

Some approaches to the concepts of incommensurability, rationality, and their impact on pedagogic models in the light of Kuhn proposal¹

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"History of Science may contribute to close the gap between philosophers of science and science itself, which may be for them both a source of problems and data"
T.S. Kuhn

Abstract

The purpose of this article is to identify the most meaningful characteristics of Thomas Samuel Kuhn's proposal, parting from his work *The Structure of Scientific Revolutions* (1962), which allow, when defending a role for history, (the classic distinction between the context of discovering and justification), to appeal, as a methodological resource, to historical records; likewise, to interpret theoretic changes a revolutionary, supported on the notion of gestaltic change of perception at holding that members of different paradigms see different things, even when they look at the same, which situation allows to argument about incommensurability, scientific change, and realism; to, and the end, to approach the problem of rationality and incommensurability regarding pedagogic models and the impossibility of performing evaluation processes on teaching and learning which purpose is to standardize and homogenize pedagogic dynamics, forgetting variations found both in theories and pedagogic models and also in what they observed.

Key words: Evaluation, incommensurability, pedagogic models, paradigm, rationality.

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Introduction

Kuhn's proposal derived from the work *The Structure of Scientific Revolutions* (1962), is strongly linked to aspects such as, historiography, sociology, and philosophy of sciences, as well as to discovery contexts, which in any manner, lead to explain the pedagogic activity, besides natural sciences. In such a sense, this article intends, in the light of some of the aspects contained in Samuel Kuhn's work, to make a systematic exposition, not regarding all of its theoretic system, but as Kuhn's proposals are assumed as valid, with no philosophic or methodological objection, to show then, the possible relationship to pedagogic aspects, thus analyzing the pedagogic reflection as a "science of education" charged of interests and values conditioned by contexts which contain cognitive-epistemic agents, the problem of rationality, incommensurability, change and evaluation of theories stated by pedagogic communities, and the impossibility of successfully perform evaluation processes both on form and content in concordance with Skills Tests (Pruebas Saber), which purpose is to:

- a) Confirm the degree of development of competences of students about to complete (example) grade tenth of middle education.
- b) Provide the student with elements to take his auto-evaluation, and development of his project of life.
- c) Provide education institutions with pertinent information on competences of applicants for higher education programs, as well as competences of those admitted, which serve as the basis to prepare academic placement programs, and prevention of desertion at this level.
- d) Monitor education quality at education institutions in the Country, founded on basic standards of competences and quality standards issued by the Ministry of National Education.

¹ Defining pedagogy as a science already problematic or a discussion both within human sciences and social sciences, notwithstanding, such issue is not intended to be ignored in this article; however, it will be assumed to recognize it the status of science, which object of knowledge is education.

- e) Provide information for establishment of added value indicators, both for middle education and higher education.
- f) Serve as information source for construction of quality indicators of education, as well as for vigilance and control to public education service.
- g) Provide middle education institutions with information for self-evaluation, and for consolidation or reorientation of their pedagogic practice.
- h) Provide information which serves as strategic reference in order to establish national, territorial and institutional education policies (MEN, 2009:1).

Evaluation processes which purpose is standardization of knowledge, omitting criteria derived from theories or theoretic models established by the various pedagogic and academic communities of teaching and learning, likewise incidence of socioeconomic and cultural context of individuals.

Incommensurability from Kuhn

Kuhn intends to approach the scientific practice from contributions by science, and from a type of more instrumental rationality, in which, historical processes are essential to provide proper comprehension, and perhaps, explanation of pedagogic practice, and pedagogy itself as a science.

An example taken from natural sciences, may be the case on performance of a scientist, member of a middle age scientific community, who,

would see as suspicious performance of current scientists before the problem of DNA structure, and followers of the scientific community dealing with this problem, could not consider his performance as irrational, because he does not know the game rules of the last community. Even here, is where incommensurability is more clearly observed. (Alcala, 1986, 130).

This is a neuralgic idea of Kuhn's central thesis on scientific change, since this incommensurability unveils the change of meaning which follows change of paradigms, which:

Obligated to restate the methodological problem of comparison and election of theories, by so doing, renewing the discussion on scientific rationality. And this is not the only thing. Incommensurability has also ontological implications, which contributed to retake the old polemic on realism, and in particular, the debate on the relationship between scientific knowledge and the world (Perez Ransanz, 2000:83-84).

