SCIENTIFIC KNOWLEDGE AND EDUCATION EPISTEMOLOGY

Ciulei TOMIȚĂ [1]

Abstract. *Epistemology is the philosophy branch which studies knowledge origin, sources and validity. This tries to answer to questions as which is true? and how could we know? Because the Epistemology study deals with aspects as knowledge foundation and the characteristic of various methods to learn the certain truth, this is placed, near Metaphysics, in the centre of the education process* [1].

Keywords: education, epistemology, the pragmatic theory, the coherence theory, epistemic reflection.

1. Introduction

Along human history it was clearly discovered that there were false accepted beliefs, once, as being true. How could anyone say that some beliefs are true, while others are false? What criteria could we use? Could we ever be certain that the truth was discovered? Most people agree that tradition, instinct and powerful feelings are inadequate as tests of truth.

The universal agreement is, likewise, doubtful (…). The philosophers mainly built upon three tests of truth: the correspondence theory, the coherence theory, the pragmatic theory.

The correspondence theory is a test which uses the agreement with *the fact* as a standard in judgement. According to this theory, the truth is in concordance with the objective reality.

For example, the clause *there is a lion in the classroom* can be verified through an empirical investigation. If the judgement corresponds with the facts, it is true; if not, it is false. The critics of the correspondence theory dealt with tree main objections. First, they asked: *how could we compare ideas with reality, as we only know our own experiences and we cannot get out of our experiences in order to compare ideas with reality in its "pure" state?* and, in the second place, they observed that the correspondence theory seemed, likewise, to make the general supposition that the sensorial data are clear and exact. And, in the third place, the critics showed that the theory is inadequate because we had ideas that did not have a concrete existence, which we could make comparisons to, beyond human thoughts.

[1] PhD, Faculty of Juridical, Social and Political Studies, Valahia University of Târgoviște, Romania

Many ethics, logics and mathematics cogitations belong to this category.

The coherence theory places trust in the consistence or the harmony of all judgements. According to this test a judgement is true if it is consistent with other judgements which had been previously accepted as true.

The proponents of the coherence theory show, for example, that an assertion is often judged as being true or false on the grounds that this is or not in harmony with what they had already decided as being true [2]. The critics of the coherence approach observed that the false thinking systems could have an internal consistence as large as the true systems.

They pretended, thus, that the theory failed because it did not make the difference between the consequent truth and the consequent error.

The pragmatic theory shows that there is nothing as the static and the absolute truth. The pragmatists reject the correspondence theory because of their belief that humans know only their own experience.

Moreover, they ignore the coherence theory, because it is formal and rationalist, in a world in which we could not know anything about *substances, essences or ultimate reality*. For the pragmatist thinkers the test of truth lies in its utility, its applicability or its satisfactory consequences [3].

The traditionalists observed a series of dangers in this test of truth, this pointing to relativism, meaning it could be a truth for all different epistemic subjects. Likewise, critics asserted that *what can be used,* in the limiting area of human experience, can be delusive compared to what we see as external reality, embedded in the sole essence of the universe.

2. Knowledge theory and education theory

This recourse in epistemology is necessary for the knowledge theory, as in Metaphysics, and is the basis of human activity and thinking. The education systems deal with knowledge and therefore epistemology is a primary determinant of educational opinions and practices.

Epistemology has a direct influence on education in many ways. For example, the presumptions on the importance of different sources of knowledge will certainly reflect in curricular accents.

An education system which is based on naturalist premises and which considers science as a primordial source of knowledge will have, undoubtedly, a curriculum and curricular materials which substantially differ, in certain aspects, from those of a religious school which sustains that revelation is the source of true knowledge.

Epistemological presumptions regarding knowledge communication from a person or a thing to another person will influence, likewise, the teaching methodology and the teacher's function in the educational context.

As a result, the teachers should understand epistemological presumptions before their affective actions.

On the other hand, our problem is that we could not make assumptions about reality before having a theory about attaining the truth. Moreover, a theory about truth cannot evolve without having first a concept of reality. The circular nature of the reality-truth dilemma is not, certainly, among the easiest aspects of philosophical thinking, but because of its existence, we are obliged to be aware of it.

The conclusion of metaphysics-epistemology dilemma is that all humans live on their belief in some fundamental convictions that they have chosen. Different individuals make different choices of belief in metaphysics-epistemology continuity and, thus, have different philosophical positions [4].

