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## Analysis of the Functioning Structure of Education from the Computer Science Perspective

Gabriela CRISTEA<sup>1\*</sup>, Ionuț-Constantin MANOLE<sup>2</sup>

### *Abstract*

*Our study is integrated into the issues promoted by the General Theory of Education (Fundamentals of Pedagogy), with multiple openings to the General Theory of Education (General Didactics), but also to the Didactics of Computer Science. The general aim pursued is to analyze the structure of functioning of education at the level of an ideal model, which can be argued on the basis of informatics concepts: information, algorithms, programming methods, units of measure (bit and its multiples), databases and so on. The specific objectives aim at analyzing the three correlations that support the structure of education functioning, approached as a general, basic structure:*

*1) Correlation between educator-educated, globally needed, computer-based argumentation through the use of some concepts (algorithms, formulas, techniques of computer systems, data collections, databases, graphs, networks, etc.) entity-relationship databases, hierarchical data model, network data model, etc.).*

*2) The correlation between information-training-development, necessary at the level of any pedagogical message, which can be argued by capitalizing on: a) the algorithm notion involved in the circuit: input data -maneuver data - output data (leading to a result or sets of results); b) specific properties of the algorithm: finitude, clarity, generality.*

*3) The correlation between the continuous external-internal evaluation, informatically sustained at external-internal feedback level in the context of a informatic system, (self)perfectionable as: a) life cycle deployed in stages (from the definition of the requirements to the maintenance of the system); b) a self-regulating function which can be decomposed into sub-functions, translated into programming languages and reprogramming; c) a model that integrates object-oriented methods, to information, to specific techniques.*

**Keywords:** *pedagogy; didactics; informatics; information; the functioning structure of education; correlation; pedagogical message; feedback (internal-external); algorithm; databases; graphs; networks;*

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## 1. Introduction

Our study respects and capitalizes on the scientific logic of a "type of theoretical article". The theoretical framework is set at the level of the functioning structure of education system which, as an ideal model, integrates and capitalizes on the most important fundamental and operational pedagogical concepts. The necessary connections between these concepts are fixed at the level of three correlations: educator - educated, informing - forming; external evaluation - internal evaluation. This issue is addressed by the most important science of education - Fundamentals of Pedagogy (General Theory of Education). In the bibliography, we evoked significant headings that analyze the structure of functioning of education at the ideal-model level. We also made special use of our own contribution [2].

Our study will address the following issues: 1) Introduction to the research topic; 2) The functioning structure of education from a pedagogical and informatic perspective; 3) Analysis-synthesis of the necessary pedagogical correlations within the structure of functioning of the education: a) educator - educated; b) informing - forming; c) external evaluation - internal evaluation; 4) Informatic analysis of educator-educated correlation; 5) Informatic analysis of the informing - forming correlation, with the purpose of positive development; 6) Informatic analysis of the external evaluation - internal evaluation correlation; 7) Conclusions.

This theoretical framework, set at the level of pedagogy, is related to a set of concepts and computer models, promoted by computer science, starting from the key concept of information technology - information. The "added value" of the paper is produced at the interdependence between pedagogy and computer science. It's investigation aimed to validate the functioning of education by capitalizing on some notions and informatic models.

As a theoretical work, our article capitalizes on the basic notions of pedagogy articulated at the ideal-model level and the basic notions of computer science useful in the analysis of the three information loops involved in: a) designing of the pedagogical message; b) communication of the pedagogical message; c) permanent improvement of the pedagogical message in external and internal feedback, external connection (initiated by the educator) and internal connection (continuously carried out by the educator, but also by the educated, found in advanced learning stages). The three loops of information are supporting the three pedagogical correlations throughout the educational act. Their epistemological and social analysis and validation requires the appeal not only of certain computer notions but also of certain computer models.

The supporting of the work is justified both epistemologically and ethically/deontologically, from theoretical point of view, but also methodologically and practically.

From a theoretical point of view, our effort focuses on the informational validation of the ideal model of the structure of functioning of education at the level of the fundamental concepts of pedagogy, articulated in the curricular design of the pedagogical message, communication of the pedagogical message and continuous improvement of the pedagogical message.

