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Not peer-reviewed version

Profile and Nature of Pedagogy as a Scientific Discipline

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Posted Date: 8 August 2023

doi: 10.20944/preprints202308.0672.v1

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Article

Profile and Nature of Pedagogy as a Scientific Discipline

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Abstract: The purpose of this work is to describe and explain the characteristics of pedagogy as a science of education, as an object, concepts and research method. The methodology assumed was the review of the history of pedagogy, especially the classics of pedagogy, those who built it with their experiences in laboratory schools. Here are listed the main concepts of pedagogy, its laws and principles; she establishes the opposition that exists between teaching-learning and education as formation of the personality; she also delimits the fields of the pedagogical method, of didactics or teaching-learning, and the methodology of educational labor that organizes the process and the educational context, the regime and the lifestyle, such as those experienced in the "colonies" or "communes" of children and adolescents, organized and directed by Neill and Makarenko. Since the present article does not derive from a primary source or from field work, as an empirical or experimental research, the results constitute the content of the article, as conclusions.

Keywords: education of the person; science of education; educational research; methodology of educational labor; pedagogical concepts

1. Introduction

This article is the systematization of a long experience based on the sources referenced here; according to Hawking, it rests on the "shoulders of giants", such as Newton and Galileo for modern physics, or Max Plan and Bohr for quantum physics. Scientific pedagogy was born with the classics, with Comenius [1], Pestalozzi [2], Rousseau [3], Neill [4], and Makarenko [5]. Today, it is inexplicable that pedagogy has divorced itself from its foundations, its sources and concepts, and above all denies the essential pedagogical experience. Here pedagogy is defined as a science of education, it lists the features and qualities that define it as a scientific discipline, its singular object of study: education as an objective reality, the method of pedagogical research and the conceptual theoretical system. The concepts are products of universal educational research and experimentation. The scientific laws abstract and generalize the logic, order and regularity in the internal links of the educational process; the scientific principles define the experimental character of the educational phenomenon and the school as a laboratory of tests and trials; the categories represent the essential aspects and the fundamental links of the process; all of them formulated on the basis of pedagogical experience, laboratory schools and research. Here it is recalled that the research method is based on the pedagogical conceptual system, as correspondence of the subjective (theoretical) with the objective: the logic of education; that the pedagogical method is not reduced to didactics or teaching and learning, it also includes the methodology of educational labor that organizes the educational process and context, the regime and lifestyle for the formation of the personality.

Pedagogy is the science that studies the most general laws of education, it is the basis of its profile and scientific nature. It is not true that pedagogy needs to be founded as a scientific discipline according to Piaget [6]. The scientific theory of education exists and is defined by its laws, categories and principles, which in addition to indicating the logic of the educational process constitutes the method of research. This scientific theory constitutes the synthesis of a long universal pedagogical tradition, its conceptual system has been verified, demonstrated and proven in practice through laboratory schools, experimental educational projects and revolutionary innovations throughout the history of pedagogy. Among the main revolutionary experiences in the history of education we can list the following: Comenius in "Didáctica magna" (1630) systematizes his experience as a

schoolmaster and promoter of educational reforms in Poland, Hungary and Holland. Pestalozzi in "How Gertrude Teaches Her Children" (1801) systematizes his experience developed in his farm school of "Neuhof" and the education of orphans in Stans. Rousseau in "Emile, or of education" (1762) summarizes his experience as a private tutor of children and adolescents. Makarenko in "Pedagogical Poems" (1925/1935) synthesizes his experience as director of the Dzerzhinsky commune and the Gorky colony. Neill in "Summerhill" (1924-1927) synthesizes his experience as director of a colony in the village of Lyme Regis (England) Encinas [6], in "A New School Essay" (1930) summarizes his experience as director of a school in Puno (Peru). Caro Ríos [81] in "Escuelas de estudio y trabajo en coeducación" (1965) summarizes his experience as principal of a school in Huayopampa (Perú). Homer Lane (1875-1925) develops his experience as headmaster of "Little Commonwealth" in Dorset, a reform school. Wahsburne [91] in "Winetka" systematizes his experience as superintendent of the Winnetka School (1919-1943) in Illinois (USA). Ferrer Guardia [10], in "Modern School" exposes his pedagogical experience in a school founded in 1901 to educate the working class (Spain). To it we must add the whole movement of the "new school" or the "active pedagogy" of the late nineteenth century and early twentieth century, which gave rise to the Montessori [11] Method of Montesori, the Decroly [12], Method of Decroly, the Dewey Project Method, the Cousinet [13], Method of Cousinet, the Freinet [14], Method of Freinet, among others.

I. The object of study: Education.

Education is the term or word that designates the process by which the person is formed, and the person comprises the set of qualities, aptitudes and faculties that man possesses, this is the personality picture, as Makarenko indicates she is the purpose of education, since,

By educational purpose, I understand a program for the individual, a program of the human character, including, moreover, in the notion character, the whole content of the personality, that is, also the character of external manifestations, of inner conviction, of political education and of knowledge; in a word, I resolutely include the whole picture of the human personality, for I consider that we pedagogues must possess this program of the personality of the individual and strive to achieve it. [5] (p. 32)

The concept of education designates, by way of synthesis, the set of phenomena, links, nexuses and sociocultural relations of the personal life of each individual subject, the historical process that takes place in the context where man lives, where the human being becomes a person, a social being with the qualities that define his personality, whether children, adolescents or adults; this category summarizes the dialectic of the socialization process that takes place from the birth of the human being. Sociocultural process by which the adult generation forms the new generations, as they live in society, in a collectivity that provides culture and experience inherited from all human evolution (phylogeny), where each individual assimilates the historical heritage of humanity according to his possibilities and conditions, the same that defines all aspects of his personality.