Epistemology or knowledge theory is that segment of philosophical research which is looking for identifying the reason and the nature of truth and knowledge and it is maybe the most important part of philosophy, for educators [5].

While the metaphysics question is *what is it?* and the axiological one is *what is good?*, the epistemological question is *how could we know?* [6] This is a criterion request, a claim of proves, a request in explaining the criterion that justifies the assertion or the demand that you know.

Thereby, the epistemological question researches not only *what* we know (the product), but also *how* we get to know it (the process). But all those questions are still preceded, by a logical question, *could we know?* The answers to that question gave us three categories of attitudes used in the identification of epistemological positions, and configured the epistemology history from Locke and Hume to Imm. Kant.

For the first situation, the answer is *Yes, we may even know and, moreover, we are certain of this thing.* This is the answer of the *dogmatism*, an epistemological position which claims that in order to know, we should first have certain knowledge that meet two criteria: they are certain, not questionable, and must not be deducted from other previous knowledge [7].

The second answer to this question is given by *scepticism*, an answer that denies the possibility of having any knowledge, any kind of knowledge. Finally, the third answer is *Yes, we may know, but we may never have that certain of knowledge that the dogmatic pretends and says it is possible* [8].

This is an epistemological (fallible) point of view which denies the validity of certain and unreckoning premises before another knowledge which we can assert it exists. When we declare that the possession of some certain knowledge is, unlikely, if not impossible, but still, at the same time, we sustain having certain basis knowledge, we could say that the adherents of this point of view have knowledge they cannot be absolutely certain of.

The contemporary philosophy, instead, admits almost completely [9], that we may know our reality. But how? The idealist discovers many ways of knowledge, but the best and the surest, he thinks, is to put the basis on that part of human nature which accords with divine nature: the mind.

For an idealist, as knowledge is ideas and ideas are products of the mind, hence, knowledge is a product of the mind, a product which comes from the mental processes of intuition and rationalizing (thinking). Thereby, as intuition or thinking may generate knowledge, the idealist is an epistemological dogmatic.

His traces may be hidden in time, hard to trace, almost invisible, but he knows they exist somewhere and is certain he will recognize them when he discovers them.

As a conclusion, epistemology is a task of philosophy which implies identification and examination of knowledge and truth criteria, which are sufficient for precisely guaranteeing *this we know* and *this is the truth* [10]. What you have when you say you know, when you have earned the right to say that, *how* you have got to attain what you know are key-questions in epistemology and education.

3. Education epistemology

Regarding education epistemology, we should mention that: pedagogy as a system of education sciences has a rich suite of epistemological premises. There are two currently relevant premises:

- *epistemic reflection* (the critical self consciousness of the pedagogic knowledge process, this being a compulsory *instrument* of searching the pedagogical truth);

- *integrative vision* (agreeing with the cognitive pedagogic process, with the new elements of knowledge and human practice or, else, valorising the results of contemporary sciences in the pedagogical knowledge system).

These two premises, not the only ones, assert that education may also be explained on the grounds of other sciences, regarding the epistemic capacity of pedagogy, so that almost all pedagogical concepts meet their changes. Otherwise, no science is always the same.

We are amazed by the manner in which they look for the concepts changing afore some problems raised by the pedagogy evolution itself, as a process of asking and answering the questions from which the knowledge as a set of clauses in education result.

These clauses compose selectively the pedagogical scientific theory, which is a global or detailed representation of the educational facts according to some developing epistemological methods.

The history of any science regards the development of its cognitive structures. The limited space of this material does not allow us to refer widely to the epistemological characteristic of the education knowledge process. It is obvious that pedagogy knows an insertion in the theoretic configuration of an era, in certain thinking models.

The characteristics of this epistemology would justify the assigning of a distinct area in the Romanian pedagogy research, regarding the educative scientific facts' production, their classification, their explaining, their reformulating and realising some adequate experiments and measurements to the education manifestations.

In order to understand the process of educational actions' *productions* we can not refer to a single pedagogical dimension, the pedagogical research methodology, even than this is a *varied methodology*, *sensible to novelty,* bringing a *coefficient of malleability and a moderate analytical rigour*.

This dimension must be correlated with other dimensions of the educational theory, amongst we can place *epistemology*.

This relation between epistemology and methodology was not, explicitly, in the education researchers' attention. The examination of some pedagogical trends by researchers, in chronological order, ordinarily – neotomism and personalism, existentialism and pragmatism – does not refer, even briefly, to different epistemological trends as logical empirics, scientific rationalism, genetic epistemology, phenomenology, critical rationalism, operationalism etc. How can we characterize the current evolution of pedagogy?

