International Journal of Educational Theory and Practice (IJETP)
Volume 1/ Issue 1/ 2014

Aspects Relating to Didactics and the Problem of Knowledge

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Received 16.04.2014; Accepted 10.05. 2014

Abstract
Some aspects relating to didactics and the problem of knowledge are presented in this paper, given the evolution of concepts, from Didactica Magna in Postmodern Didactics. This evolution was exmplified through three stages: traditional didactics, modern didactics and postmodern didactics. The problem of knowledge belongs to philosophy, respectively gnoseology (epistemology).From scientific knowledge to the knowledge of school type, is reached through a process called Didactics Transposition (DT-Chevallard, 1982). The concept evolved into Anthropological Didactics Transposition (ADT Chevallard, 2012). Definition paradigm, as designating a model was used, in „The Structure of Scientific Revolutions" (1962), author Thomas Kuhn, following the impact produced on the scientific community, in Postscript (1970). Three personal contributions aimed at a better understanding of this. Paradigms of curriculum use to guide Postmodern Didactics. The conclusions of this study which put face to face didactics with gnoseology (the knowledge problem), are presented at the end of the paper.

Keywords: didactics, curriculum, paradigm, postmodernism, gnoseology

1. Introduction

General pedagogy is a speculative science, because obtained the "epistemic dignity" by fulfilling certain conditions (Cucoș, 1996:18):

-It has subject to interrogations (phenomenon education);

-it has investigative tools, methodological type;

-it has, the principles as the regularities and domain rules;

-it synthesizes reflections into consistent theories.

Although teaching is one of the oldest human activities, pedagogy is relatively recent. She appeared only in century XVII form of principles and rules that streamline the art of teaching. and was developed into four historical stages: classical pedagogy, experimental pedagogy, education sciences and science education. In contemporary pedagogy (see Fig. 1) didactics was interpreted as a "theory of curriculum" or a "general methodology", which includes "all legal principles, rules and procedures applied equally, different training situations". Historically, in parallel with

pedagogy, we talk about the traditional didactics (century XVII-XIX), the modern didactics (century XIX-XX) and curricular didactics or postmodern didactics (Stanciu, 2003: 91).

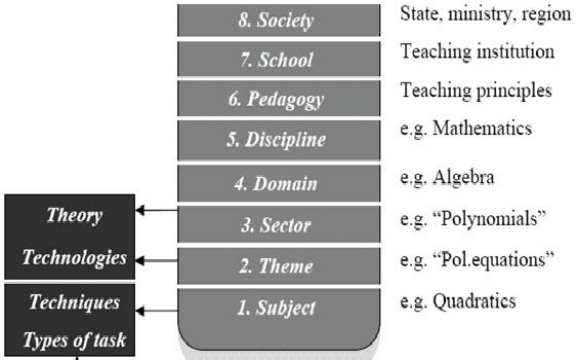

Figure 1. *Levels of didactic co-determination as proposed by Chevallard (2002), related to the components of (mathematical) organizations (Winslow, 2010: 14)*

In the **Fig. 1** Pedagogy - Teaching principles is placed on a level over ordered of the disciplines – e.g. mathematics. Extending exemplification, physics, chemistry and other sciences are established with mathematics on the level of disciplines. It is, and the place of the didactics, on the five level.5.Discipline- e.g. Mathematics, in the scheme of Chevallard.

2. Didactics and the problem of knowledge

2.1.Foundation

Foundation from which derives philosophical theories of the knowledge is the answer to the first question of the fundamental problem of philosophy: the relation between matter and spirit (consciousness). At this factor of derivation of the concepts the knowledge we add the answer to the second question of the fundamental problem, namely: if the world may or may not be known. This is gnoseology (or, gnosiology). From the Greek gnōsis, a word for "knowledge". Any philosophy or branch of philosophy concerned either with solving problems about the nature and possibility of knowledge, or with delivering knowledge of ultimate reality especially in so far as this is not available to sense-experience. "Gnoseology" is an archaic term and has been superseded in the former sense by "epistemology" and in the latter sense by "metaphysics" (www.answers, 2014).