The mediating element in the formation of man is the educational content, that which defines all aspects of the personality picture, as well as the objects of school learning, for example, knowledge, "competences" and concepts. The appropriation of such content happens incidentally, spontaneously, constituting a phenomenon inherent to human existence, as Margaret Mead says everything comes from the cultural world, first from the external world, this is the "process by which the child yields his physiological autonomy and accepts cultural control, a very concrete series of operations executed by the cultural agent"[15] (p. 137); that is to say education is "the process by which the child is transformed into an adult, into that complicated individual version of his people and of his time". So that, "Whatever the method employed, whether the young are disciplined, trained or carefully instructed, whether they are left to wander wildly or even if they are harassed by adults, the result will be the same"[16] (p. 19), they will be formed as a person by the adults. The young will be formed as a person by the process and the context that involves them, it is not the school that educates but the whole of life.

In the following conceptual map, pedagogy is in charge of studying the most general laws of education, as a product of the study of that objective reality; that the whole educational process is

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oriented to the formation of the person, where the organization of education includes the methodology of educational work, didactics and educational technology; and from that phenomenon arise the corresponding sciences of education with their specific objects of study.

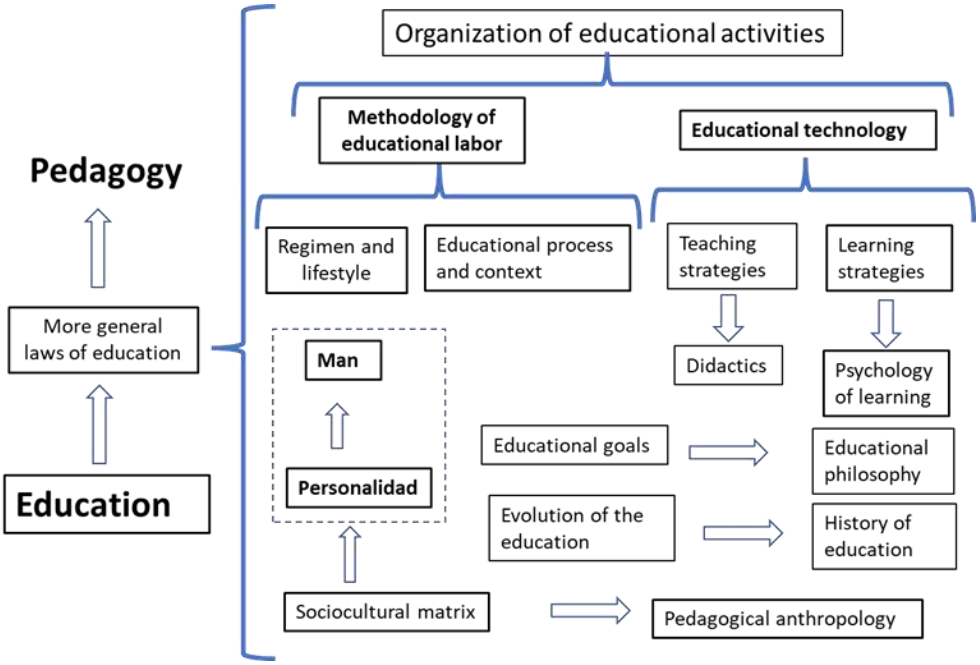

Figure 1. Describes the universe of pedagogy and educational sciences, whose specific object of study is education. Prepared by the authors.

Education is a phenomenon that happens in permanent change, always in movement, education refers to the development or process of man's life, it indicates his evolution as a person, it is not a static fact or an instantaneous act; this quality is the natural substrate of the concept, it is the fundamental characteristic of education, from it is abstracted and generalizes all the links, relations, nexuses or interrelations between the Learner and the Educator, as conventionally adopted, regarding the relationship between men or social relations, by the interinfluence between them. The objective reality that designates the concept of education refers to the set of social relations in permanent change, generating processes of assimilation and transmission of cultural patterns, which configure the personality framework; this is the essential aspect of the educational reality. It is the object of study of pedagogical science as a social phenomenon or science of man. This process or social phenomenon is not reduced to the school or to mere teaching; pedagogy establishes a substantial difference between education and instruction, as distinct aspects or opposite qualities. Education occurs through all social dynamics, in the economy, in culture, in politics, in productive work, not excluded from social reality. According to Vigotsky [17], it includes all sociocultural relations; because social relations make education possible, they encompass and take place around man, they fill everything, as a universal concatenation of social character.

For the sake of illustration, we will indicate some concepts that result from the dialectic described above.

- ✓ The educational context is constituted by the entire socioeconomic process of a historically determined society, from the family, the neighborhood or local community, the school, the factories, etc.; where education takes place, where men interact, where socio-cultural relations take place.
- ✓ The subject of education: man, who assimilates skills and faculties, transmits cultural patterns, shares experiences and interacts with his peers. They are characterized, by abstraction, as learner or educator, although this definition in the social dialectic is relative and conventional.
- ✓ The educational content, all the elements, aspects or qualities of human culture, particularly of the society or people where the real and concrete man is found; for example, inherited human

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experiences such as talking, walking, thinking or working, customs that define values, attitudes or behaviors, science and technology as tools that man uses to satisfy his needs and interests.

