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Informatic Foundations of Training Theory

Gabriela CRISTEA[1], Ionuț-Constantin MANOLE[2]

Abstract

The Training Theory or General Didactics has historically evolved in the pedagogy asserted in the modern and postmodern era, as a sub-element of the General Theory of Education (which integrates the Foundations of Pedagogy and Education Theory, approached in a narrow sense, referring only to "the sides of education").
In the early modern age, its foundations were ethical and psychological. The ethical foundations aimed at developing the goals of "education theory", predominantly related to intellectual education. The psychological foundations aimed at developing the methodology of education that includes the forms of organizing training.
In modern and advanced modern (postmodern, contemporary), the general didactics, asserted under the formula of the "theory and methodology of the training", is founded philosophical (epistemological), psychological, sociological and political, anthropological and cultural. The multitude of perspectives calls for a special analysis model of computer-based training activities. We consider: a) the valorisation of the fundamental concepts of informatics (Data, Information, Algorithms, Graphs, Database, Networks, Feedback) in defining and analyzing the object of study, normativeness and methodology of research- specific to the training theory education / general didactics; b) their use in the validation of the pedagogical language involved and perfected in a general ideal-model (the curriculum model of the training activity), but also in the applied models (see the curriculum model of the lesson, managerial approached). On their basis we can consolidate the specific pedagogical language of the training theory, structured at the level of a "disciplinary matrix" or a "strong epistemic nucleus".

Keywords: *Training Theory; concepts of informatics; disciplinary matrix; fundamental concepts; epistemology.*

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1. Introduction

General didactics is the fundamental pedagogical discipline asserted in the history of pedagogy as part of the general pedagogy promoted in modern age as a socio-human science specialized in the study of education and its main subsystem, training. In the early modern age, general didactics was called the theory of training or the theory of education. It is the central part of the general pedagogy, which is situated between the fundamentals of pedagogy (philosophical and psychological) and the theory of education - conceived predominantly as a theory of moral education, referring also to the other "edges of education": aesthetic, physical, applied (oriented to the profession) (Johann Friedrich Herbart, General Pedagogy, 1806; Pedagogical lectures, 1835) [9],[10]. In this historical perspective, asserted in the early modern age, general didactics (or the general theory of education or training) specifically envisages the "aspect of intellectual education". This explains the tendency of approaching and even defining general didactics / general theory of education as the theory of intellectual education. It is a negative trend, sometimes extended to the present. We consider it an obvious negative trend because: a) Not all subjects providing the content of education studied by general didactics / general theory of education / general theory of instruction are reported as priority to "the side of intellectual education - see educational subjects priority reported at aesthetic education (music, imitative arts, literature), practical school activities, physical education and sports, moral education (civic education, religion); b) all educational disciplines, even if they have a predominantly intellectual content, should be oriented and exploited not only in informative, intellectual, but in formative sense, following what Herbart defines through the "educational training" formula, promoted at normative level in early modern pedagogy, with positive influences in the modern pedagogy of the 20th century and in modern, contemporary (postmodern) modern pedagogy. The negative tendency is generated and historically maintained by the special epistemological limit of pedagogy, which has long been under the tutelage of philosophy and science derived from abstract or partial (ideological) discourse of philosophy. Its overcoming calls for an analysis of the pedagogy fundamentals that support its historical evolution in a historically and theoretically determined context.

2. Theoretical Background

The theoretical background that sets the foundations of knowledge in any science is dependent on the historical evolution of the field. The

connection between the theoretical evolution - "logistic or axiomatic" - and the "genetic", historical, necessary in analyzing the fundamentals of any science, is an axiom of epistemology. Knowing the fundamentals of a science, thus calls for "a viable epistemological approach from two distinct but complementary perspectives: a) historical or genetic; b) axiomatic or logistic" [7:30, 31], [14:123-126]. This link should be highlighted in the case of general didactics (general theory of education / general theory of training). We have in mind the scientific foundations of pedagogy reflected specifically at the level of general didactics / theory of training as fundamental pedagogical science - a fundamental component of general pedagogy. In the current language, general didactic is the "theory and methodology of training", fundamental science of education, included in the proposed pedagogical curriculum for the initial and continuous training of teachers at all levels and disciplines of education (together with the fundamentals of pedagogy and curriculum theory and methodology). The two formulas, the general didactics - the theory and methodology of training, epistemologically equivalent (see specific research object, specific normativity, specific research methodology) are used alternately in the specific literature according to the tradition of each country or pedagogical-cultural space.

