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On the Holistic Approach of the Primary School's Mathematics Curriculum

Bogdan N. NICOLESCU¹, Tudor C. PETRESCU²

Abstract

Since Pedagogy adopted the holistic as a its new paradigm, in the educational policies of the many states it has happened the different modifications and/or reformulation for most curriculum at any level of the national education systems. All these new things have many implications at the teachers' level, and also at the students' level. Unfortunately, at the university level, the expected changes derived from the new pedagogy's paradigm did not happened, and also in the formation plans for the teachers. In this context, for example, a primary school teacher is now put in the difficult for him and for his students in the frame of a new disciplines, like "Mathematics and environmental exploration". More, the handbooks for these new discipline have not any links with the spirit, philosophy and the scientific knowledge of this discipline. Of course, at the management level of the Romanian educational system, we find some momentary solutions for these situations: it is supposed that the primary school teacher can cope to these their real situations through participation at the short training courses of the differently institutions or/and organizations which have the education minister allowed. The aim of our paper is to present a possible holistic approach of some example of didactic situations for the discipline of mathematics and environmental exploration, which should be considered by the research of the educational domain

Keywords: holistic education, mathematics curriculum, primary school.

Introduction

Obviously, in this paper we will not be able to give an exhaustive presentation of the holistic concept along all its mankind history of the knowledge. We just try to present some of the issues concerning with this concept, which are allowing us to make short connections with the education domain. Holism (from Greek ὅλος *holos* "all, whole, entire") is the idea that any kind of system, which means that it can be physical, biological, chemical, social, economic, mental, linguistic, etc., and its properties should be viewed as wholes, not as collections of parts of him. In the withal, this concept includes the view that any system functions as wholes and that its

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functioning cannot be fully understood solely in terms of its component parts. But, any system is uniquely characterized, among other things, by its own energy source required by its own internal process that is governed by the laws, better known or less well by us, which assure its appearance, its development, its operations etc., brief, its existence. In plus, any particular system admits a integrator system in which it is embodied in an unique way of interactions with the own complementary exterior in this. This is only way to provide the true meaning of the whole concept.

As we see today, holistic is one of the most widely used concept in the most areas of scientific research, but understanding its meaning and hence its applications are very different from one science to another. As far as we know, the term of holism was introduced in the science modern language by J. C. Smuts (1927). In his book, Smuts argued that this concept represents all of the wholes in the universe, and it is also a factor because the wholes it denotes are the real factors in the universe, beyond the humankind (<https://en.wikipedia.org/wiki/Holism>). Moreover, this Smuts' ideas are not new and many of them we can discover in reference works, starting with those of Aristotle to those of Galileo, Newton, Hegel, Kant and Russell, to name just a few of them which belonging to the fields of science, of mathematics and of philosophy. The impact of the Smuts' book was enormous due to its political and military positions in South Africa and in the British Commonwealth. Although, Smuts understood the holistic characterization of the universe, he never applied this principle to knowledge the people of the South Africa, viewed like a system, which was lead by himself, at that time, from the politically position. And this misunderstanding of the dynamics of South Africa's people was paid by himself (https://en.wikipedia.org/wiki/Jan_Smuts) and, unfortunate, by to much human beings of this nation. The moral of this true story has been fully understood by the political leaders of the world much more late, and we are afraid that the political leaders from now forget this moral too.

Another example of misunderstanding of the strong links between the concept of dynamic system and the holistic concept is the atomic bomb attack on Hiroshima and Nagasaki. Only when the political leaders at that time found out what were the devastating effects of this military attack at the Earth's level, they understood that the Earth is a complex dynamical system, with everything that means, be it environmental, population, health, nutrition, education, etc., and that all these must be approached from a holistic perspective. From this, it appear the concept of globalization with all which are derived from him.

In short, the intent of this brief introduction is to point out that there can be no holistic approach outside of dynamical systems theory

(Arnold, 1978; 1998), (Arnold, 1983) or outside of system dynamics theory (Forrester, 1968; 1973). In general, there can be no holistic approach without a precisely connection of this to a dynamic system or to a complex whole for whom this holistic approach must be applied. In a contrary case, holistic approach is just a shape without content, like Maiorescu said some time ago, in the context of “rise” of a modern Romania.