- ✓ The method of education is the means that makes possible the formation of man, they are of spontaneous or natural constitution as opposed to those defined by the state, government, culture or social classes. Its conceptualization is as follows,

1. The method of education.

The concept of "Method of education" is of utmost importance in the science of pedagogy, it specifies, defines and describes the essential logical processes about how systematic and directed education takes place, whether inside or outside the school; from the concept of education, the fundamental category that separates education from teaching and learning, it specifies two educational methods. The method of educational labor as distinct and opposed to teaching learning or didactics; two ways, one to educate and the other to teach. The pedagogical method is not one and is not reduced to teaching-learning; the pedagogical method comprises two opposing fields: "one and the other - the method of education and that of teaching - constitute, in my opinion, two more or less independent sections of pedagogical science" [5] (p. 27); one is educational labor for the formation of people, for the development of values or behaviors, as opposed to the methodology of teaching-learning, as a set of strategies of the teacher that is organized for the learning of the learner. Two means, two methods, two disciplines, since, as Makarenko affirms: "I am inclined to separate the educational process from the instructional process" [5] (p. 278). because they are two different processes, with different purposes, opposite contents, and dissimilar results.

The concept of educational method separates the teacher as a teacher from the pedagogue who organizes educational activities; for example, and just to illustrate, in a school the educator would be the Director or Rector but not the teacher who gives lessons or classes, one is responsible for educational activities outside the classroom and the other for learning the subjects; while one organizes the educational process and context, the activities of the school, the teacher is limited to giving lessons inside the classroom. The educator is the pedagogical leader of the school, he/she is involved for the whole institutional activities, for the collectivity, not for each individual in singular, although he/she also dedicates his/her attention to him/her. In this process the person, the values, the attitudes or the behaviors will depend on how the activities are organized and directed; as Makrenko indicates, it will depend, "on the guiding pedagogical collectivity, [by] this means it is organized in the colony in the best way"[5] (p. 278); the educational results are of the educator, the learning of the teacher, since, "All pedagogical zeal must be carefully kept in the office of the organizer" [5] (p. 278) he is the responsible and the educational authority of the school.

The substantial difference between educational labor and teaching-learning, as part of the method of education, is the logic of the process, totally opposite; educational research must consider this fundamental detail; the formation of the person, the values or attitudes, the education of behavior follows an order, a different logic and laws, in this process the teaching-learning strategies are not applied, the methodology is of educational labor, it organizes the process and context, the regime and lifestyle. In this precise case, research is neither equivalent nor identical to the teaching-learning process; the question is the difference in the method of education.

The conceptual map below ratifies the difference between education and teaching, as between educational labor and the teaching-learning process, within the pedagogical universe, the difference between the social context and the school context, with all the elements and aspects that underlie them.

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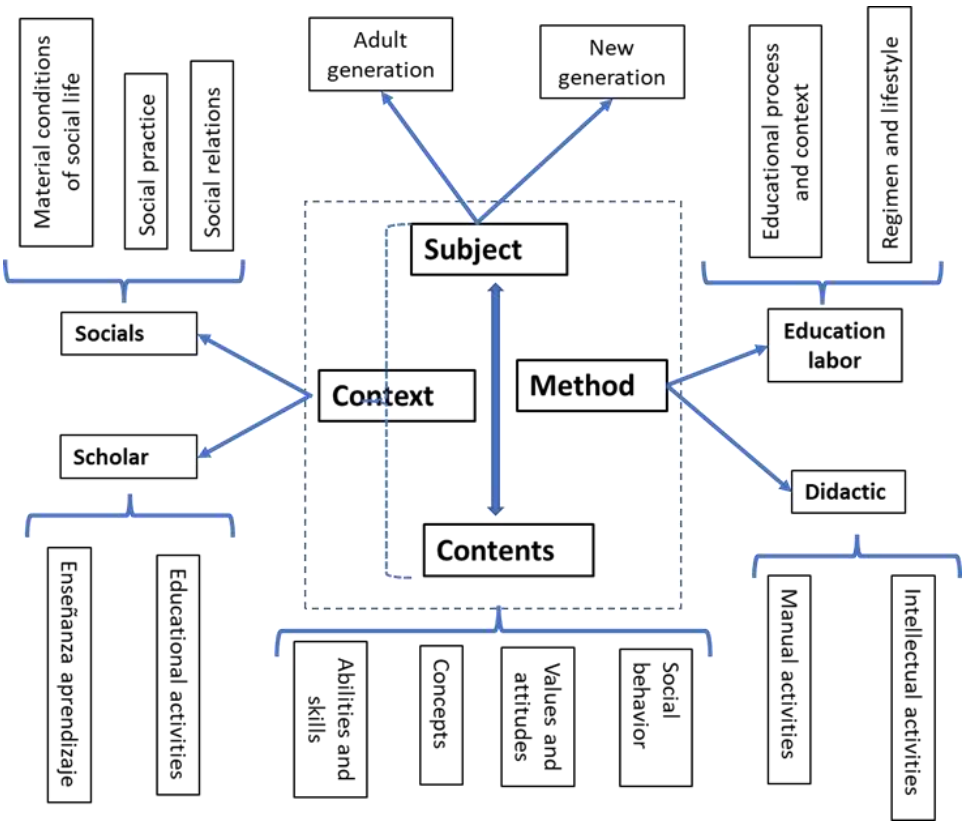

Figure 2. Links and connections between the elements of education. Own elaboration.