From a methodological and practical point of view, our approach can substantiate and guide the analysis of the functioning of the education system in two particular cases: a) the training activity as the main subsystem of education (see the structure of functioning of the training process) ; b) computer science didactics, approached as a general applied didactic and as didactic of the specialty or domain (which designs, communicates and improves the pedagogical messages in relation to the specific of the knowledge and the informatic action).

## **2. Theoretical Background - The functioning structure of education from pedagogical and computer science perspective**

It is a study that has not been done in the specialized pedagogical literature. Added value is produced at the level of interdependence between pedagogy and computer science.

Education is the specific study subject of pedagogy. It should be studied in terms of its dimensions of maximum generality, which is its essence as an activity so important for the permanent progress of man and society.

The general dimensions of education are articulated in the structure of education. This includes the most important components of education and the links between them necessary for the functioning of the activity. From this perspective, the functioning structure of education represents the general, basic structure of education. It "involves the exact definition of the constituent elements and the specification of the continuous training mechanisms" in the educational activity [2].

This issue is promoted by the General Theory of Education (Fundamentals of Pedagogy). Within it are proposed various ideal-models for approaching the basic structure of education [7], [8], [2], [3]. By their general character, these models offer multiple openings to the General

Theory of Education (General Didactics), but also to the particular Didactics, including the Didactics of Computer Science.

In the analysis of the structure of education functioning can be used the methodological resources of informatics, becoming basic school discipline, but especially methodologically involved in curricular design of each educational subject, of each lesson, etc. In this perspective, the process of adapting education to the requirements of an "information society based on the creation, dissemination and use of information and knowledge" must be achieved. This process represents the "new mode of human existence", prepared and anticipated by the school through all its institutional, psycho-pedagogical and psychosocial structures. [6]

The general aim pursued in this context is to analyze the functioning structure of education at the level of an ideal model, built and argued on the basis of computer concepts: information, algorithms, programming methods, units of measure (bit and multiples) , databases etc.

The specific objectives aim at analyzing the three correlations that support the structure of functioning of education, at a general level: 1) educator - educated correlation; 2) the correlation of informing - forming - development; 3) external evaluation - internal evaluation correlation.

The analysis of these correlations highlights the value of the pedagogical messages through which the educator (teacher) interacts permanently with the educated (the student). Within the pedagogical messages elaborated by the educator (teacher) a decisive role belongs to the specialized information (literary, mathematical, informatics, biological, philosophical, historical, artistic, technological etc.). It must be processed and transformed pedagogically into basic knowledge useful for the positive formation and development of the pupil - cognitive, but also affective, motivational, characterial, etc.

In this perspective, pedagogy, a science that studies education at the level of a general structure, must relate to the key concept of informatics - we refer to the concept of information.

Information is the vital matter and energy that sustains the three necessary pedagogical correlations at the level of the structure of general education functioning, valid at all stages and cycles of the system and of the educational process. All those who design education in the educational process, at the lesson level, school / university textbook, school / university programs, educational plan, auxiliary teaching materials, educational software etc. the concept of information that represents the "information action" that leads to the shaping of the mind and the character through the communication of the instructive knowledge (...) on a certain fact, topic or event " [9].

Pedagogy particularly explores the "concept of information from the 20th century that has its origin in cybernetics, in close connection with the communication at a superior level of abstraction" [9].

In this context, the pedagogical communication achieved within the structure of functioning of the education at the level of the three necessary correlations must relate to the types of information classified by computer science based on several criteria: 1) Form of information exposition: a) quantitative information (analogue - digital); b) qualitative information; 2) Information support: a) verbal information; b) written information; c) graphical information; d) video information; e) optical information; f) magnetic information; g) encoded information; 3) Location of information in time: a) active information (currently); b) passive information (past); c) predictive information (for the future); 4) The content of the information: a) elementary information; b) complex information; c) synthetic information; 5) Field of activity of the information: a) scientific information (specific: mathematics - informatics, natural sciences, socio-human sciences); b) technological information; c) artistic information; d) economic information; e) political information, etc .; 6) Sources of information origin: a) internal - external information; b) primary - secondary information etc .; 7) Duration of current information: a) constant information; b) conditional-constant information; c) variable information; 8) Principles of information processing in computer systems: a) logical-mathematical data; b) texts; c) documents; (d) graphs; e) audio sequences; f) video sequences; g) audio-visual sequences. [9]

