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Communicative Act – Feedback

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Abstract: Our study aims to create an analysis, from multiple perspectives: philosophical, pedagogical, informatics on the communication act, respectively the concept of feedback.
In the philosophy of the 20th century, an important direction is the "rediscovery of language". Ludwig Wittgenstein opens the communication on "language games". These are used as a logical analysis by post-modern authors, between the language and the structures with the role of formation within the thinking. In pedagogy, communication plays a very important role. The way it is achieved, the resources that come into its composition, and the characteristics of the actors involved, give importance to the desired educational finalities. Out of cybernetics, the concept of reverse link has profound implications in computer science as well. Basically, everything that happens in an information system is related to the cybernetic principles of circulation of information. Claude Shannon and Warren Weaver have developed a very influential model (with applications in various fields), starting with Shannon's idea of studying the fidelity of transmission of various types of signals from the transmitter to the receiver. Cybernetics is required when a system subjected to an analysis has in its structure a closed signalling loop (causal relationship, circular) where the action of the system creates a change in its neighbourhood and the change creates changes to the initial system. Cybernetics is relevant in physical, mechanical, psychological, social, but also in political, pedagogical, medical, and other related fields.

Keywords: *Language; philosophy; pedagogy; informatics; cybernetics; feedback.*

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1. Introduction

A definition of Pedagogy "is the science that studies educational phenomena with all their implications on human personality formation in view of its active integration into social life" (Nicola, 1996: 121-122). It is science according to its own logic that decides on the finality of educational action in accordance with a system of social values, while also providing the means necessary for the implementation of these ends.

The domain that pedagogy addresses as science is that of education in all its competence:

- Education as a process-pedagogy aims at the positive transformation of the human being in the perspective of explicitly formulated goals;
- Education as leadership-coordinating the process of human forming and development;
- Education as a social action - a long-lasting action in forming the personality of the individual;
- Education as a human interrelation;
- Education as a transmission process;
- Education as a framework of influences (Cristea, 2016: 65-68).

Through extension and generalization, it has today developed integrative science that studies education from a multitude of hypostases. Education is involved in the vast process of human and social development at the same time. Due to its major importance in human life, several fields of knowledge have developed over time that have addressed educational phenomena from different perspectives: philosophy, sociology, psychology, economics etc.; the emergence of some broad branches: the psychology of education, the sociology of education demonstrates that within the science of education it has become a reflection object from an angle of its own, dictated by the internal logic of that science.

The complexity of the analysis of pedagogy as a science must focus on the particularities of educational action from different hypostases. Pedagogy as a positive and philosophical science at the same time is a positive science that takes into account the real reality and aims to capture cause-effect relationships.

2. Theoretical Background

Pedagogy enters the philosophical field through reflections on value and the presence of some finite points demonstrating the philosophical valences of the educational phenomenon, conferring pedagogy a

philosophical science status. The issue raised by the pedagogy status that science is the subject of debate and is a scientific fact because it fulfils a number of conditions:

- a well-designed study object and a research field consisting of educational phenomena;
- specific methodology: observation, experiment, etc.;
- cognitive endpoints: ideals, goals, objectives that designate the intentions of the educational instructive process;
- specific normativity: pedagogical principles guiding the pedagogical education;
- the results of pedagogical research and reflection are stored in the educational ensemble - theories (Cristea, 2018: 46).

The main moments of pedagogy - As a social phenomenon, education emerged with human society being directly involved in the process of work, and it gradually broke away from it through self-sustaining activity in two stages:

1. The stage of reflecting education in the common consciousness of people.
2. The scientific reflection of the educational phenomenon (Cristea, 2008: 143).

The stage of reflection of education in the common consciousness of people surprises the educational phenomenon in the form of isolated and sporadic ideas and occasional representations empirically constituted in the process of direct practical activity through transmission in the form of counselling.

Gradually the first attempts to theorize the educational phenomenon and implicitly the first pedagogical theories that mark the jump in the second stage appeared.