Education as the formation of the personality does not happen in an instant of life, nor is it reduced to the activity of the learner in school, to form the person we need to modify the personal and social history of the individual, transform the socio-cultural context that encompasses that singular and collective life, reorganize the community or society. To follow the laws of the teaching-learning process for these purposes is a gross mistake. As Lucien Malson and Itard [18]; demonstrate, in order to become a person, the human being needs the social world, a relationship with other men, from whom he receives and inherits the human experience formed throughout his evolution (phylogeny), otherwise education would stagnate in his condition of "animal"; and so, it is necessary to organize his life history, the circumstances of his environment, the regime and lifestyle, whose rationality is represented by the educational labor. The synthesis of this process and experience is the basis of the methodology of education, as opposed to spontaneous means, forms and procedures, which occur incidentally or involuntarily. And, if this process and context were negative, a process of "compulsory de-education" would occur, as Paul Goodman [19]; says, and then, it would be necessary to demand the "de-schooling of society" as Ivan Ilyich [20] said, or to develop a process of "conscientization" for the liberation of man as Paulo Freire [21] proposed. Because the formation of the personality happens by laws other than teaching and learning, which sometimes needs the whole life, historical, economic, social and cultural factors, to modify or restructure human behavior, as to change or modify some aspect of the personality picture, otherwise human faculties will be mutilated, deteriorated or simply annulled, as it happens today by the action of the State, the Media or the Internet, and even by the fault of the school, the curricula and the legal norms.

II. The scientific laws of education.

1. The law of formation.

The law of formation is the universal tendency by which the human being is transformed into a person by the action of education, it happens inevitably and against the will of the individual subject; by living the human being in a social environment, in relation to other men, he shapes his personality;

this process is inherent to the existence of man, the aptitudes, faculties or capacities are organized spontaneously by the mere fact of living in society, of belonging to a culture, a people or State. It indicates the regularity or determinism of the educational phenomenon, inasmuch as whatever the circumstances or material conditions of life, education will form man in the likeness of his time and social space. It is the tendency of the order and logic of human education that occurs in a historically determined process and context; it is the first fundamental law of education. Man from birth is "predestined" to become a person, to be formed as a man, he will inevitably be a person, as part of his condition of social being. No man, unless he excludes himself from the social environment, from contact with his fellow men, ceases to become a person. Unless he lives from birth isolated from society, from a culture, from a social context as Lucien Malson affirms,

Man is distinguished from the animal by his premature birth. His personality is elaborated after birth, on a series of cultural matrices, which are as important for his development as the mother's own matrix. It is the affective relationships he has with his mother in the first years of his life that conditions his whole emotional life; it is the learning of language in due time that conditions his whole intellectual life. This means that a normal child from birth can become practically an idiot[1] if the circumstances of his education are unfavorable. It is essential the idea that the personality will develop to the same extent that the environment, for its educational value, offers the child the appropriate cultural subsidies at the right time. [17] (p. 76)

It is up to educational research to know the order and the singular and specific regularity about the formation as a person of each man in the particular circumstances of his life, in the concrete details of his culture, since in all of them the logic of formation will be the determining factor, the general tendency. The law of formation is a general law, a universal truth, a logical category designating an invariably inevitable and deterministic phenomenon, indicating a necessity and causality, and therefore scientific law of pedagogy about the formation of the person; it describes the logical order of such a phenomenon or natural process and regularity in the existence of man. The law of formation describes the dialectics and logic of education in the constitution of man as a person, the same that regulates the way how the specific, real and concrete forms of each man in his context and singular process must be investigated, because the formation of the personality will invariably happen, in the configuration of the educated or the citizen. Inasmuch as all socioeconomic, socio-cultural or political events will contribute to it. That is historical character in the organization of the characteristics of a person.

There are no juridical laws or political actions that prevent the formation of citizens or children and adolescents as persons; it will happen as a determinant and natural law of education, unless the social existence of the individual subject is prevented. From the first moment of man's existence, he will invariably become a person in the image and likeness of his time and social space, whether as a member of a tribal community or of the most advanced society; whether as slaves, as masters, as serfs and vassals, as lords, as workers or as bourgeois, as rulers or ruled. They will always end up becoming members of a society, adults with personality, and this will inevitably happen against the will of the individual subject. For this reason, Caro Ríos points out,

"The essential foundation of any school organization is the recognition of the formative-modeling role of education, (that education is the phenomenon by which society spontaneously or systematically exercises the function, role or modeling role of the person) which means that, through a properly organized educational action, it is possible to model the will, character, intellectual, physical, moral, sentimental personality, etc. Of the learners" [8] (p. 149)

2. The law of educational action.

[1] The quotation is reproduced exactly as found in the text. It is not a pejorative adjective against "educational inclusion", nor the denial of their attention because of their disability or "defect", as Vigotsky indicates. It refers to the condition of the child or adolescent due to lack of socialization, lack of education, who has developed only his instincts, without having adopted cultural or social patterns, as an animal as the author indicates.

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As we have already indicated, through the set of social relationships, a set of influences and mutual inter-influences occur simultaneously, that is to say, between the learner and the educator, educational actions occur parallel and simultaneous to these interrelationships; this action and interaction constitute the formative factors or determining influences in the formation of people. This is "educational action" as a pedagogical category. An educational action is a socio-cultural influence, which is subjectively and consciously assimilated or appropriated, all influences have value and significance according to the degree or level of affectation on each personal experience: "each individual child receives a version of the official culture, highly idiomatic, imposed on its constitution and unique hereditary disposition and giving origin to what we call personality" [15] (p. 139); the diversity and multiplicity of interactions or educational action entails a result, the complexity of each individual subject in singular, a highly specific personality, real and concrete. Assimilated or transmitted through the whole history of personal life. All educational actions and influences define the singular characteristics of each individual as such, according to the educational process and context, the society, the economy, the culture, the States, the family, the institutions, the media in charge of modeling the new generations in their image and likeness, saying it or not saying it, by spontaneous or systematic means.

