answers is the clarification of the following two cases: a) we can not study at the curricula without taking account the social dimensions b) we can not just studies at these dimensions without analyzing programs. The social and political approach was performed using the classification tool (Berstein, 1991), adapted to the needs of research.

The concept of classification refers to the nature of differentiation between contents. Wherein the registration is valid, the contents are well insulated from each other by strong limits and unlike in the case of reduced insulation. That refers to the degree to preserve the boundaries between contents.

In the case of Curricula Geosciences, the classification relates to:

- The detection of limits of the course of Geology and Mineralogy in the Natural History.
- The detection of limits of the course of Mineralogy in the course Chemistry and Mineralogy.

Specifically, the following coding was used are present in Table 1.

Table 1 - Encoding of classification.

Encoding	Interpretation for the course Geology & Mineralogy
[4]. Very strong classification	Individual appearance entitled at the Curriculum
[3]. Strong classification	Show titled at the Curriculum not individual
[2]. Less strong classification	Show as unity of Natural History with terminology appearance in the Curriculum
[1]. Patient classification	Show as section Natural History without terminology appearance in the Curriculum
[0]. None classification	Absence appearance in content and terminology

3. Facts - Interpretation

The presented facts in this chapter arose from the study of legislation for the period 1836-2015 and especially from the documents relating to Secondary Education. They used the Curricula and Timetables that describe and define the teaching of Geosciences for the above years. With basic criterion the type and the structure of Secondary Schools, the facts were grouped into two periods: a) from 1836 to 1930 and b) from 1930 until today.

3.1. Classification in Secondary Schools 1836 until 1930

In Secondary Education of the Modern Greek State the position of the Geosciences until 1883, is informal and content of induction arises from the used books. In educational legislative documents is not used the term "Geology" or "Mineralogy" and found only in parts of books with in title "Natural History". The degree of classification is increased from 1884 onwards, necessitating the

use of terminology Geology and Mineralogy in Curricula both Hellenic Schools and Gymnasiums (Figure 1).

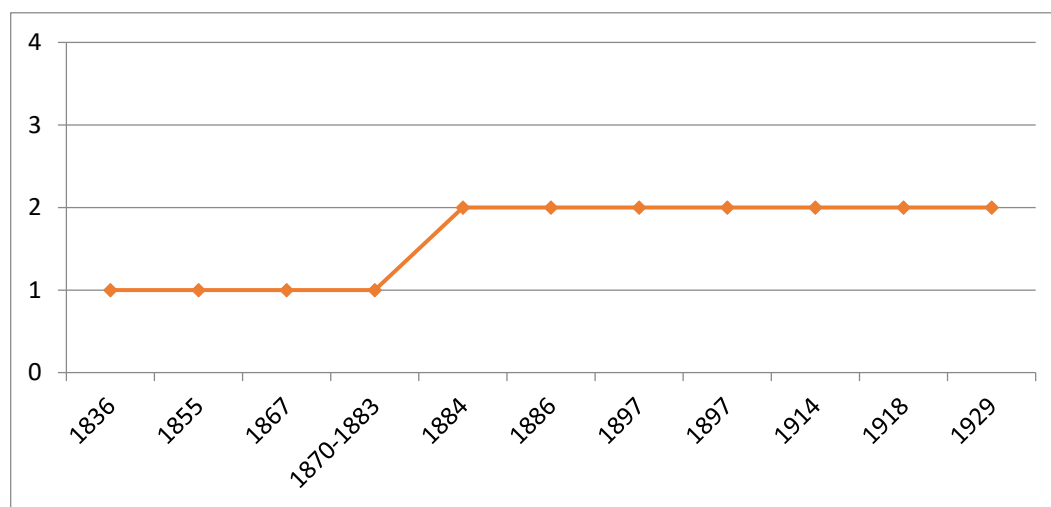


Figure 1 - High School, 1836 until 1930 (explanation in text).

In Varvakeio and Practical Schools the Geosciences are treated as utilitarian science for economic growth and therefore often separated Geology and Mineralogy. In 1922 (Figure 2) enhanced the independence of Mineralogy with a corresponding degradation of Geology. Important role in itself contributes to the identification of the mineralogical knowledge in technical professions mining relationship.