### **3. Argument of the paper - Analysis-synthesis of the three pedagogical correlations: educator-educated; informing-forming; external-internal evaluation**

It is a theoretical work which capitalizes the basic notions of pedagogy articulated at the ideal model level and the basic notions of computer science that can be used in the analysis of the three information loops involved in: designing the pedagogical message, transmitting the pedagogical message, and permanently perfecting the message pedagogical in external and internal feed-back.

The three pedagogical correlations that support the functioning of education at all levels of the system and of the educational process are the following: 1) Educator (teacher) - educated (student) correlation, underlying the structure of functioning of education; 2) Correlation of informing - forming, which should be pedagogically oriented in a positive sense within the pedagogical messages elaborated by the educator (teacher); 3) The

external-internal evaluation correlation, which must be done permanently by the educator (teacher), but also by the educated (student) at the moment of achieving superior performance in the education activity.

The three correlations constantly interfere with pedagogical interdependence. From an informational point of view, they have the value of informational loops that reflect the dynamics of a graph that guides the relationship between input and output.

(1) Educator (teacher) - educated (student) correlation. It is needed globally. It refers to the functionality of education mechanisms, viewed as a whole. It is promoted in any curricular pedagogical project (lesson, school curriculum, school textbook, educational software, curriculum, etc.) centered on the objectives / skills of the education and the corresponding basic contents (included in the education and in curricula, operationalized in each lesson, etc.)

In order to achieve this correlation, the educator (teacher) must know and respect the principles of curricular design: a) priority reporting to general, specific objectives, skills "open to all the resources of the personality of the students - moral, intellectual, technological, aesthetic, physical - formal, but also non-formal and informal "; b) ensuring pedagogical correspondence "between objectives - content - methods - evaluation"; c) carrying out the "continuous evaluation of the activity with regulating - self-regulation - permanent function" [2].

(2) Informing-forming correlation. It is necessary at the level of any pedagogical message that should be oriented in a positive sense, based on the educational objectives designed by the educator in any pedagogical message that leads to the permanent positive development of the educated (student, etc.).

From this perspective, we can advance the necessary informing - forming - positive development correlation formula in any well-designed and correctly developed pedagogical message. Such a curriculum-based pedagogical message includes specialized information (literary, mathematical, biological, philosophical, technological, etc.) transformed by the educator (teacher) into basic knowledge, with positive, sustained educational effects on the personality of the educated: priority development of thinking, of the internal motivation for learning, of the correct affective and characteristic attitudes of the educated (student) towards society, school, educators (teachers, parents, etc.), towards training and learning, work, discipline, community (local, national, etc.) etc.

(3) The external evaluation - internal evaluation correlation is done by the educator (through external feed-back) and educated (through internal feed-back) for the continuous improvement of the activity. This correlation

ensures the formative and self-formative evaluation of the education cycle that has openness towards permanent education and self-education. It closes the structure of the functioning of education at the level of the last informational loop, which is also the first loop of a new cycle of education, of a superior quality compared to the one completed, corrected /self-corrected, improved /self-improvement, adjusted /self-refurbished, etc. through the higher formative effects of continuous external /internal evaluation.

The correlation between the educator and educated, globally needed, can be informatic argued by calling for the following:

- a) concepts: algorithms, formulas, techniques for realization of information systems, data collections, databases, graphs, networks;
- b) models: the entity-relationship database model; hierarchical data model, network data model [4].