We are in a transition moment which generates conceptual difficulties, by various reinterpretations and by proliferation of terminological researches etc. There is not a rule of epistemic behaviour, the *validity and the objectivity of educational actions' research*. This behaviour regards:

a. the epistemic point of view of the researcher;

b. the social interests which pedagogical research represent;

c. the concordance of the point of view resulted from the pedagogical research process with the political directions of the society that we build.

According to one or the other condition, in the process of education research there are some negative aspects regarding misinterpreting the *objectivity of pedagogical information* to the subjectivity of those who research a problem of educational practice.

The potential judgements on some facts or sequences of objective reality, some explanations that humans give to those, a beginning of clarifying the observed or experimented facts are confirmations to an *epistemic attitude* (correct or false) of the researcher in pedagogy.

We may ask ourselves if it is not necessary to distinguish between the *positive subjectivity* in the process of pedagogical research (according to a social interest or to a correct stated purpose) and the *negative subjectivity* (the preconceived interest or purpose they follow in their research).

We consider that in order to be scientific, the researcher's attitude is characterized by his sincere striving to realize a profound pedagogical knowledge, using methods and techniques adequate to *epistemic models and correct methodological standards*; through them the researcher in pedagogy expresses his *active position as a subject of knowledge.* From this point of view, two other conditions (we add them to the previous ones) are definitive to a scientific pedagogical attitude:

a. *the researcher is not driven by extra-scientific intentions* (his personal interest, animosity and prejudices toward some people and scientific pedagogical results);

b. *the researcher should admit that the truth about the educational information is a synthesis and a hypothesis* of restoring the cognitive results about education with the meaning that the explanations for educational facts are not *definitive*; they are, always, limited, partial, relative. In conclusion, according to A. Schaff words, we appreciate that the progress in knowledge and its evolution *are not possible unless they develop every time, concrete forms of the subjective element* [11].

Conclusions

In the history of pedagogy evolution we distinguish the *empirical state,* of education factual *chronic*, of presenting ideas and directions of research regarding educational actions, and the need to analysing the pedagogical concepts and theories, and the methods of scientific knowledge in education seems slight or absent. Or, the process of education knowledge as a human activity type cannot make an appeal to the general epistemology data.

Pedagogic scientific knowledge is a process of disclosing the origin and the cognitive evolution of education, having as a result getting some knowledge expressed by pedagogic language.

On their turn, these become objects of knowledge [12]:

What should we follow in the process of education knowledge?

a. to reproduce education in its manifestations more adequately;
b. to explain and understand education as a human specific action;
c. to anticipate the development of this action in time, and *project* it in the future.

These purposes have implications for the teaching process of education knowledge, including the elaboration of pedagogical instruction programs of some human collectivities.

Changing the meaning of *education philosophy,* seen as a idealistic pedagogic orientation, with the meaning of *philosophic pedagogy* considered as "full of quotes – beautiful literary sentences, but taken from the concrete reality of instructive-educative phenomenon, to be researched with scientific methods" or with an education philosophy in the quality of conception for humans and of methodological "basis" of pedagogical investigation which expresses a lack of cognitive maturity of pedagogy as a variant of science philosophy.

Or, the way in which pedagogy advances is given by its epistemology, whose object is the process of knowledge associated with *the critical study of education research results* (scientific pedagogical facts, concepts, notions, laws, theories, judgements and pedagogical arguments, scientific knowledge methods). This association of pedagogy epistemology with analytic philosophy of education is a characteristic of the education domain sciences as an *open dynamic system of knowledge,* made of a global conception on education, pedagogical scientific language, investigation methods and techniques of educational facts, models of educational practice, testing criteria and thinking operations regarding stored pedagogical information, etc. in conclusion, "such a study is not separated from the tight link of education with cultural values and experience built-up by our society" [13].

This assignation is useful, in order not to resume pedagogical epistemology to methodology of education research or other dimensions of it, as, for example, the axiological dimension of education sciences. For all those hypostases, education and instruction are concepts in which a *synthesis of knowledge regarding humans* is produced.

The theory of education is such a concept, resulted from a reciprocal correction of education science history with education science philosophy. For this reason, the education philosophy term is used improperly. We see that in some pedagogy

papers which speak about an *education philosophy* concerning the ideal and purpose of education.