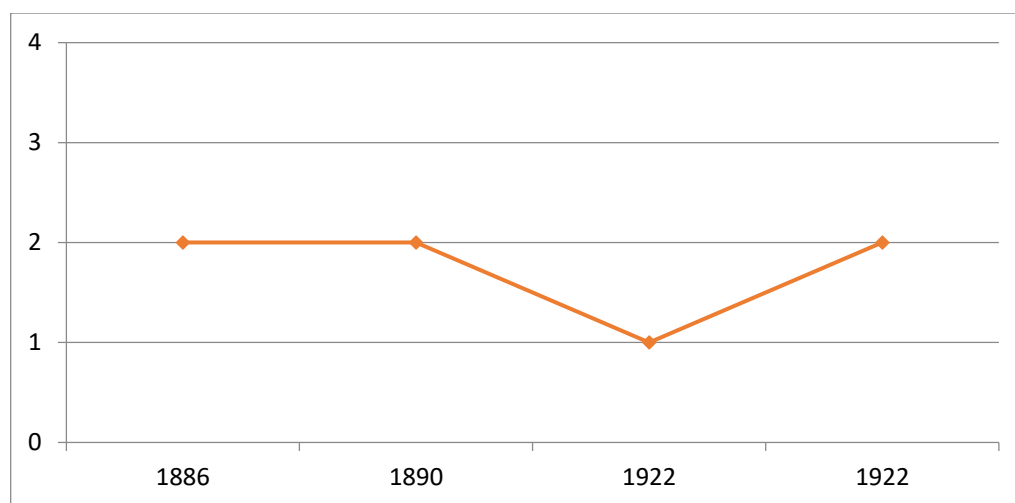


Figure 2 - Varvakeio (Practical) High School, 1836 until 1930 (explanation in text).

3.2. Classification in Lower High School (*Gymnasium*), and Upper High School (*Lyceum*), 1930 until 2015

Since 1929 the structure of Secondary Education was changing frequently between 6- years High School, and 3 years Lower and Upper High School. To draw firm conclusions on the graphs as Lower High School accounted for the A, B, C of 3-years Lower High School and 6-years High School. As Upper High School accounted as the D, E, F classes of 6-years High School and A, B, C, 3-years Upper High School. In curricula of interwar (Figures 3 and 4) the Geosciences are stable

unity of their naturalist and teaching defined by the specific legislative texts. From the German occupation and until 1961 in Lower High School absent the geological discipline, while Upper High School displayed using the terminology in curricula as unity of Naturalists.

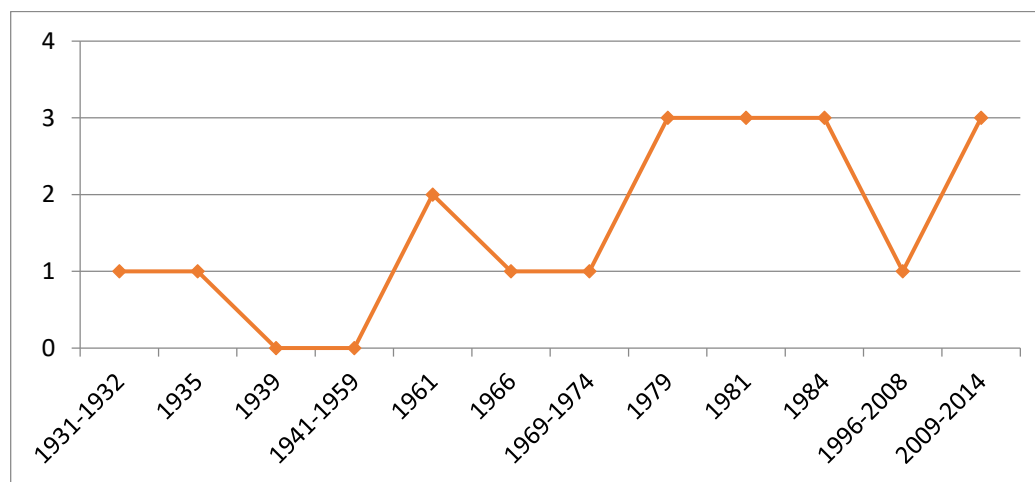


Figure 3 - Lower High School - Gymnasium, 1930 until 2015 (explanation in text).