The correlation between informing-forming- positive development, required at the level of any pedagogical message, can be argued by means of:

- a) the algorithm's informatic notion: a set of symbols used in mathematics and logic, allowing to find mechanically (through calculation) of some results - a sequence of operations necessary to solve a computer problem involved in the circuit: input data - data of maneuver - output data (leading to a result or sets of results);
- b) specific properties of the algorithm: finitude, clarity, generality;[10]

3) The correlation between the continuous /external formative assessment - the continuous / internal self-assessment can be informatic argued at the external feed-back and internal feed-back, achievable on the basis of some external- internal- inverse connection, developed in the context of a system of education, with characteristic of a open computer system, (self) perfectionable as:

- a) lifelong learning cycle, from the definition of requirements (the pedagogical message received, internalized, capitalized) to the system maintenance measures (by improving the project, the message, the common repertoire, the methods, etc.);
- b) a self-regulating function which can be decomposed into sub-functions, transposed into programming languages and reprogramming, at the level of operationalization techniques of the specific objectives between minimum and medium standards;
- c) a model that integrates object-oriented strategies (education viewed as a potential subject of education), information (processed, transmitted, and built / rebuilt as open positive formative resources), specific techniques (redesigning activity against results obtained). [5]



#### **4. Arguments to support the thesis - Informational analysis of the educated-educated correlation**

The educator -educated correlation, built at the level of the curricular pedagogical project required at the general level of the education system, can be argued by means of some concepts (algorithms, formulas, techniques of realization of information systems, collections of data, databases, graphs, networks) and specific models (entity-relationship database model, hierarchical data model, network data model, etc.). Informatic analysis involves a description process using a data model. The modeling made allows the shift from perceiving facts to conceptualizing them at the basic data level.

The educator -educated correlation, built at the level of the curriculum pedagogical project required at the general level of the education system, can be argued by means of a set of concepts that allow the analysis and improvement of the functioning structure of education at global level: algorithms, formulas, techniques the realization of computer systems, data collections, databases, graphs, networks. Through the articulation and mediation the educator -educated correlation can be argued informatic by specific models: the model of the entity-relationship database; hierarchical data model, network data model, etc.).

The informational analysis of the educator - educated correlation involves a process of description using a data model. The modeling allows the transition from the perception of facts to their conceptualization, at basic data level, which highlights the main components of the two main actors of education:

- 1) Educator, through the construction of the pedagogical project and the pedagogical message, transmitted through educational strategies in the area of the common repertoire with the educated, created especially for the success of the education activity;
- 2) Educated, by capitalizing on all its cognitive and non-cognitive resources, activated in the common repertoire area, created especially by the educator, which allows the reception and assimilation of the pedagogical message and the elaboration of a pedagogical response to the requests of the pedagogical message, directed and subsequently self-directed.

The key concept that must be activated specifically for the argumentation, analysis and improvement of the educator-educated correlation is the concept of computer algorithm.

Computer algorithm is a primary concept, basic in computer science. This notion is used not in defining a reality, but in describing it at the level

of "succession of mechanically applicable stages in order to obtain a result" - in our case the success of the education activity through the full, permanent valorisation of the correlation between educator and educated.

The informational algorithm of the educator - educated correlation allows the logical and pedagogical description of the educational activity, starting from the "input data" (the central function of education - the macrostructural finishes of education, the curricular pedagogical project focused on the microstructural finalizations of the education/general objectives, specific and concrete aspects of education - the pedagogical message) which, to the extent of their realization in the process of transmission of the pedagogical message, at the level of common repertoire between the educator and the educated, lead to the "output data" (reception, assimilation and use of the pedagogical message in the elaboration of a guided pedagogical response, subsequently self-directed).

The quality of the educator - educated correlation can be verified by referring to the properties of the algorithm describing the unfolding of the activity. It aims at:

- a) the finitude of the educator - educated correlation, proven according to the time and the pedagogical space invested for its realization throughout the activity, using strategies (which integrate different methods, organizational forms, managerial styles) "with a minimal computational effort" ;
- b) the clarity of education, which implies the achievement throughout the activity, "without ambiguities through the steps contained as clearly described".

Educator - educated correlation sustains and refines the educational activity at global level as a whole. In informatic terms, it refers to the "life cycle of an information system" that can be analyzed through several models: the entity-relationship database model; hierarchical data model, network data model; the distributed data model, the semantic data model, the logically constructed (and pedagogical) data model, the object-oriented model (which in the perspective of permanent education and self-education tends to become subject of activity).