The main aspect that emerges from these definitions is relation between information and knowledge, more accurately, that the information, experience and learning are at the base of knowledge. We can talk about knowledge as a phenomenon, as a process, and as a product of human activity (Porumbeanu, 2004: 127).

From the point of view of didactics, curriculun is viewed from three perspectives: as a structure, as a process, as a product (Gheorghiu, 2014: 17).

It is observed that three analytical perspectives are the same, for knowledge and respectively for curriculum:

2.1.Didactic Transposition

From the scientific knowledge at the school-type knowledge is reached through a process called didactic transposition (Perrenoud, 1998: 487). This concept, developed by sociologist Michel Verret (Le temps des etudes, 1975), was introduced in teaching

mathematics by Yves Chevallard and Marie-Alberte Joshua in the work Un exemple d'analyse de la transposition didactique: la notion de distance, printed in Recherches en didactique des mathématiques, 3.2. Grenoble, La Pensée Sauvage, 1982 (Ghiordunescu, 2010: 6).

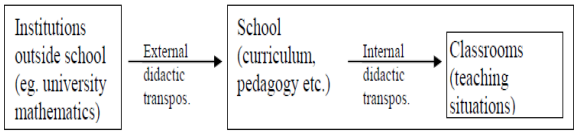

Figure 2. *External and internal didactic transposition (Winslow, 2010: 5)*

Through his study of the historic developments of the notion of distance in 20th century mathematics, and the attempts to accommodate it in various domains of school mathematics, Chevallard exhibits the two basic steps of the didactics transposition, which have since become known as external and internal didactic transposition (see Fig. 2). These two are distinct because they operate, respectively outside the school (in what Chevallard's ironically terms namely the noosphere, which means the "thinking circle" around the school), and inside it (e.g. as teachers struggle to adopt and adapt a new curriculum in actual teaching). The study offered in Chevallards book, of a part of the didactic transpositions involved in the history of "modern mathematics" in school reforms of the late 1960's, clearly offers a French perspective. Historically, the germs of ATD are to be found in the theory of didactic transposition (Chevallard, 2010: 4), whose scope was at first limited to the genesis and the ensuing peculiarities of the (mathematical) "contents" studied at school; from this perspective, ATD should be regarded as the result of a definite effort to go further by providing a unitary theory of didactic phenomena as defined in what follows (Chevallard, 2012: 2).

2.3. The concept of form

The form, in its abstract sense, can be regarded as a perception of the existence in Universe of the objects or phenomena. .

Considering the complex nature the human spirit, appeared the question if the order of the nature is that from which the spirit learns the "form" or the spiritual order, is that who designs the form on what is perceived from reality. As a conclusion, we can say that the forms come from nature for to enroll in the human spirit and are designed on the world by spirit, for enroll the external reality in the preset models.

To translate the reality of forms in a representation, which may process the computer is necessary a translation of the form as a reality of human perception, in form as a mathematical object. The object is described by a number of characteristics, becoming form.

The characteristic is the component form, which together with other components, place objects in space. Pattern recognition can be seen as follows:

- as a problem of classification and analysis of the data structure;
- as a problem of decision-theoretic recognition;
- as a problem of syntactic recognition.

Physical principles confirms that the form exist simultaneously, both outside of us, accompanying our existence and in our consciousness. Thus we can see form a strong link between external reality and human's perception.

Pattern recognition using decision-theoretic approach: In this approach, each form, which is intended to be classified, it is assigned a vector

In this approach, each form which is intended to be classified is assigned a vector x=(x ,x ,.....,x)t 1 2 n of the characteristics into a n dimensional space, Rn. The characteristics vector is generally a random vector, which has the components, { xi }i=1,n , random variables (see fig. 4).

There are two stages, one for analysis, which also includes learning process and other for recognition. In the stage of analysis, the selection characteristics is essential phase in terms of success recognition system (Pușcașu, 2004: 82-85).

3.T. Kuhn– gnoseeologic benchmarks

3.1 Definition of the paradigm

"In its usual acceptation, a paradigm is an model or accepted framework; this sense of her allowed me, in the absence of a better term, to circumscribe until now the paradigm " (Kuhn, 1962 apud Prodan, 2011: 55). Paradigm manages to earn status "because, he better than its rivals, solve some of the problems considered acute by the group of practitioners". It offers rather "a promise of success revealed by some examples inside and still incomplete". In this sense, the paradigm requires a lot of carefulness and perseverance of researchers, "gardening work" sometimes occupying an entire career of scientists.