In the subsequent troubled years of the degree of independence of Geology and Mineralogy for Secondary schools remains the same while increasing in Lyceums. One cause of diversification in the classification between levels of education is the interest for vocational education of Dictatorship state.

After 1974 there is a positive shift in the treatment of Geosciences with increasing independence, especially in the first Lyceum there becomes autonomous course “Geology-Mineralogy”. In High School curricula define the Geology-Geography lesson, a situation that applies today, except for the years 1996-2008 shows that only Geography, but with the same content. In 1981-85, interest renamed to Geology - Mineralogy & Economic Geography in Lyceum, characteristic of direction designed education policy. From 1997 onwards, there is autonomy in the subject of Geosciences at the Lyceum and after a period of complete absence, as recovering section in second grade without description in the curricula, resulting in their current position, as an option to display course not autonomous.

4. Results and Discussion

The Geosciences appears early in Secondary Education, but informally. For many years the content of their object is fragmented, without subsequently distant for the student, difficult for the teacher and without any care from formal state.

By 1884 the position of Geosciences in Secondary teaching is not defined and neither institutionalized, as is clear from the texts of the roll curricula. The knowledge on Geology and Mineralogy contained in Natural History books and Natural Science courses. Since the implementation of the Curricula in 1884 and then the Geosciences acquire fixed position relative content of Natural History books. Since 1870 Greece entered orbit industrialization and began the operation of mines (Lavrio Mantoudi, Kimi). This trend is strengthened by the government of Charilaos Trikoupis (1832-1896), since some of its main objectives and goals were the development of the economy and the reorganization of the country's industry. The social and economic needs have established the technical-vocational education through which the Geosciences were introduced more vigorously at the Secondary Education.

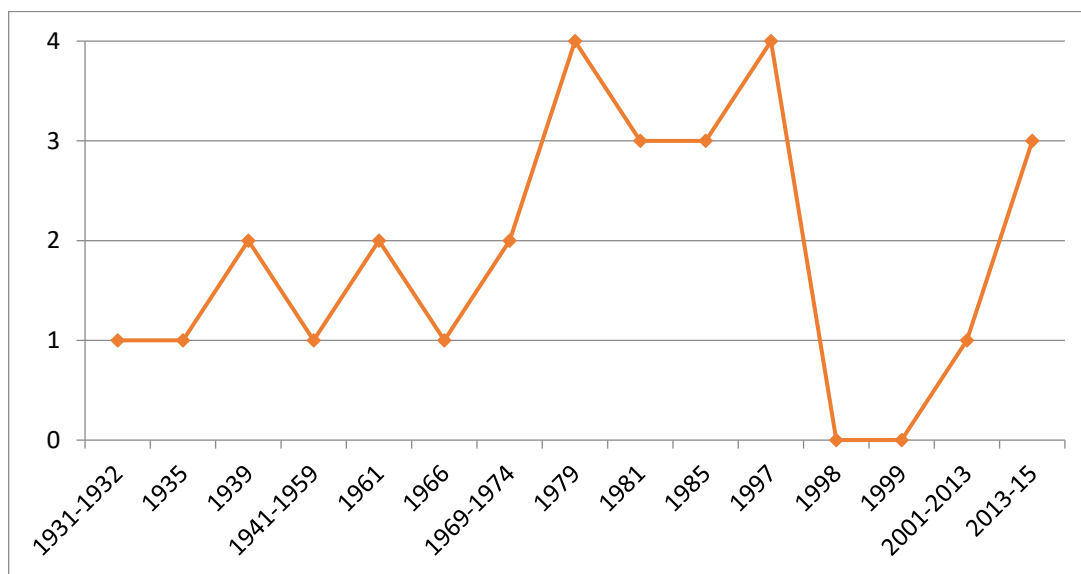


Figure 4 - Upper High School - Lyceum, 1930 until 2015 (explanation in text).

The position of Secondary Geosciences upgraded substantially during the 1930s (Figure 3). The action of Educational Club which upgraded the matter of all courses and adapted the teaching content mainly in data mining was one of the major factors that contributed to this change.