In the open context of education, expanded and amplified in the special conditions of the postmodern, informational, knowledge-based society, it is necessary to recall the "cascade model" that seeks to capitalize on the life cycle of an informatic system by creating and monitoring an informatic path that includes [1]:

- 1) The analysis and definition of the functional requirements of the computer system, which in our case, are valid at the level of the

general and specific objectives / skills found at the center or at the base of the curricular pedagogical project;

2) Designing the system and software, which in our case marks the essential quality of the obvious curricular pedagogical project at the level of permanent optimization of the correlation between the educator and the educated as an essential component of education, confirmed at the level of basic structure corresponding to the basic function of education (education-development for optimal social integration in the short, medium and long term);

3) Implementation and testing of the program units, which in our case represent the action of the educator of transmitting the pedagogic message, supported by the action of elaborating the common repertoire between the educator and the educated, which allows the realization of the educational activities, reception, assimilation and use of the pedagogical message in an open context

4) Integration and testing of the informational system, which in our case is accomplished by the strategies proposed by the educator in relation to the pedagogical and social resources of the educated psychologist (cognitive, but affective, motivational, etc.), known and exploited in multiple open variable contexts and situations.

5) The exploitation and maintenance of the informational system, which in our case is effectively realized by the continuous evaluation, for the formative purposes, of the pedagogical responses provided by the educated, led by the educator, subsequently self-directed by the educated. Continuous evaluation that allows the discovery and solving of some design and programming errors or omissions found against the initial functional requirements announced at the beginning of the activity underlying the activity.

## **5. Arguments to argue the thesis - Informatic analysis of the informing - forming correlation**

The informing-forming-development correlation it is necessary within any pedagogical message designed and developed by the educator (teacher). This correlation is positively oriented through the proposed objectives of selecting and teaching the informations that supports the education of the educated (in relation to memory) and the internal motivation of the educated (in relation to external motivation). From this point of view, the informing -forming correlation is permanently

reconstructed and perfected at the level of optimal correlation between formation and positive development.

The analysis of the pedagogical correlation between informing - forming (oriented towards positive development) can be argued at a informatic level by capitalizing on the algorithm involved in the circuit: input data - maneuver data - output data (leading to a positive result or sets of positive results). The improvement of the informing - forming- positive development correlation is supported by the use of the specific properties of the algorithm - finitude, clarity, generality - followed throughout this informational loop, developed within any pedagogical message.

The informational analysis of the informing- forming correlation, pedagogically oriented to the positive development of the educated (student) is possible through an algorithm built on the circuit that includes:

- 1) Entry data - includes the data necessary for the development of the pedagogical project (objectives - content - methods - evaluation) which results in the completion of the pedagogical message to be transmitted.
- 2) Handling data - includes the basic contents distributed logically at the level of the pedagogical message communicated through educational strategies (which exploit different methods, organizational forms, leadership styles) that create the common repertoire of the educated and the educator necessary for receiving and assimilating the pedagogical message
- 3) Output data - includes the learner's responses to the pedagogical, guided and self-directed message, which should be evaluated / self-assessed according to the computer skills expressed in terms of finitude, clarity and generality, which create the premise, pedagogical and informatic of their internalization and valorisation on short, but also medium and long term, in multiple contexts, open, variable, complex, contradictory, etc.

Throughout the presented circuit, which is subordinated to an informatic algorithm, the quality of the selected and processed information within the pedagogical message is essential, depending on the general and specific objectives /skills pursued. On a pedagogical level it is necessary to transform the information into basic knowledge, with the value of positive, sustainable formative resources.