No phenomenon or educational event is exempt from the law of educational action, whether it happens inside or outside the school, whether it is foreseen or spontaneous, the educational action indicates a productive result as influence or education. For example, the Media and the Internet exert an effective and efficient educational action without proposing it expressly; likewise, an educational result of a negative environment is observed, either in environments with delinquents, drug addiction and in conditions of extreme misery, which psychology calls the process of alienation and alienation. This is also a product of an educational action, since it significantly and ultimately influences the formation of people. The whole socio-economic process and the socio-cultural environment influences the development of habits, values and human behavior; these influences constitute determining factors of education, through social relations, social practice or personal experience. Everything will depend on the educational action that is exercised. The law of educational action serves to analyze and evaluate the influences, to know the determining factors of the educational process and context, for example, of the curricula, of the learning strategy, of the regime and lifestyle, according to the degree or level of assimilation or appropriation by people. According to Vigotsky, educational action will depend on the quality and relevance of sociocultural relations, of the conditions and circumstances, of the time and space in which these influences occur.

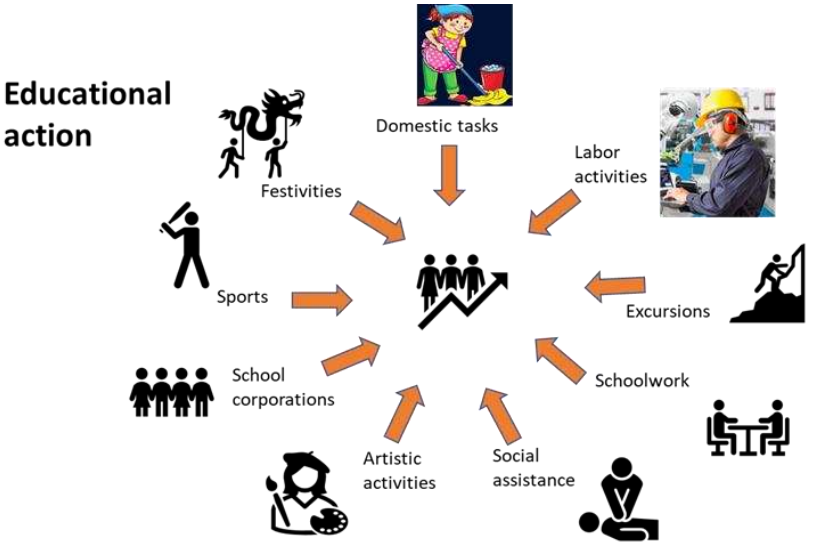

Figure 3. This figure shows approximately those activities in which the child or adolescent participates in daily life. Prepared by the authors.

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As can be seen in the figure, the educational action of the process and the context is not reduced to school activities or to the activities of classes or lessons; there are multiple and varied human activities, social practice or the experience that each learner lives mainly outside the school.

Why are people the image or representation of their culture or people? Because of the educational action exercised by that culture or people. Children and adolescents are formed in that context, they are the products of that education; they are the consequence of the educational action of the set of relationships, links, actions and interactions that have developed in it; it is the logical consequence of the educational action that has marked or sealed it, including among them the alienation and alignment generated, through the Media or the Internet, for example; whose State or society sponsors and promotes, or through the church, religion, and even the school. The educational action is the natural factor of the history of personal life, of the socio-cultural context, of the regime and lifestyle received, assumed by social practice; that educational action forms and shapes people, they define the forms of behavior or conduct, they are products of spontaneous non-school education.

3. The law of parallel pedagogical action.

Parallel pedagogical action is the law that indicates the specific way in which the person, values, attitudes and behavior develop, in that the assimilation or appropriation of the educational content happens simultaneously with the activity or experience of the learner; that the educator's action is indirect, just as the learner's learning is indirect. The educational action does not occur directly, nor does learning occur through linguistic means, but through the task or activity that is developed. The direct action of the teacher on the learner is the opposite of the parallel pedagogical action; thus, the educational action can be direct or indirect, or parallel, which stems from the difference between education and teaching. In this respect Lucien Malson affirms, "It is not the educator himself who educates, but the environment" [17] (p. 130). The educator educates by organizing the environment or by directing the activities of the learner. Makarenko also states: "Neither my conversations nor those of any pedagogue could do what a proud and well-organized community could do" [5] (p. 467), organize and direct the activities and tasks of the learner. The educational action takes place through the collective, not by direct action of the teacher, as in conversation with each individual, but through respect for the norms of the collective; diametrically opposed to the theory of groups, which is in vogue at school.

> "What do I mean by parallel pedagogical action? In that we only relate to the detachment. In that we do not deal with isolated individuals. That is the official formulation. In essence, it is precisely the way of influencing the individual. But the formulation goes parallel to the content. In practice we work with individuals, but separately, but we claim that we do not deal with them particularly" [5] (p. 86)

The educator organizes, directs, guides, advises and evaluates the group, does not order or command directly on each individual separately, but exerts influence indirectly on the individual, while exerting direct action on the group as a whole. As can be seen in the following graph, the development of the activity or the learner's experience in it allows the learner to assimilate and appropriate the desired content.