From the 20th century onwards, there is substantial and systematic teaching of Geosciences. The scientific topics are contained in the Curricula, and by the 1929, the term of Natural History has disappeared, integrating geological courses in Geography and Natural Science. This change, however, is not reflected in the total number of teaching hours, which remained almost unchanged, at the level of two hours per week in class D of Gymnasium.

The teaching of Geology and Mineralogy was uninterrupted in D class of High School even at the time of German occupation (1941-1944). The cognitive content of Geology - Mineralogy were dispersed in several subjects (eg *Geography with elements Geology*, *Physics with elements of Mineralogy*, etc.) at the subsequent postwar years, giving a supplement, both in content and in the course title, which incorporated their cognitive content. The study and analysis of curricula reveals the increase of the classification between objects until 1967 (Figure 3 & 4), declaring the first attempt for the scientific establishment of the geological object, without the accompaniment of the independent teaching of Geosciences.

This process inhibited by the dictatorial regime (1967-1974). On the other hand, new courses were introduced as an attempt of modernizing secondary school programs, for reasons of both internal and external policy (Foteinos, 2013; Bouzakis, 1991). On this basis, the title “Mathematical Geography and Physics with elements of Geology and Mineralogy” was introduced, aiming the providing of geographical knowledge, and furthermore at the exaltation of national feeling, by the specificity of the Greek landscape, but also by the use of the Geosciences, as useful in technical projects, environment, economy and culture.

With the programs of the modern period (1974-2015), the separation of the theological content of the lesson of Geography was occurred and thus, the degree of registration of the program was increased. In 1979, Geology was first introduced as a standalone course at the Lyceum. On the other hand, at the Lower High School, the course of Geography contains a unity entitled as “Geography with Geology” and it has already been introduced in the 1978 programs. It seems the arise the level of classification of the geological object-lesson, since it has been dispatched by a broader field of knowledge (Natural Science, Geography) and it becomes which autonomous at the exclusive

scientific space, until 1997, marking this period as the one of the development and consolidation period of Geosciences in Secondary Education.

To adequately understand the concepts of Geology, it should be referred in earlier times and simultaneously scientific models should be constructed, which are not governed by the normal laws of nature that a student is familiar. It is concluded that this process is of major difficulty in the teaching of Earth Sciences, which is combined with the strictly scientific writing language and the large volume of these concepts. These facts, as well as the lack of professional tutor geologists, resulted the concept that Geology is a non accessible and non friendly science during the 1990s.

The above difficulty at the teaching of Geosciences, could be improved by the implementation of 1997 curricula which repel the teacher-centered model and gradually introduce the constructive teaching model in education. Unfortunately at the same time, the Geosciences are withdrawn from Secondary Education and are classified at levels of curricula of the period before the decade of 70s, as shown in Figure 3.

Essentially, the Geosciences lose their standing in education as a separate, autonomous subject area and seek for a new identity in the “Environmental Sciences” and “Geography”, which is not finally established. The newly introduced courses of “Technology” and “Information Technology”, marks a modernization turning of curriculum, in which Geology has no place since it is wrongly considered as a sterile science without substantial object.

Since 2014, there is an effort for the introduction of Geosciences at the Lyceum, under the umbrella of the object of “Management of Natural Resources”, due to social and economic requirements for the exploitation of natural resources of the country. Geology tends to acquire again the character of an economically useful science, as it was at the early 20th century, when the mining activity was intense. The key questions are: what is the purpose of teaching geosciences at the education, is it to serve the financial needs of the state or to promote the spirit and critical thinking of pupils, in relation to the Earth's complex environment? The interdisciplinary and holistic approach of science, which are the pillars of modern education and are well expressed through the study of geological phenomena and the understanding of their interactions with the human environment, why are they not displayed in the Secondary Education? Exemplary, the objects of Natural Hazards and Environmental Management, could not they contribute towards that direction?

Excluding the period of development in mining and mining activity (late 19th - early 20th century), the Mineralogy shows continuous degradation, since its object does not find practical and economical application, and it is virtually eliminated from 1985 onwards, without the provision of any knowledge any longer for the structural units of the Earth's environment. In contrast, the other sectors of Geology constantly grow, but always in a balance among them, for about 45 years (1940-1985).

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