The concept of paradigm of T. Kuhn will be reconsidered in a Postscript-1969, suggesting the usefulness of the concept paradigm separation of the notion of scientific community. The author considers his own book as affected by the two different meanings of the concept of paradigm. The first sense, the sociological, considers paradigm "an entire constellation of beliefs, values, methods, etc., shared by members of a community". The second effect considers paradigms as exemplary achievements of the past: "concrete solutions of puzzles, increasing used as models or examples, can replace explicit rules as a basis for solving other puzzles of normal science" (Paradigms as Shared Examples) (Kuhn, 1970: 187). In the area of the sciences of education, theoretical construct proposed by T. Kuhn proves its usefulness, primarily for the analysis of some theoretical currents. Such steps have been taken by a number of researchers, bringing a new light in understanding educational concepts. It should be noted, that in the literature, using the approach from the positions of the philosophy of science and paradigmatic approach. In this sense we mention the studies of Cezar Bârzea, Eckard König şi Peter Zedler (Prodan, 2011: 58).

3.2 Three personal contributions

Interpretation defined paradigm of Thomas Samuel Kuhn can be done by analogy with representations of different scientific fields. The concepts used by T. Kuhn are: normal science, scientific laws, scientific community. In light of these notions, we identified three phases in that can be viewed definition paradigm of T. Kuhn: as a luminous radius, as a discrete signal, as a class of forms. Considering these aspects, the scientific community behaves

accordingly: as a mirror, as a digital system, as a reference vector.

1) Representation light beam reflected (optical)

Paradigm is trated as a ray of light and the scientific community is treated as a mirror. Paradigm, as defined by T. Kuhn in 1962, departing from the normal science, where he was drafted. It is reflected by the scientific community, like a ray of light by a mirror and returns after seven years in the normal science, where T. Kuhn draws conclusions and reformulates the concept of paradigm in a Postscript 1969 (see Fig. 2). Face it (Kuhn, 1970: 174) at the request of a collaborator, who was a student of his, named Sigheru Nakayama, PhD of the University of Tokyo, to include feedback in the Japanese translation of the book "The Structure of Scientific Revolutions".

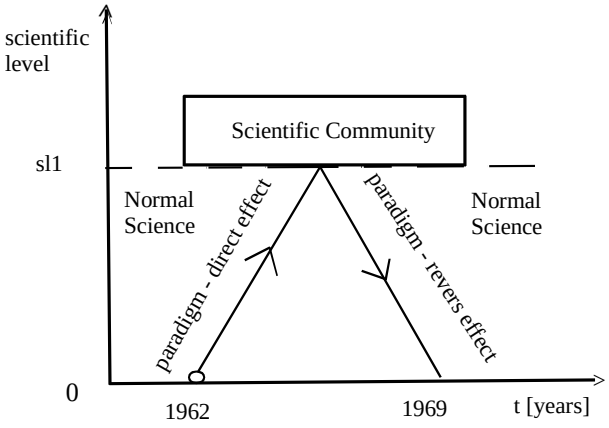

Figure 3. *Representation of the light beam and meanings for the definition paradigm of T. Kuhn*

2) Representation of signal processing systems (automation-systems theory)

Paradigm is trated as a digital signal. It departing from the normal science as a form of the excitation signal and returns to the normal science like the response signal. The scientific community is treated as a system digital of signals processing (see Fig. 3). I believe that such a digital system of signal processing is suitable for modeling the situation in which is the paradigm definition of T. Kuhn. because the signal response of the scientific community allowed T. Khun to write a Postscript 1969, thus realizing feedback.