The analysis of the historical foundations of general didactics calls for the use of the concept of: a) historical age, taken from historiography; b) paradigm as a model for approaching the scientific theory (pedagogical theory), taken from historiography. By combining the two concepts, the historical foundations of general didactics / training theory can be identified (as a component part of general pedagogy (general pedagogical theory)). 1) the premodern age (XVII-XIX centuries): premodern pedagogy, pre-scientific pedagogy - the teacher-based paradigm. It is philosophical (metaphysical) and theological (dogmatic). It involves focusing the training on the teacher. The student who teaches and his evaluation are subordinate to the dirigist teaching, authoritarian, proposed by the teacher. 2) Early modern age (19th century): modern early pedagogy (19th century) scientific, philosophical (ethical) and psychological founded - The formal didactic paradigm, that combines the foundations: a) ethics of education, that support the general purpose of education and training; b) psychological of education, that supports training methods and the lesson model based on the strict observance of formal steps [9]. 3) advanced modern age (20th Century): scientific pedagogy, psychologically and/or sociologically grounded - Paradigm of psycho-centered didactics (focusing on student requirements, Key, Binet, Meumanm, the "new education" current) and sociocentric didactics paradigm (training based on societal demands, on

"methodical socialization of the younger generation", Durkheim, Natorp, Makarenko). 4) The recent modern age (the second half of the 20th and the 21st century: psychologically and sociologically grounded pedagogy - The curriculum paradigm that supports the focus of training on the ends of education and education system built on the interdependence between education and education system requirements: a) psychological , expressed in terms of competencies, aiming at capitalizing the cognitive and non-cognitive resources of the student; b) social, expressed in terms of basic contents recognized by the society, necessary for the student, included in the plans, programs, manuals, etc. [1], [7].

3. Argument of the paper

It is typical of a historical research, applied in the field of general didactics / historical theory, in historical evolution, from the premodern and modern age to contemporary, postmodern era. This argument allows on one hand to distinguish between pedagogy as general theory of education and general didactics, as the theory of instruction, distinction made by A.H. Niemayer in 1796 [6]. On the other hand, the historical argument is also supported in the logical plane by clarifying the relations between the general and the particular, evident in the theory of the training, which are: a) a subsystem subordinated to the general theory of education, training being the main subsystem of the education activity, which should not be reduced only to the part of intellectual education; b) a general background for the various training methods of teaching subjects (mathematics, history, physics, etc.), and under the form of applied didactics or particular didactics [13:304].

The historical perspective supports the logistic perspective of the construction of the theory of training, carried out in the modern age on ethical and psychological backgrounds (Herbart, formal steps didactic paradigm), psychological (psycho-centric didactic paradigm) and sociological (paradigm of sociocentric didactic). Postmodernist teaching, asserted in the recent modern age (the contemporary age), is psychologically and socially based, according to the curriculum paradigm that ensures: a) "setting the specific study object at the level of the training activity designed and realized within the educational process"; b) its global approach to the interdependence: psychological requirements (competences) - social (basic contents legitimated by society; objectives - content - methods; teaching - learning - evaluation actions; c) its open approach in relation to the forms of necessary organization, existing pedagogical resources, possible pedagogical styles. The ordering of the specific study object requires reporting to a set of

informatic foundations needed at the level of the theory and methodology of training. We have in mind the general didactics / theory and methodology of training philosophical (epistemological) and psychological, sociological and political, anthropological and cultural founded in specific conditions to the information society. The multitude of perspectives calls for a special analysis model of structures of training activity informatic grounded.

4. Arguments to support the thesis

Postmodern general didactics / the theory and methodology of training, asserted in postmodern, informational society, is grounded: a) philosophical (epistemological); b) psychosocial, psychological (in relation to the competencies concerned) and sociological (in relation to the basic contents, legitimated by the society, selected according to the competencies concerned); c) political and ethical (in relation to the ideal of education and the strategic aims of education aimed at democratizing education); anthropological and cultural (in relation to the superior products of culture, which support the basic formation of the pupil's personality). The multitude of perspectives calls for a special analysis model of computer-based training activities.

Such a model supports the thesis of processing the information supporting the construction of any didactic message, based on classical normative criteria, historically asserted at the level of didactic principles (essentialization, systematization, etc.) that guide the training activity in a positive formative direction (with emphasis on the formation and development of operational thinking, internal motivation, positive affectivity, strong will, positive character, etc.).

5. Arguments to argue the thesis

The thesis focuses on the need for optimal pedagogical processing of specialized information, many of which are at the basis of the building of didactic messages in most of the subjects of education. Supporting this thesis is based axiomatically on the two characteristics of informatics - the processing of essential information and their network integration - which allows the positive orientation of any message. In this way any didactic message elaborated and transmitted by the teacher becomes synergic, open (to self-refinement), fully involved in the permanent formation and development of higher, cognitive and non-cognitive skills and attitudes, useful both in the school environment and in the extracurricular environment.

A model for analyzing the structure of the informatic training activity allows: a) to capitalize on the fundamental concepts of informatics (Data, Information, Algorithms, Graphs, Database, Networks, Feedback) in defining and analyzing the object of study, normativity and methodology research - specific to the theory of general education / didactics; b) their use in the validation of the pedagogical language involved and perfected within a general ideal model (the curricular model of the training activity), but also in the applied models (see the curriculum model of the lesson, managerial approached) [2],[3],[4],[5],[6]. In this context can be capitalized not only fundamental informatic concepts that define and analyze the specific object of study of informatics, but also the fundamental and operational concepts that epistemologically fix the normative and research methodology specific to the domain. On their basis we can consolidate the specific pedagogical language of the theory of training, structured at the level of a "disciplinary matrix" or "strong epistemic nucleus" [11].