This matter related to incommensurability (rationality and pedagogic models), from Kuhn's proposal, defines the situation surged between two paradigms. When such is the case, the inhabitants of both paradigms, "do not use the same vocabulary or use words in a different way. They speak, from incommensurable points of view" (Kuhn, 1986:305). By so doing, each one, to say so, are or act, or behave "as members of different linguistic communities" (Kuhn, 1986:10), among which there are no communication, or such communication is interrupted. Now, such concept was seen in Kuhn's proposal as incommensurability of meaning, since, at passing from a scientific tradition to another, words meaning change.

Kuhn recognizes that change of meaning made it impossible to define the terms of any theory in vocabulary of the other, therefore, theory of incommensurability would end turning, in words of some critics, into impossibility to translate theories in the terms of the other. Before such situation, we may state that the theory of incommensurability recognizes that meaning of scientific terms and concepts change depending on the theory they are included in; according to Ronald Giere: "in Einstein physics, -mass- Kuhn says, it does not mean the same as in Newton physics" (1992:59), and that this happens, it makes impossible definition of all terms of any theory in the vocabulary of the other; however, as Giere claims, incommensurability of meaning does not become a central concern in Kuhn's proposal, since the problem of science is not reducing any difficulty of language, since "The key to properly

understand science is not to be found in philosophy of language" (Giere 1992:59).

Otherwise, the essence of the matter is found when comparing normal scientific traditions, in which incommensurability of standards surge, such standards built by the scientific community, which, configures standards; standards determined by models acting on academic formation of scientists, these standards provide representation about the world, in such situation, there is no standard of higher hierarchy than in consent of the pertinent community (Giere, 1992). This is the *quid* of the matter in this article, since academic formation of those immerse inside a paradigm, a theory of a pedagogic model² express the standards of the community which epistemic agents are members of (teacher and disciple, teacher and student, teachers and discent), pedagogic paradigms which determine the way of seeing, understanding, interpreting and/or explaining the world.

In Kuhn's words, normal scientific tradition which consolidated subsequently to a scientific revolution, to the basis of academic formation of the scientific community is incommensurable regarding its ancestor community, but this incommensurability is better understood, according to Kuhn, if we recognize in the light of Gestalt's theory, the creative and global character of the subject's activity in perception; (such is the case of the school traditional model, and contemporary models), it is how Kuhn illustrates the "incommensurability through analogies and perceptual terms. Analogy to restructurations -perceptive- of Gestalt theory was central. Paradigmatic divergence was described as -seeing-different things -looking- at the same thing. (Kuhn, 1989:27), because of this, observation is charged with theory, and it is not natural and pure, since it is conditioned by cultural context and theoretic, distinguishing in turn, between neutral observation and the theoretic burden of the same. Such aspect becomes determining within the educative event, this is parting from the acceptance in this writing of pedagogy as a science, which approaches its object of knowledge, education through theories of pedagogic

2 These concepts are taken without the purpose of establishing the aspects constituting each one.

models intended to account for teaching –learning dynamics, all observation process being loaded by theories.

Distinction between neutro observation and theoretic burden in history of philosophy of science, comes from the Circle of Vienna, which philosophy is named neo-positivism or logic positivism related to this, surges what will be known as logic empiricism. This question on theoretic burden intended to point out that observation is not neutral and pure, as logic empiricists claimed, but, according to historians of observation it is loaded with theory, being subject, conditioned by theoretic and cultural context, this challenging statements such as:

If observation experience used to contrast validity of any theory depended on the theory in question, this is, if preparation of observation reports serving as the basis for comparison proposed validity of the theory, then we would have a self-justified circle. Therefore, if the observation basis has to serve for contrasting then it should be theoretically neutral (Diez and Moulines, 1993:301).

Kuhn, following the analysis line undertaken by N.R. Hanson, 1958, criticizes such empiric thesis about the basis of neutral observation, because such claim lacks of legitimacy; neutral observation does not become sufficient condition to justify theories, while, neither logic regarding interpretative structure, nor neutral observation, and equal for all scientists, as cognitive agents, may determine by themselves the character of scientific theories at ignoring the epistemic contribution of other sciences about the scientific procedure, and election of theories, an aspect that according to the intention of this article, result clearly pertinent, because of dealing with pedagogic models supported on other sciences, or are understood in the light of progress achieved by sciences such as the cognitive ones, in function of theory of perception; likewise, contributions made by history of science and psychology of perception on sensor information processing become effective resources, since, as confirmed by Kuhn himself about gestaltic ways:

What previously to the revolution were ducks in the scientific world, later turned into rabbits. The man who used to look at the interior of the box from upside, now looks at its interior from

downside. [...]. When looking at the surrounding of a map, the student sees the lines on the paper, while the cartographer sees a photograph of the land. At examining a bubble camera photograph, the student sees confusing dotted lines, while the physicist sees a record of sub-nuclear events he is familiar with. Only after a certain number of those transformations of the vision, the student turns into an inhabitant of the world of scientists, such student sees what scientists see, and responds in the same way as them. [...]. Therefore, in times of revolution, when normal scientific tradition changes, scientist's perception on his environment should be reeducated in some situations in which he has familiarized with, should learn to see a new shape (Gestalt) [...]. Of course, in their most usual shape, experimentations of shape (Gestalt) illustrate only the nature of perception transformations (Kuhn, 1983: 176-177).