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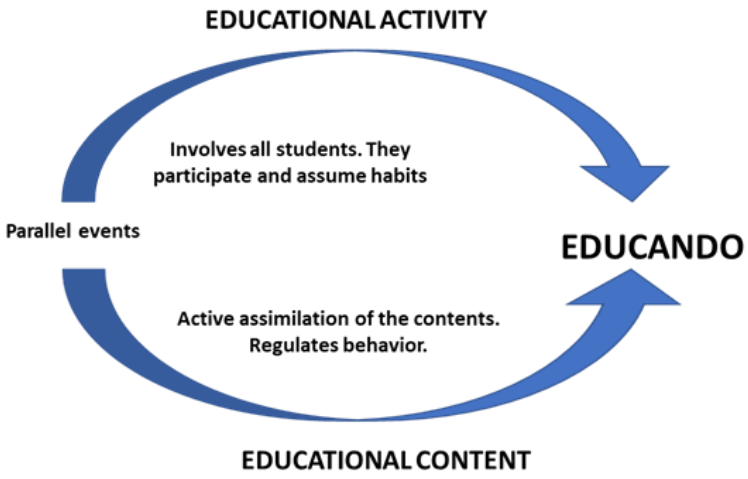

Figure 4. Illustrates the phenomenon of parallel pedagogical action of content and activity in the education of the individual subject. Own elaboration.

In the parallel pedagogical action, the educator influences the learner indirectly, through the organization and direction of educational activities, ensuring that the learner participates in it as a member of the collective; this law regulates or governs the education of the person, values and behaviors; the same that happens through the process and context, the regime and lifestyle, in the educational work. Education happens through the activities, the tasks that he/she develops, experiences or lives, when he/she develops, performs or participates, together with his/her peers or companions. As Makarenko indicates,

> "In the country of the Soviets, the influence of education is experienced not only by the child, the schoolboy, but also by every citizen at every step. This education is instilled in him sometimes under specially organized forms and sometimes under forms of a coarse social influence. Each of our affairs, each campaign, each process operating in our country, always carries with it not only special tasks, but also educational missions" [5] (p. 25)

The law of parallel pedagogical action indicates the logic of the development of values, attitudes and behaviors, as opposed to the classes or lessons of the teacher; in it the assimilation and appropriation of the educational contents happen when he/she develops or participates in the activity; the activity with his/her peers or companions assures the educational action; for this it does not require the classes or lessons of the teacher: the direct action. Parallel pedagogical action ensures the assimilation of the educational content, generating real changes in the person, as opposed to lectures and sermons of the teacher.

4. The law of active and conscious assimilation.

In the teaching-learning process, the educational content is assimilated consciously and through an activity, that is why man learns throughout life and through all activities, practice or experiences; this law must be observed objectively in the school and by the teacher; human learning is a conscious process that happens through activity. In this part we refer preferably to the transmission of knowledge, the development of competencies and the formation of concepts, we exclude from it the modification of conduct or the modeling of behavior indicated above; here we refer to the conscious and active assimilation of school learning as a capacity of the individual subject, and proper of the subjective activity, for which the teacher organizes certain strategies or didactics, also called teaching-learning methodology, by which it is expected that the students assimilate the contents of the curriculum or the subjects. The law of conscious and active assimilation regulates the logic of didactics, the teaching-learning process, teaching strategies or learning methods. The contents of

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which also contribute to the development of human faculties and aptitudes, ways of thinking and manual capacities for productive work; as the school's own task.

The teaching-learning process is determined by the law of conscious and active assimilation, which defines the subjective appropriation of the educational contents of the study plan or curriculum; the activities are all the tasks developed, performed or executed by the learner, those schoolwork that are elaborated, produced, designed, constructed or operated. In the development of labor competencies or manual skills and abilities, school activities are those that take place in the manufacturing workshop or in the fields, just as in the sciences they take place in the laboratories; without them, true learning or meaningful learning is not generated. In this part, it is worth remembering that most contemporary schools are still bookish and rote, based on the literal and mechanical transmission of knowledge, despite the fact that scientific pedagogy since Comenius and Pestalozzi were criticized and challenged. In the learning process the "consciousness" of the learner needs to be in a state of wakefulness, of attention, motivated or predisposed, as a subjective phenomenon, otherwise learning will also be a failure. As the theory indicates, it is a matter of the unity and dialectic of both aspects: of activity and consciousness; this is the organic and internal mechanism of human learning, which requires activity, practice, experience, plus a subjective state regulated by consciousness.

III. Concepts and categories.

It is not the purpose of this paper to enumerate all the concepts and categories of pedagogy, this would require an encyclopedia, for now we have to indicate the essential and elementary as far as it establishes substantial difference with other scientific disciplines that study man. In addition, there are thousands of educational researches and experiences to which we must refer if we wish to have a complete theory or moreover specific with respect to our object of study, as when it is necessary to organize and direct education, carry out research, design pedagogical innovations, etc. Among them we have, for example, the indissoluble unity between economy and education, the correspondence between society and education, the unity between education and culture, products of diverse interdisciplinary research. Thus, we have the concept of school as an institution where systematic or mainly instructive education takes place, for example, the school for the learning of children and adolescents, as well as other forms of school, such as universities for science and the development of professional skills, prisons for "re-education" or barracks to train the army. Human learning, unlike animal learning studied by behavioral psychology, refers to the subjective process, conscious activity or psychological process of man aimed at the appropriation or assimilation of educational content, whose phenomenon is internal and is not possible to know directly or establish a tangible contact, hence its indirect study through the tasks of the learner.