1. About the Holistic paradigm of the Pedagogy

Since Pedagogy adopted the holistic as a its new paradigm, in the educational policies of the many states of the world it has happened the different modifications and/or reformulation for most curriculum at any level of these national education systems. All these new things have many implications at the teachers' level, and also at the students' level. More and more, the researchers in the psychology and pedagogy fields speak now about a holistic education, which is a new concept linked with the holistic paradigm of the pedagogy. From the perspective of the authors of this paper, as the mathematics teachers able to understand the knowledge of the dynamical systems theory, of the system dynamics theory, of the complexity theory, etc., with which one can describe whatever reality from the Universe in a holistic way, is very important for us to understand what is meant by holistic paradigm of pedagogy. Because we are not the specialists in the general pedagogy, we searched the literature on this subject. The approaches for the holistic paradigm of the pedagogy are multiple and the number of works on this subject is huge. Among them, for us, the one we found a systematic somewhat on this subject is (Sirous Mahmoudi, 2012). Thus, from this paper, we can summarize some of the base ideas for the holistic education: “Holistic education is a fairly new movement and it emerged as a response to the dominant world view of mainstream education, often referred to the “mechanistic” or “Cartesian-Newtonian” world view. Rather than attempting to provide a model of education, holistic education seeks to challenge the fragmented, reductionistic assumptions of mainstream culture and education. In other words, holistic education is concerned with underlying world views or paradigms in an attempt to transform the foundations of education. Holistic education is not to be defined as a particular method or technique. It must be seen as a paradigm, a set of basic assumptions and principles that can be applied in diverse ways.” It is a point of view, but it is not true entirely, because we can not ignore that the whole is knowing only by research it like a open dynamic system. Otherwise, the

whole is only a material point in the Universe. The human being is not a such point in Universe, he is a “complex universe” (Lakoff & Núñez, 2000).

For example, even the holism paradigm assumes that education has multiple parts which are point out through its principles (Flake, 2000), (Forbes, 2003). Among these principles there are:

- education is a dynamic, open human relationship;
- learning is a lifelong process;
- learning is both an inner process of self-discovery and a cooperative activity;
- learning is active, self-motivated, and encouraging of the human spirit.

If we are starting from the last principle, implicitly we have to admit that every individual human being is a complex dynamical system evolutes in a complex world, which is knowing by him in a specific way based on own mod of learning through his unique experience. In this case, what can his parents, his teachers, etc., do for him. Can we know what is proper things and actions which are to do for his best interesting? It is a question with the complex answers! Who risk to assume these answers?

2. Projection of Holistic Paradigm in the Integrated Methods from Schooled

In the pedagogy framework, very often it is possible to meet the idea that “the current teaching practices tend to view mathematics in terms of subject matter such as definitions, theorems, proofs, problems and their solutions, not in terms of the conceptual tools that are necessary to construct such mathematical objects”. It is a point of view of those pedagogues which do not understand that the mathematics there is by a hand, in implicit way, in every thing we do day by day, and by the other hand it is a science in its own right, which is interconnected with any field of knowledge. So, via transdisciplinary philosophy, this was appeared the innovative educational approach called integrated method. For that at the primary level was adopted a so called integrated curriculum. In this sense, a concrete example that we want to bring in the analysis is that of the attempt to integrate together the mathematics and the sciences for the first part primary, i.e. from the preparatory class till the second class. Thus, it was resulted a new discipline so called “Mathematics and environmental exploration”, which is quite innovative and revolutionary discipline for the integrated curriculum of the primary school. The idea was good, but its

implementation in practice has created many problems for both students and teachers.

Although this discipline should not only be a juxtaposition of themes from different fields such as mathematics, biology, physics, chemistry, geography, but rather to address the knowledge in these areas it had to be done in an integrated manner closer to how the child perceives the environment. But, we must do not forget that this integrated method must be done for highlight that “the student has need to apply mathematics as a tool of investigations, of measurements, of analysis, of calculus, etc., for learning the environmental knowledge”.

Unfortunately, in almost all textbooks for the discipline “Mathematics and environmental exploration”, the learning units (lessons) are divided into two distinct parts, and they are usual differentiated on two pages in the mirror mode. It means that on the first page the student finds a learning activity in mathematics, and on the second page he has a learning activity in the field of science.