The scientific reflection of the educational phenomenon characterizes the preoccupations to unify in various ideas about education in order to provide a deeper explanation for this phenomenon. The system of theories that were concluded was meant to guide the practical educational activity. In the initial phase of this stage, pedagogical theory was part of the philosophical systems, and later it was separated from philosophy into true pedagogical systems.

Towards the end of the 19th century and early 20th century, as a result of the results obtained by sociology and psychology, pedagogy knows a new leap in its evolution through various currents and orientations predominantly sociological or psychological (Nicola, 1996: 143). The

sociological orientation mainly focused on the subordination of education to the needs of society by cultivating only those indispensable qualities in the younger community. Psychological orientation places the centre or the child with its interests and needs. The basic idea behind these guidelines demonstrates that education must start from the child, from his needs and aspirations, to the requirements of his or her age. The interdisciplinary relations of pedagogy derive from general law - the universal connection, which points out the truth that the phenomena of objective reality, especially those that have a series of similarities, links, are in interaction, they condition each other (Mialaret, 1954: 43-45). This phenomenon is accentuated under the conditions of the contemporary scientific-technical revolution when solving scientific problems objectively requires not only interdisciplinary relationships but also multidisciplinary relationships, as is the case with the cybernetic approach - involving relationships between physics, chemistry, mathematics, biology, psychology, computer science, etc.

3. Argument of the paper

The interdisciplinary character of pedagogy is generated by the fact that the man - object and subject of education, is studied from certain angles of view and by other sciences - such as biology, anatomy and physiology, philosophy, sociology, psychology, logic, ergonomics, cybernetics, etc. (Anghel, 2017: 43). The study of laws and strategies of education cannot be done thoroughly and completely without considering the laws and data of the sciences that study the man from certain angles of view (Manole & Petac, 2016: 81-83). Of course, the interdisciplinary character of pedagogy must take into account the qualitative differences, the specific difference of data provided by a science or another with which they enter into relationships, addressing them in close connection with the specifics of the pedagogical, educational phenomenon. The relationship of pedagogy with other sciences has, as in other fields of knowledge, led to the emergence of new scientific disciplines as a result of the mutual influences of disciplines in the relationship, called "border discipline" (Avison & Shah, 1997: 24-30). In this context, pedagogy has many relationships with certain scientific disciplines, among which we mention:

a) Philosophy - the science of the most general laws provides pedagogy with elements of theoretical substantiation and general research methodology on the world, and so on. From the relationships between philosophy and pedagogy, philosophy of education (philosophical pedagogy) has developed.

b) Psychology - the science of the development of mental processes, consciousness and individual human personality. Psychic processes, consciousness and individual human personality develop and manifest in the educational process (Vijver, 2013: 74-75). The links between pedagogy and psychology are among the strongest and most immediate. From the relationships between them developed "pedagogical psychology" (educational) or "psychological pedagogy". "Psychology is for the teacher what is mathematics for a physicist" (Mialaret, 1954: 54-55).

c) Sociology - science that studies social (socio-human) processes, relationships between people and socio-human institutions. Pedagogy, in addressing education, as a socio-human phenomenon, takes into account sociological data. From the relationships between them appeared the discipline called "pedagogical sociology (sociology of education)" or "sociological pedagogy".

d) Logic - science that studies the laws of human thinking, scientific thinking, logical operations (analysis, synthesis, comparison, abstraction and generalization) and forms of knowledge (notion, judgment and reasoning). It can be argued that any science takes account of logic data. Pedagogy takes account of logical data because it cannot conceive teaching-learning, education, in general, without logical data. Developing a border science would be absolutely necessary.

e) Mathematical statistics (the science of describing and interpreting mass data in mathematical terms). Pedagogy, based on statistical-mathematical data, captures the pedagogical phenomenon in quantitative terms -tables, diagrams, graphical representations, percentages, formulas or mathematical models regarding the conception, development and results of the instructive-educational process, giving them the possibility of a measurement and objective evaluations (Novikov, 2015: 51-54).