The conceptual system or set of categories of pedagogy can be found in the works of the classics, they are also products of specific and interdisciplinary research, they designate the essential links and fundamental aspects of education, among them we have didactics, educational technology, learning project, evaluation, learner, educator, educational content, educational work, etc. Fundamentally, we are interested in ratifying the necessary and indispensable difference and opposition between education and teaching and learning, as dissimilar categories, never equivalent and impossible to be identical; as Kilpatrick indicates, education as learning does not only happen in the school but belongs to human existence in general,

> "...despite our academic biases, learning outside of school is still the essential kind of learning, which has always been and remains in quantity and importance and probably in quality the most important learning we do" [22] (p. 51)

IV. The active principles of learning.

The active learning principles reviewed here, as we have already indicated, correspond to the logic of the teaching-learning process, not applicable to the methodology of educational labor. These principles were discovered and formulated by Pestalozzi and Comenio. Here we will refer to those

 doi:10.20944/preprints202308.0672.v1

established by John Amos Comenius in his "Didactics Magna", who fought head-on against the idealism and metaphysics of his time, against bookish learning, literal and mechanical memorization, which reduced learning to the transmission of knowledge against the development of human aptitudes and faculties. These principles refer to what is to be "done, to be learned by doing" [1] (p. 95), to guide learning and to generate learning by doing. to guide learning and to generate the method to continue learning after school, against the misnamed pillars of education of Delors [23] or UNESCO.

1. Learning by doing.

More than 70% of human skills inherited by man are developed as active learning after birth, they are learned by doing throughout life, such as "in schools they must learn to write, by writing; to speak by speaking; to sing, by singing; to reason, by reasoning, etc." [1] (p. 95) True learning is learned by doing; this is the first condition for true learning or meaningful learning.

> "On other occasions, in relation to country walks, and always from a utilitarian point of view, children learned to overcome obstacles, to shorten distances, to climb walls and trees, to pass ravines, to descend slopes, to climb summits, to appreciate distances, to know the sinuosities of a terrain, to cushion fatigue, to rest" [7] (p. 78)

2. Teaching to learn.

Faced with complex tasks, adults or parents, rather than teachers, teach to learn unknown strategies and methods, they are in charge of guiding, accompanying or facilitating learning, like craftsmen "who take them to the workshop and make them witness their work, and then, making them imitate them, they put the tools in their hands and teach them how to hold them; If they make mistakes, they admonish and correct them" [1] (p. 96) and this is how they teach them to learn difficult procedures and complicated operations; that is, "the use of tools must be taught with the tools themselves, not with words; that is, with examples rather than concepts" [1] (p. 95); teaching to learn means receiving the teacher's help or support to master the strategy in problem solving or the method of productive work. Thanks to the expertise of the school teacher, the logical order of the strategies is mastered; the teacher's task is to ensure that the learner masters the corresponding method.

> The teacher's task is to ensure that the learner masters the corresponding method: "that this order, which we intend to be the universal idea of the art of learning and teaching all things, we should not and cannot take it from any other part than from the teaching of nature (...) and observing the procedures that nature follows in its operations, we will try to proceed in a similar way" [1] (p. 95)

3. Learning to learn.

After learning by doing those basic qualities, receiving guidance and help in strategies and complex methods, on it is born the future self-didaxia to continue learning, since after the school stage, during adult life you will continue learning in the face of new problems or more complex tasks, being necessary to create your own strategy, innovate what is known, on what you were taught to master and obtain the necessary expertise; for this you need to learn to learn with the help of the teacher. Learning to learn will accompany you all your life towards success or improvement when you no longer receive the guidance of the teacher, the teacher is not there to help you, you will need to create new strategies, innovate, solve new problems, you need to continue learning by yourself. For men have been given an opportunity for continuous and endless perfectibility, for creativity, for lifelong learning and for self-education,

> "In everything that has to be imitated, the first copy (at least) has to be made by faithfully adjusting to the model until, with his hand, tongue or intelligence already exercised, he can

 doi:10.20944/preprints202308.0672.v1

imitate it with the greatest freedom and gets used to carry out the work by his own ingenuity" [1] (p. 96)

V. The scientific research method of pedagogy.

Scientific research never proceeds in the opposite direction to the logic of objective reality (Palacios) [24], the laws and concepts of the pedagogical discipline guide the investigation of the educational phenomenon; the researcher proceeds in the same way that the order of education indicates. The method of scientific research in education is defined by its conceptual system. The scientific method indicates the dialectical logic, it specifies the correspondence between subjective image and objective reality, it is the condition of science, it is not possible for the conceptual system not to be pedagogical if an educational phenomenon is to be investigated, and vice versa, it is not possible to make an interpretation or analysis of the results without pedagogical concepts; it is not possible that the concepts in educational research correspond to a different or opposite science to the object of study; that is to say, educational research cannot be developed if the laws of education are partially or totally unknown, much less the concept to which the research problem refers. Pedagogical research starts from the conceptual system, from its laws, categories and principles, the methodological operationalization, techniques, means, materials or research instruments are adjusted to them; the conceptual system of pedagogy is the "sine qua non" condition in the scientific research of education.