From a informatic point of view it is necessary to transform the information into a formative resource that supports efficient communication in any area of reference. In the context of education, efficient pedagogical communication is dependent on the ability of designers to capitalize on all

the qualitative dimensions of information identified from several complementary perspectives:

- 1) Perspective of information time:
  - A) Information planning, taken and broadcasted "at the right time";
  - B) Upgrading the information at the moment of its transmission, reception and assimilation;
  - C) Frequency of information in an appropriate, "whenever required" version;
  - D) Multiphase of information, capable of "reflecting events in a past, present and future" time.
- 2) Perspective of form of the information:
  - A) Clarity of information "provided in a readable form for the receiver" (educated);
  - B) The level of expression of the information, "in a detailed or summary form";
  - C) Sequence of information - "arranged in predetermined sequences";
  - D) Information presentation - oral, numerical, graphic, etc.
  - E) Information support - written, video, graphic, computer etc.
- 3) Perspective of the content of the information:
  - A) The accuracy of information that "must accurately reflect events", facts, situations, personalities etc. ;
  - B) Relevance of information that "must be related to the information requirements of a receiver (student) for a specific situation";
  - C) Completeness of information that "must cover all information requirements of a management system at a given time";
  - D) Concision of information referring to "only the required information to substantiate decisions";
  - E) The finality of information targeting "a more general or more limited goal, an ascending or descending direction";
  - F) The performance of information that targets the concrete (operational) objectives of the activity that can be measured.

The quality of the pedagogical correlation informing-forming-positive development correlation, depends on the quality of the "life cycle of information", confirmed during five stages:

- 1) Collection of significant quality information through novelty, authenticity and accuracy.

- 2) The transmission of quality information at the common repertoire level between the educator and the educated.
- 3) The processing of information at a qualitative level, which requires the achievement of the leap from its objective dimension to the subjective dimension, which is specific to the knowledge.
- 4) Use of quality information, relevant pedagogical and informatic, proven in open contexts.
- 5) The storage of quality information, processed and used at the level of basic knowledge, with multiple sustainable positive formative effects.

Improving the informing-forming-positive development correlation presume the valorisation of all psychological resources of information, at the level of "cognitive, generalized and abstract informations after the understanding of cause and effect relationships", as well as non-cognitive information that supports attitudinal (affective, motivational, of character), the leap from informations to knowledges, from the multiplied knowledges to essentialized, basic knowledges.

## **6. Informatic analysis of the external evaluation - internal evaluation correlation**

The external evaluation - internal evaluation is informatic argued at the external feed-back level (made by the educator) and internal feed-back, achievable by the educated in the moment of the acquisition of the correct self-evaluation capacity. It takes place in the context of an open, self-perfecting informatic system as: a) life cycle deployed in stages (from defining requirements to system maintenance measures); b) a self-regulating function which can be decomposed into sub-functions, translated into programming and reprogramming languages; c) a model that integrates object-oriented methods to basic informations, and to specific techniques.

The correlation between the external evaluation - the internal evaluation carried out through external and internal feedback is continuous. Involves the evaluation/self-evaluation of the information system, transmitted by the teacher - received by the student as well as basic knowledge with positive formative value. In informatic terms, continuous evaluation/self-evaluation of the system (of theoretical, procedural, conditional, knowledges etc.) involves "checking and validating the data" which are received, assimilated and internalized by the student on the circuit between the communication of the pedagogical message- understanding the

pedagogical message- applying the pedagogical message in as many situations and contexts, which can be opened, differentiated, diversified, etc. During this circuit, the system's evaluation/self-evaluation (of knowledges, skills, attitudes, etc.) becomes formative/self-formative. It is the result of a maintenance process that includes three phases:

- a) elimination of unforeseen or unserviceable abnormalities in previous stages - "corrective maintenance";
- b) adaptation to emerging changes (positive - non-active, visible - invisible, etc.) during educational activities on a informatic circuit determined in the context of the educational process - "adaptive maintenance";
- c) development of the informatic system of pedagogical actions (design and communication of the pedagogical message by the educator, reception and assimilation of the pedagogical message, initial, continuous and final evaluation) through new applications necessary for the "optimization of the data flow" - "perfectible maintenance".