f) Cybernetics - the science of the mathematical study of links, controls and control in living organisms and technical systems on formal analogies. science that is based on the feedback principle. The learning process can and must be approached from a cybernetic point of view and pedagogy takes into account the data of this science. From the relationships between them appeared "cybernetic pedagogy" or "pedagogical cybernetics", having as application computer-assisted training (Biensan, 1987: 16; von Foerster, Mead, & Teuber, 1951: 6-7).

g) Technology (greek techno - craftsmanship, skill, applied science, logos - word, speech, discourse, rational justification, science). The relations between pedagogy and technology have led to the creation and introduction of some technical means and modern didactic techniques in the education

process, contributing to the development of what was called "didactic technology". On this line we mention the creation and use for the instructive-educational act of modern technical means, such as: didactic models and simulators, audio-visual didactic means, electronic training and evaluation machines etc., which, implemented with competence, make a valuable contribution to the quality improvement and efficiency of education and system of education (Cerghit & Vlăsceanu, 1988: 47-51; Cristea, 2018: 79-85).

4. Arguments to support the thesis

Defined by her maker, Norbert Wiener as "theory of leadership and communication in machines and living organisms" (Wiener, 1948: 23), cybernetics broadens her influence in the most diverse fields of science and technology. A. Berg characterizes it as the "science of optimal, oriented management of complex dynamic systems" (Anghel, 2017: 68). Other scientists consider cybernetics to be the science of organizing and conducting analogous systems in different domains or, in a wider sense, the art of giving action to action (Avison & Shah, 1997: 45). Communication, control, self-regulation, command, etc. are essential aspects and conditions of organization in analogous systems. On this basis, cybernetics was defined as the science of general and common laws of organization in analogous systems with self-regulation, from different domains - machines, living organisms, psychic and society (Biensan, 1987: 12; Cristea & Manole, 2018: 117-119; Herold & Greller, 1977: 142-147; Jeschke, Isenhardt, & Hees, 2014: 23-24).

All phenomena and processes that act on the principle of command and control can be studied and cybernetic modelled. Teaching can be considered as a type of management and control system that consists in directing the formation and development of the system of knowledge, skills and abilities, processes and psychological attributes, and the personality as a whole. The fact that education is a form of command and control allows us to consider the laws of teaching a particular case of the general laws of command and control. So cybernetics can also be applied to the pedagogical phenomenon, especially to the teacher (Herlod & Martin, 1977: 135-138).

However, the theory of learning is not reducing or reduced to cybernetics, since the scope of its application to pedagogy, as in any other science, remains limited to a well-defined setting. Thus, for example, solving some problems of pedagogical sciences, such as the purpose and content of education, is determined by the demands of society, ideological factors

rather than cybernetics (Nicola, 1996: 143-150; von Foerster et al., 1951: 8-10).

Education has its own specific principles and laws that we can not only study from the point of view of cybernetics. But the analysis of the educational process from the perspective of leadership and control science, the requirements for a good command and control system, opens a fecund perspective of analyses and highlights some deficiencies in the theory and practice of education, implicitly contributing to their removal (Cristea & Manole, 2018: 119-121).

From cybernetics a greater application in education have computer science, modelling theory, algorithm theory, etc.

Informatics, the science that deals with the obtaining, transmission, processing, storage and retrieval of information, is the result of the discovery of the analogy between the functioning of the automatic regulation systems performed on the one hand and the functions of living organisms on the other (Anghel, 2017: 97). This analogy has made it possible to establish the truth that in all regulation systems the fundamental role is the circulation and processing of information. As in all educational processes (Cerghit & Vlăsceanu, 1988: 62-65) information plays a very important role, it is self-evident that the discipline that studies its principles, that is, computer science - presents for instruction and education at least equal significance.