Our observation on educational research is not to the research itself nor to the scientific process in abstract, but to the relevance of the discipline about the object of study and corresponding concepts in the formulation of the research plan as in the analysis of the results, cannot be alien to pedagogy. The failures of educational reforms, errors in pedagogical projects and even school disasters are not due to the lack of scientific research in education, they are a consequence of educational policies; unfortunately, educational projects and reforms go against the current of pedagogical science. It is totally false that pedagogy cannot foresee such failures, errors or disasters, to the same extent that it defines successes, achievements or improvements; it is enough to review, read and study the scientific theory of education and real pedagogues such as those we have listed here to demonstrate the contrary. The failures of educational policies are not failures of pedagogical science. Educational research is based on laboratory schools, on experimental research, on which the sciences of education have been founded.

1. Educational research.

The conceptual system of pedagogy is based on experimentation in laboratory schools, its results constitute an approximation to the truth, and therefore is the basis of scientific prediction, the prediction of pedagogical research allows modeling innovations, reforms and all future educational projects. Prediction in pedagogical science is a consequence of research, of experiments, of laboratory schools, described in treatises and reports of pedagogues, in the accounts of their protagonists. Therefore, scientific research in education must consider that,

- ✓ Pedagogical concepts constitute the frame of reference for educational research; laws, categories and principles are used to study the educational phenomenon, insofar as they describe the order, logic or regularity of the educational phenomenon; they are used to plan the research and analyze the results.
- ✓ The method of scientific research in pedagogy is described by the logical order of the educational process: its laws and concepts. The method of educational research is defined by its conceptual system. Educational research requires mastery of pedagogical concepts.
- ✓ Educational research is experimental in nature because the educational action, the learner's learning or teaching practice are objects of test or trial, their variables are subject to control or manipulation. The experimental character of education is described mainly from the laboratory schools, where new forms of education were experimented.
- ✓ All educational research, as in any scientific discipline, starts from known concepts, from discovered laws, towards a new knowledge, this is the ascensional process from the abstract to

 doi:10.20944/preprints202308.0672.v1

the concrete, starting from the pedagogical conceptual system towards the investigation of an unknown concrete phenomenon.

- ✓ Educational research "by ethics" does not qualify the person, it abstracts from him/her certain qualities or aspects for study purposes. To investigate the development of values does not mean to evaluate the person, but to measure the degree or level of change in his moral behavior; to investigate values does not mean to explore the subjectivity of the person, but to analyze his experiences, practices or manifest behavior, since values are studied by indirect means.

The constructivism in vogue in the last decades of the 20th century is a demonstration of how educational pseudo-research has become a failed attempt at pedagogical science by excluding the conceptual system of pedagogy from the theoretical framework, the method and the analysis of the results; besides identifying education with teaching and learning, reducing the educational process to mere teaching, as if education, human life and society as a whole were summarized in the reduced and short space of the school. Educational research in the constructivist framework has replaced pedagogical science with a certain fashionable psychology, represented by Piaget, Bruner [25] and Ausubel [26][2], psychologists in training and research. This pseudo educational research considers that the formation of the person, the development of values and the modification of behaviors happen through teaching-learning processes.

2. Educational activity as an object of experimentation.

Education is the object of permanent experimentation, from when parents raise their children according to their own decisions, when states run schools and impose curricula, when peoples educate according to their cultural patterns, when social classes educate according to their needs and interests, or when adults in general establish norms and moral behaviors on the new generations. This has been studied by anthropology as demonstrated by Margaret Mead. The problem of this experimentation is the definition of the perimeter or boundaries that enclose the laboratory as a "ceteris paribus", where the experience takes place, the framework or outline of the sociocultural laboratory; this could be an observation to the educational experiment as opposed to the school as a laboratory. In all educational action there is a conscious and rational direction, it is a defined task, a systematic action, duly oriented, and in them the experimental forms are multiple and varied, even if they are not literally called laboratory schools. If schools are well defined boxes or receptacles, only a rigorous control of their procedure, a systematic follow-up would be enough to define it as a laboratory, besides the fact that in them curricula, study plans, norms, protocols are experimented in a compulsory way by order of the State, under the control of the school's directors; these educational programs are true objects of experimentation.

In each country, the State defines study plans, curricula, subjects, methodologies, forms of evaluation, etc., to be applied in schools; these documents specify the educational content to be developed and are of obligatory execution; they are the objects of experimentation that turns the school into a laboratory of trials and tests. These practices or experiences are objects of control or manipulation, of systematic follow-up under the responsibility of school authorities; there we have educational experimentation in a pathetic and evident way, and the school turned into a real laboratory. No one will deny that educational activities and the school are guided by plans, projects or theoretical models defined expressly, which are objects of a rigorous control, sometimes almost police, to obtain the expected results. The monitoring of this process qualifies it as an experimental act and the school as the laboratory where pedagogical experimentation takes place. The opposite is to deny objective reality. The problem could lie in the lack of an entrance and exit examination, of the foreseen diagnosis and the subsequent evaluation, of course due to negligence, but the results of the experiment matter.

What are the variables of the pedagogical experiment, the answer is simple and straightforward:

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[2] I exclude Vigotsky, in spite of being insistently referenced as a constructivist, because I am familiar with his content.

- ✓ The test or trial variable, the object of the experiment, are the curricula, the curricula, the didactics, the forms of evaluation, etc.
- ✓ The resultant variable or the consequences of the experiment are the learning, the intended purposes, the behavior of the learner, all the educational results.
- ✓ The "agents" participating in the experiment are the learners, the teachers, the school authorities, the parents.
- ✓ The intervening variable can be the educational environment or context, school environments, classrooms.

The means, materials and research instruments are all the means, materials and instruments (documents) of the educational activity; for example, the notebooks, work or homework of the students, the rest is left to the creativity of the researcher.

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