Continuous evaluation/self-evaluation formative/self-formative fulfills the pedagogical function of regulation /self-regulation of the education activity in order to maintain it at an optimum level of development. This function is argued on a informatic base throughout the activity at the level of:

- 1) Building the curricular pedagogical project through "data gathering" and "processing" to become basic knowledge validated in the "data life cycle".
- 2) Creating the pedagogical message by "encoding the data", by transforming information into knowledge with positive, sustainable, "perfectible maintenance" value.
- 3) Communication of the pedagogical message made in the process of transition from "external coding" to "internal coding" that is centered in the area of common repertoire needed between educator and educated.
- 4) The reception and assimilation of the pedagogical message by the educated person, which practically marks the process of validating the quality of the pedagogical message communicated by the teacher by choosing the most appropriate strategies with formative finality.

Regulation /self-regulation of assessed education has to conform and stimulate the quality of the process of transformation of information into basic knowledge. On a informatic plan, we record the conversion of data into significant information. On a pedagogical level, we record the conversion of significant information as specialized information (scientific,

artistic, technological, philosophical, etc.) into basic knowledge of positive, sustainable, formative value. This last conversion, essential in pedagogy, can be informatically tested. In this perspective, it is verified at the level of:

- a) Pedagogical development time: planned, updated, performed in optimal frequencies, in each sequence or moment of activity;
- b) pedagogical form of qualitatively outlined achievement by clarity, level of detail, sequencing, way of presentation, support - material, iconic or symbolic;
- c) essential, systematized, accessible pedagogical content, characterized by accuracy, relevance (scientific and didactic), completeness, concision, methodological and practical opening, achievements reached according to the proposed objectives /skills.

## 7. Conclusions

In the Introduction to the researched theme is argued the type of committed research, the theoretical research of a less studied problem in the specialized pedagogical literature. We are considering the issue of validating the structure of functioning of education at the level of an analysis based on the use of informatic language (asserted in conceptual, normative, methodological terms). "Value added" can be identified at levels of: a) theoretically, by contributing to the explanation of the functioning of education, from an epistemologically supported computer point of view; b) methodological and practical, through the openness offered to solve the problem of the rapporteurs between the general theory of education (the fundamentals of pedagogy) - the general theory of the training (general didactics) - the applied didactics (in the case of non-teaching Informatics didactics - a future investigation).

The analysis of the functioning of education is made from a pedagogical and informational perspective. From the pedagogical point of view, the "general structure of functioning of education" highlights the necessary connections between the main components of the activity that support the three basic correlations: a) educator - educated correlation; b) the correlation between informing - forming - positive development; c) external evaluation - internal evaluation correlation. From an informational point of view, the "general structure of functioning of education" highlights the importance of information - which is the "key concept of computer science" - pedagogically capitalized throughout the activity at the level of the leap required from "specialized information" to the basic knowledge with formative, positive, consistent, coherent, sustainable value.



The analysis-synthesis of the three pedagogical correlations (educator - educated, informing - forming - positive development, external evaluation - internal evaluation) which are supporting the structure of functioning of education at all levels of the system and the educational process, fixes their epistemological and social value, argued, pedagogical but also informatically.

The educator - educated correlation is supported by: a) pedagogical, by the quality of the curricular project centered on the necessary connection between the finalities of education (ideal, general aims, general and specific objectives) and the general contents of education (moral, intellectual, technological, aesthetic, physical), a connection made and permanently perfected by choosing an appropriate methodology in the existing context; b) informatically, by using some computer science concepts (entity, algorithms, data collections, databases, graphs, networks, etc.) and informatic models (entity-relationship database model, hierarchical data model, network model).

The correlation of informing - forming - positive development is supported by: a) pedagogical, by transforming the specialized information (scientific, technological, artistic, philosophical, etc.) into basic knowledge with positive, sustainable, formative value; b) informatically, by the special capitalization of the algorithm notion and the properties of computer algorithms (finitude, clarity, generality), validating the quality of the construction of the common repertoire between the educator and educated, in any context (social, pedagogical, etc.).

The external evaluation - internal evaluation correlation is supported by: a) pedagogical, by integrating the two forms of evaluation at the level of the continuous evaluation strategy with a formative /self-forming function that ensures the permanent regulation of the educational activity; b) informatically, using the external feed-back - internal feedback notions (external inverse connection - internal inverse connection) engaged in regulation /self-regulation of any activity in relation with the obtained results that need to be refined, supplemented, structural corrected, and so on.

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