"We deal with an ill formulated and treated problem, through a language and artificial abuse, without the technical apparatus of philosophy which is categorical opposed to forced introduction of a science in a prefabricated philosophical background" [14].

In order to understand, in this context, the process of the education content, we should explain a casual event. Otherwise, it means to deduce a statement and which describes it from *universal laws* and certain singular statements about *initial conditions* (Randbedingungen) [15].

We casualy explained, for example, tearing of a thread, and we said that the thread had a tearing force of 1 kilo and it hung up 2 kilos. This explanation contains more components: first „every time a thread is stressed with a burden above its resistance of tearing, it will break" – a statement that has the character of a nature law; second, singular statements (there are two in this example) describe a particular case: "for this thread, the resistance of tearing is 1 kilo" and the "hung up of this thread was 2 kilos" [16]

There are two different ways which supply together a *complete casual explanation:*

1. *universal statements*, hypotheses, laws of nature and
2. *singular statements* which describe a particular case, which they call "*initial conditions"*.

From the universal statements in connection with initial conditions we can deduce the singular statement: "this thread will tear". We call this statement a specific or singular *prediction* [17].

The initial conditions describe what we usually call, *the cause* (the fact that the cause of the tearing of a thread with a resistance of 1 kilo, was the hung up of a burden of 2 kilos), and the prediction, is what we call the *effect* [18].

The causality principle is the assertion that any event can be casually explained, deductively predicted. As we understand the word *maybe*, this assertion is either a tautology (an analytical statement) or an assertion about reality (a synthetic statement).

If *maybe* indicates a logical possibility, the assertion is tautological, because we can find universal statements and initial conditions for any prediction, from which this can be derived. (If these universal statements were tested and substantiated in other situations it is, of course, another problem.)

If *maybe* means that world is governed by strict laws, that this is built as if every event is a particular case of universal law, then the statement is synthetic, but beyond falsification.

As a result, we may formulate a simple methodological rule, which is mostly analogue to *the causality principle (*this can be considered as its metaphysic correlation), "the rule is not to cease looking for laws, of a unitary theoretical system and not to abandon trying to explain from a casual point of view any event which we can describe" [19].

This rule should lead the teacher in everything he *does.*

REFERENCES

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[2] *Ibidem*, pp. 333-352.

[3] *Ibidem*, pp. 352-353.

[4] G.R.Knight, *Issues and alternatives in educational philosophy* (Oxford University Press, 1989) p. 22.

[5] *Ibidem*, p. 24.

[6] T.Ciulei, *op. cit*., pp. 11-12.

[7] *Ibidem*, pp. 82-91.

[8] I*bidem*, pp. 114-137.

[9] The exceptions come from the existentialist philosophy, and especially from K. Jaspers and S. Kierkegaard. See also G.F.Kneller, *Existentialism and Education*, (John Wiley and Sons Inc., New York, 1964) pp. 58-66.

[10] C.J.Brauner, and H.W.Bums, *Problems in Education and Philosophy*, (Prentice-Hali, Fondations of Education Series, 1962) pp. 11-15.

[11] G.F.Kneller, *op. cit*., p. 66.

[12] M.Calin, *Consideraţii privind epistemologia educaţiei* (Considerations regarding education epistemology), in *Revista de Pedagogie* (Pedagogy Magazine), nr.3/1987.

[13] Ibidem.

[14] Ibidem.

[15] K.R.Popper, *Logica stiinţei* (The science logic), (Scientific and Encyclopaedic Publishing House, Bucharest, 1981) pp. 97-99.

[16] A clearer analysis of this example, where we can distinguish two laws and two initial conditions, is: „For any thread with a structure data S (determined by the material, thickness, etc.) there is a burden w or the thread will tear every time it will be stressed by a bigger burden than W" and „For any thread the structure S1, the burden w1 is 1 kg". These are the two general laws. The two initial conditions are: „This is a thread with the structure S", and „the burden which will be hung up is 2 kg". See, K.R.Popper, *op. cit*, pp. 100-101.

[17] The term „prediction" (Prognose), as it is used here, gather statements about the past („retro-utterances") and even the „given" statements, which we want to explain („explicanda"). See, K.R.Popper, *The Poverty of Historicism* (London, 1945) p. 133.

[18] T.Ciulei, *op. cit*., pp. 333-345.

[19] K.R. Popper, *Logica stiintei* (The science logic), *ed. cit*., p. 104.