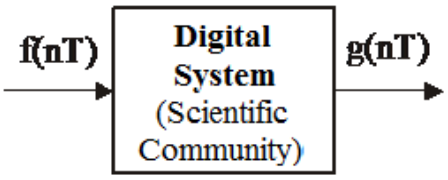

Figure 4. *Representation of digital system and meanings for the definition paradigm of T. Kuhn:*

f (nT) - excitation signal (Theory paradigm of T. Kuhn, made in 1962);

Digital System - The scientific community;

g (nt) - signal response (response of the scientific community in 1969 to the definition of paradigm of T. Kuhn from1962)

Details of systems theory: A signal processing system (or, more simply, signal processor) is a device or group of devices well established that receives input an analog signal f(t) or digital f(nT), called excitation, and outputs a signal of the same type, g(t) and w(nT), called the answer. The relationship between the two signals (excitation and response) is determined by the construction of the signal processor.

A signal processor is symbolically represented by a box (rectangular), with an

arrow going into the box (excitation) and a protruding jut other (response) (Fig. 3).

A system is linear if its response to a sum of excitations equals the sum of individual responses for each excitation in part, if it had been applied separately. In other words, in a linear system, if the excitation f1(t) produces a response g1(t), and another excitation f2(t) produces a response g2(t), then an excitation representing a linear combination of the form f(t) = af1(t) + bf2 (t), a and b are arbitrary constants, will produce a response of the form g(t) = ag1(t) + bg2 (t).

A system is time invariant if the answer to an excitation moved forward or backward by a certain time equals the response to the original excitation, moved in the same direction and the same time. In other words, a time invariant system, if an excitation f(t) will produce a response g(t), the excitation of the form f'(t) = f(t-x), will produce a response g'(t) = g(t-x).

Another important property of signal processing systems is that of causality (or satisfiability). They say that a system is causal, feasible or non-anticipatory if its response is zero for all time points prior to the application of excitation. Thus, if the excitation f(t) comply with the property of f(t)= 0, for points of time t<t0 , then in a causal system, the response will also meet the same condition, namely g(t) = 0 for t<t0

3) Representation of a class forms and associated reference vectors (computer science - the theory of pattern recognition)

Paradigm is the depiction of a class of forms. Scientific laws are forms, and members of the scientific community are treated as a reference vectors (see Fig. 5).

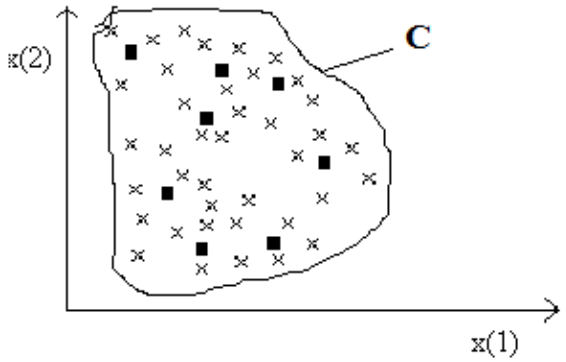

Figure 4. *Representation of a forms class and meanings for the definition paradigm of T. Kuhn:*

C class of forms - scientific discipline;

x forms - scientific laws;

■ ***reference vectors*** - scientific community

One immediate practical applications of this work (Kuhn, 1970: 182) is pattern recognition, recently addressed in computer science field. Foreshadowing this new field has achieved a T. Kuhn in Postscript (Kuhn, 1970: 181-186) (2 Paradigms as Share Exemples). In this chapter, the relationship of the scientific community group members is modeled mathematically with the formula and the term theory, considered too limited, is replaced with "disciplinary matrix".

3.3 Paradigms of the curriculum

Didactics is the part of pedagogy that studies the principles (Eşi, 2010, 24-34), methods and forms of organization of the educational process. The using of the paradigms is specific of the philosophy. With the advent of postmodern didactics, curriculum type, the using of the paradigms in pedagogy has expanded greatly, creating a whole literature (Cujbă, 2014: 10). At present, we can say

that the curriculum paradigms use to guide the contemporary education, serving to a more efficient application of didactics in the problem of knowledge (Eşi, 2011, 73-83). The success of curricular theory is determined by its impact on educational practice (Prodan, 2013: 183)

The teacher E. Păun, signals influence in education of the different paradigms and presents many similarities between the paradigms listed and the characteristics of modernity and postmodernity. Modernity is associated in relation with rational and technological paradigms, because that give value at the socio-organizational theory, the economic aspects and at the systemic approaches in education.