The thesis of information processing in order to build an effective didactic message highlights the necessity of formative orientation of specialized knowledge taken from science, art, philosophy, technology etc. Such a processing involves: a) observance of a fundamental principle of curricular design - the principle of transformation of specialized knowledge into pedagogical knowledge, with positive formative value; b) capitalizing on the fundamental concepts of computer science involved in explaining the shift from data to information and from basic information, integrated into the network, improved in feed-back conditions (external and internal, see external evaluation).

The application of the basic concepts of informatics at the level of the analysis of training as an object of study specific to the general didactics is done especially in the field of curricular pedagogical design. The data concept sets the design prerequisites. Information [12] as a prerequisite for the didactic message is obtained by processing specialized data (taken from science, art, philosophy, technology etc.) into pedagogical data (oriented in the positive direction). The processing of meaningful data is accomplished by: a) search, planning, sorting, "lossless compression" algorithms; b) graphs with zero or multiple nodes that establish the links between information at the database level. Articulation of concepts integrated into the database supports the structure of the training set at the ideal model level. It capitalizes on a set of networks (links in the basic structure - organizational structure - planning structure) improvable / self-improvable at the level of the realization structure through the call to the concept of feed-back promoted also in normative plan (as a law and basic principles of training).

These fundations that informatics offers at the design level can be broadly compliant (see the ideal training model) and specially (see the ideal-model of design of the lesson, curricullar and managerial supported) [3], [4], [8:106].

6. Dismantling the arguments against

The thesis of pedagogical processing of specialized information is challenged directly or indirectly by the followers of private didactics elaborated without a special reference to the fundamental concepts of general didactics / training theory. Any argument put forward in this sense can be dismantled by counter-arguments that appeal to:

a) the practice of elaborating overloaded or inconsistent school curricula and textbooks;

b) the basic concepts of general didactics (training, learning process, training objectives - training content - training forms - training methods - evaluation of the training, teaching-learning-evaluation as actions subordinated to the training activity; normativity of training: principles of organisation, planning, making of training, teaching principles) absolutely necessary in the development of any particular didactics;

c) the network of fundamental pedagogical concepts articulated at the level of the relations between the general theory of education and the general theory of training (see the logic of the relations general - particular / system - subsystem, existing between the concepts of: education - training; educational system - learning process; the educational system - the finalities / objectives of the educational process; the general contents of education - the contents of the training: the curriculum, the curricula and textbooks, the general forms of education - the forms of training, the methodology of moral, intellectual, technological education etc. - methodology of training: methods, proceedings, didactic means; evaluation of the education system - assessment of the educational process);

d) The structure of any curricular project (objectives - contents - methods - evaluation) applied specifically in the context of each stage and educational disciplines (organizational forms, pedagogical resources, pedagogical styles etc.).

7. Conclusions

The historical evolution of the theory of training (general didactics) can be validated informatically in relation to its fundamentals that support

the construction of the specialized language (fundamental concepts defining the subject of specific study, the normative and specific research methodology) and the ideal models (the general model of training, the model of the training objectives, the lesson model, etc.). In the early modern age, the fundamentals of the theory of training / general didactics were:

a) ethics, underlying the construction of "goals" that are predominantly intellectual;

b) psychological, underlying the construction of the methodology of education, of the forms of organization, of the lesson (by the formal steps). From this historical point of view, the relationship between general didactics (education theory or training theory) and particular didactics is clarified.

General didactics provide the logical and informational foundations of all private didactics. In modern advanced and recent (postmodern, contemporary) age, general didactics evolves under the formula of training theory and methodology. In the modern age, general didactics is philosophically grounded (for the elaboration of the finalities of education), but above all, psychologically and socially. In the postmodern era is founded philosophical (epistemological), psychological, sociological, political, anthropological and cultural. The multitude of perspectives calls for a special informatic founded model of analysis. At this level there is a special interdependence between the informatic and the epistemological foundation.

The processing of didactic information involves: a) valorisation of the curricular principle of the transformation of the specialized knowledge into pedagogical knowledge; b) the fundamental concepts of informatics useful in explaining the shift from data to informations and from basic informations, integrated into network, improved in feed-back conditions (external and internal, see external continuous assessment). The articulation of the integrated concepts in the database supports the structure of the training at the level of ideal-model developed at the level of a set of networks (links which are fixed in the basic structure - organizational structure - planning structure) perfectionable in normative feed-back conditions (continuous evaluation).

The fundamentals of informatics are capitalised at the level of the curriculum design activity analysis at general level (see the ideal-model of functioning of training) and specially (see the ideal-model of design for lesson, curricular and managerial supported).

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