The basic concept of informatics is the information (acoustic, visual, motor, etc.) around which numerous discussions take place. In the primary sense, the term information meant a general notification (Codd, 1990: 72-78). With the development of cybernetics and the general theory of systems, this term, although retaining its original meaning, has materialized and has begun to be used in a more precise sense to designate what the observer knows or finds about the system and to the environment in which it operates (Cristea & Manole, 2018: 125-127). Thus, information can be defined as a sum of influences exerted on a system that determines something new in the activity of this system, building its behaviour, its actions, etc. If we look at the didactic process from the point of view of informatics, we better understand its specificity, as well as its characteristic moments (Cristea, 2016: 59). Based on this theory, instruction can be viewed as a process by which the body gathers information from the environment in the broad sense of the word. In the successive stages of this process various parts of the body are required (receiving organs, afferent nerve tracts, nerves, motor organs). At each of these levels the information undergoes some processing, it is encoded, received, summed, etc. In the analysis of the training process, the overall processing of information between the input

and output of the system as a whole is of particular interest. In the training process the body forms a special communication system, to which the correspondence of the input signal-output signal is not determined from the beginning but is to be gradually established. (Kenny, 2009: 103). From this point of view, training can be regarded as a succession of informational-operative cycles, each cycle being constituted of the moments: information-decision-action (Wiener, 1948: 39-42).

These moments do not follow linearly but intertwine; sometimes the process takes place so quickly that components cannot be traced. The distinction between receiving information and decision-making is sometimes very difficult to accomplish with precision, and the intersection of stages creates one of the greatest difficulties in studying activity (von Foerster et al., 1951: 8-9; Kline, 2015: 12-13).

Reverse connection - Feedback, is a cybernetic concept that designates a phenomenon closely related to the circumstances, the general moments of leadership. The idea of the inverse connection has allowed substantial enrichment of man's possibilities of understanding the mechanisms in and through which information flows. The notion is fundamental to science and is directly related to the regulation process, and is one of its components (Shannon, 1948: 380-381; Wiener, 1948: 58-59). If the information means the command, the reverse link means control. The need for control stems from a particularity of communication, coding and decoding during which perturbations may occur.

Between the two aspects of the didactic process - the transmission and the reverse link - there must be a strong correlation. In reality, however, due to different reception rates, the degree of non-determination of the received information is not the same for all students; because of the different processing speeds of the information, it is felt that the mutual teacher-student adaptation is poor. To this is added a partial, sometimes zero, understanding of the contents, which is obviously poor, as well as the low efficiency on time usage (Tzafestas, 2017: 41-43). Therefore, under the conditions of the current education, the teacher often knows quite a bit about what and how the pupils learned from the material taught and about the way they actually participate in the activity (Potolea, Neacşu, Iucu, & Pânişoară, 2008: 16-17). This means that the traditional teaching process has an incomplete inverse connection (Wiener, 1948: 128-129). The tutor does not always have sufficient data during the lesson, the success or failure of his work. Such a state of affairs hinders the transmission and assimilation of knowledge and affects to a certain extent the development of the students, because the teacher cannot intervene, he does not know well enough in time

to participate in the lesson, the way and the degree of understanding of the presented data, cannot give extra explanations when they are needed, does not know when to emphasize, cannot help differentiating students and so on.

5. Conclusions

Scheduled training optimizes the "reverse link", but its value is not reduced to that. The main effects exercised are primarily reflected on the student. The programmed material determines the student to think, to work effectively the whole hour, to control himself, to return to the unnoticed aspects, in order to finally find that through his own effort he has managed to assimilate much of the lesson's content. Due to the more logical organization of content, improvement of the inverse connection, the working rhythm, the programmed training optimizes the didactic process. The teacher offers him the opportunity to know the rhythm of the class, of each pupil, his reaction to the weights and the successes, the nature of the mistakes, the degree of the skills of the independent intellectual work. It also allows for a more thorough analysis of the usual lesson, highlighting commonly overlooked aspects (reverse link, organization of individual work, differential treatment of students, etc.). The pedagogical programming operation is an exercise of a certain formative value for any teacher and especially for those at the beginning of the didactic career. Developing a program is a pretext for pedagogical reflection, constituting an excellent exercise that allows the author to have the awareness of the difficulty of learning a given content. The appreciation of the programmed training cannot be made only in the light of the results it generates in the field of acquiring knowledge by the students. It also offers to pedagogical theory a much more analytical and rigorous perspective on some didactic and even general pedagogy issues.

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