Postmodern theorizing include (Prodan, 2011: 31): historical perspectives (reinterpretation, subjective experience of history); aesthetic perspectives (artistic dimensions of the human person) social criticism (construction and deconstruction of truth and knowledge); cultural analysis (critical negative impact of modern technology on the human psyche and the environment); radical eclecticism (critical discourses construct and deconstruct): cosmological discourse (personal and universal harmony search).

Deepening the problems paradigmatic, E Joiţa proposed redrafting using "the update and the development of a system of paradigms" in order to enhance the status of pedagogy as normal and mature science.

In the famous book "Undestanding Curriculum. An Introduction to the Study of Historical and Contemporany Curriculum Discourss "W. Pinar et al, granted early times, a focus on the use of the concept of paradigm in the curriculum (Pinar, 2004: 15-23). The study "reflects the change in the definition of the curriculum exclusively as school subjects in the curriculum as symbolic representation", making a presentation of the two paradigms: the paradigm of curriculum development and the curriculum understanding paradigm.

The first paradigmatic construction "Didactica Magna" is focused on "a universal art to learn all everything" (Comenius, 1970: 7).

It took for a long period of reflective maturation of the human spirit that the problem adequacy of knowledge to the object of knowledge to be able put in perspective of the development and the criticism of the philosophy.This process of cognitive maturation has led to the formulation of problems and solutions "paradigmatic", means the methods, the scope, the guarantees and the value of the knowledge of which man is capable (Drăgoi, 2014: 3).

Pedagogy has a new mission: to provide teaching paradigms and methodological ideas suitable for education postmodern (Ilica, 2010: 1)

4. Concluzii

The Anthropological Theory of Didactics TAD by Chevallard in 2012 is not simply than a collection of theoretical tools and case studies. It is an emergent research program which defies the boundaries within which much past and present research on mathematical education seems to be confined. Its point of departure has been to defy the unquestioned (or .“naturalistic”) conception of disciplines, such as

mathematics, as institutionally independent "bodies of knowledge" which schools and teachers succeed, more or less, to "disseminate. Historically, the germs of ATD are to be found in the theory of didactic transposition elaborated by Yves Chevallard in 1982 and recent developments in this theorization is the effect of new problems it intends to address in developing to meet the Theory of Didactic Situations, elaborated by G Brousseau în 1998. It finds practical application in designing educational software.

Dictionaries take the word "paradigm" in the sense of the philosophy of science studies undertaken by Thomas Samuel Kuhn (1922 -1996). The book "The Structure of Scientific Revolutions" contains no explanatory drawing, physicist-philosopher making a bestseller in over one million exemlare, relying solely on the power of the word.

The scientific community, that court scientific validating of the scientific theory circulated, giving quality paradigm has the following specific features identified in this article is part of the sociocultural system (Wikipedia, 2014) and it is influenced by positive or negative according to data from literaura specialty (for example: Grădinaru, (2010) "Transforming Scientific Communities in the Digital Age", Moles,(1980) "Psychology of Kitsch" or Pintilie, (2010) "Social Hypostases's Kitsch"). Problem of the ,scientific level suggested in Fig. 2, currently has a practical solution with indexation in international database systems (for example: Thomson ISI, IEEE, Scopus, Elsevier, Copernicus et al) specific to that make a selection process based on criteria the performance and calculate an Impact Factor.

The intervention of Margaret Masterman, (1910-1988) philologist and philosopher from Cambridge, T. Kuhn recognizes the existence of 22 senses of the word paradigm used by himself in the "theory of scientific revolutions" (such as Newton's law is sometimes a paradigm sometimes part of the paradigm, and sometimes paradigmatic). In this situation I do not feel anything abnormal large number of paradigms existing in the field of curriculum. Some of these were presented in this article, especially those of the modernism and the postmoderninsm. That can be attributed to the large number of classes of forms introduced in didactics, where there is the curriculum, the way those sciences which make good house with pedagogy, to merge in interdisciplinarity.

Didactics and epistemology have in common the three perspectives that are use to define the curriculum and the knowledge, so: as a structure, as a process, as a product.

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