For example, these are coupled learning activities:

- “The decrease of the natural numbers for the case ‘TU-U’ versus. “Water and the benefits and negative effects of the Sun”;
- “Money. Banknotes” versus Sounds. Musical Sounds”;
- “The odd numbers and the even numbers” versus “The magic of the electricity field”;
- “The comparison of the natural numbers and the order relation on the set of the natural numbers” versus “the hygiene of the shoes”, etc.

Clearly, it is a challenge to link in a naturally way the knowledge of mathematics with the knowledge from the science fields. For that, it requires a specific training for the teachers, which involves an encyclopaedic culture, for that the teachers be able to do a teaching approach for the integrated activities. But, it is well known that the teacher for primary school does not receive such suitable training program regarding with their real job. On the other hand, we asking ourselves what the student can learn about the arithmetic operations in association with the water, like a material or like a living environment, and with the Sun as an energy source. Or, what is the general competence which corresponds to the combination between the money and the music sounds. How it can be derived the properties of natural numbers to be odd or even, from the properties of the electric or magnetic field? These questions are fully entitled to be considered, because almost of the learning activities at the mathematics and environmental exploration are presented and treated in the textbooks in a separate and unrelated way. In the first part of any learning activity there are present some

knowledge from the science domains, and in the second part of it there are present some knowledge from the mathematics domain. In plus, there are not any link between these two parts! The many such examples may be done, but this is not our goal in this paper, like in Huitt (2011).

Obviously, there are many factors involved in this new situation created by the application of integrated activities paradigm. Besides the problem of the inadequate textbooks for this paradigm we can mention the issues concerning the training programs for the teacher, at the university level, which do not content the knowledge for this new discipline that aims to integrate mathematics and sciences at the primary school level. In plus, we notice that the ideas or suggestions submitted by the continue learning centres of the Regional Schooling Inspectorates for the teachers, have not a scientific consistence vis a vis of the objectives of the early education. Last but not least it should be noted that the time to implement the new curricula for mathematics and environmental exploration, respective, mathematics for the last tow primary class, was extremely short. Thus, the primary schools system was taken by in a great surprise and unprepared.

We believe that another negative perturbation for the correct implementation of the integrated approach of teaching-learning mathematics and science at the primary school, is done by the opinions issued by the people who have no expertise in this area or by the people who have beliefs and particular interests. Such as an exaggerating teacher training for the pedagogy and not for the didactics for the sciences, for the mathematics, for the arts, etc., which are at the base of the activities in the primary school.

To solve the problem of designing integrated curriculum and appropriate textbooks, which should be just learning support for pupils at home, we must develop educational policies nationwide. Last but not least, we must emphasize the fact that the curriculum for primary is designed on the basis of general competencies that students need to acquired.

The general competences for the discipline “Mathematics and explore the environment” clearly do not reflect neither what are actually pursuing acquisitions for the knowledge of mathematics and sciences, nor what skills correspond them for the students. Moreover, the general competences for the discipline “Mathematics” for the last two years of primary school are almost the same as those for mathematics and exploring the environment. This fact should conclude that the discipline “Mathematics” must be approached by the integrated method too. But how can teachers do this thing if the textbooks for this discipline contain only learning activities designed only based on the knowledge of mathematics? Something is not right!

3. Instead of conclusions

From our experience with students and teachers from the primary school we can say, taking us everything we say with great responsibility, there is great confusion carried to a chaos of opinions on the integrating the notions of mathematics with the notions from other domains as physics, biology, medicine, communication, arts, sports, etc.

The teachers are subject to the subordination of the instructions and of the tasks which are given by Regional Scholar Inspectorates, by the trainers who come in contact with them within various training programs which are organized in the framework of national or European projects, etc. Unfortunately, there is no real consistency on a study of the situation in the national educational system for the primary level, in particular, and neither in pre-university school education, in general. These situations, which have existed for many years by virtue of the lack of the responsible political will, does nothing but to waste the human resources reserve, both for students and for the teachers.

Unfortunately, at the university level, the expected changes derived from the new pedagogy's paradigm did not happened, and also in the formation plans for the teachers. Why? It is very hard to explain these things because we have a great national legacy.

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