Everything stated so far, parting from historic turn and psychology of perception, in function of the scientific change, allows to consolidate the thesis of this article, regarding which, it becomes impossible to perform evaluation processes /such as Skills Test), which purpose is to standardize and homogenize teaching and learning processes carried out in a country, ignoring that such processes are affected by paradigms in which members of each academic, pedagogic and/or educative community are immersed, which has decided how to perceive the world. The above raises again Kuhn's polemic on realism and its methodological implications.

Materials and methods

Taking into account the nature of the research, the method of conceptual analysis was used, using as a source text *The structure of scientific revolutions*, by Thomas S. Kuhn, besides review of secondary sources, such as Ana Rosa Perez Rasanz, Ronald Giere, Moulines C. Ullises, German Guerrero Pino, etc. This being a theoretic reflection to show the use of concepts such as: Rationality, incommensurability, pedagogic models and paradigm, parting from a hermeneutic approach to them in their relationship to sciences of education.

Results

Some aspects constituting Kuhn's proposal

Kuhn, in *The structure of scientific revolutions*, introduces the discussion related to scientific practice and knowledge of human beings, demonstrating:

That pretention of knowledge is based on methods and on criterions that, far from being absolute, have historically varied; that production of knowledge never parts from an even table, or never from zero, but always presupposes previous beliefs and skills, and that in the center of research programs there are flesh and bone individuals with beliefs a values, standards, wishes, and specific needs which form the basis to create knowledge, which basis changes along history (Olive, 2001:15).

From this historical perspective, both natural science and pedagogic science are seen with a marked social commitment, strongly conditioned by interests of subject immerse in academic, pedagogic and scientific communities.

Therefore, parting from *The structure of scientific revolutions*, we may identify some central and constitutive aspects related to overlap among sciences among themselves, and the context, such as:

There is no a group of standards or principles independent from science which may account for the process of scientific development. Science is linked to external factors such as the historic, social and psychological, among other.

Kuhn's proposal should be understood as a *descriptive* analysis of the model in which science is practiced *de facto* within the various scientific communities, without forgetting the importance of the *regulating* character on how science will proceed; these "standards of regulating principles should be taken from the historical record of the successful science" (Moulines, 1993:183).

Models on science that allow to understand construction of scientific knowledge, are built and tested parting from history of science.

From 1969 postscript, it is inferred how Kuhn understands scientific development on analogue basis to evolution given in species.

Rationality of science may not be established *a priori*, since science is immerse on practical basis in the field of what is allowed.

From the above it is concluded that pedagogy as a science supported not only on other sciences, (History, Psychology, Psychology, Cognitive Sciences, among other), to justify its beliefs on the world as true, without incurring in a vicious circle, but in turn, it is conditioned by epistemic agents and the context where such agents are, since it is the result of academic communities sharing common interests.

Kuhn will express how scientists' behavior in their daily life is influenced by factors not only epistemic but also social, cultural and historical, which change along the time. For such purpose, he will explain in the light of an endless number of examples, drawn from natural sciences, how science has actually been developed, revealing that traditional epistemology is unable to account for this so dynamic and complex process.

Ana Rosa Perez Ransanz in *Kuhn and the scientific change*, claims that:

One of the most transcendental repercussions of Kuhn's work is his contribution to a new way of understanding philosophy of science, which manner has been considered as neutralized. Notwithstanding the fact that this orientation has an important background – within the same Circle of Vienna- on Otto Neurath's ideas, and later it is expressly developed by Quine (1969), the main origin of this change of direction may be traced in the ERC (1962) (Perez Ransanz, 2000:193)

The North American Philosopher, will be, as suggested so far, one of the pioneers in the historical turn³ philosophy of science, which main objective is rejection of the *formal logic* as a substantial tool for analysis and comprehension of science, to, instead, propose history of science. This turn facilitated the approach between philosophy and scientific practice. Dieguez, regarding this contact, states that such situation has made it possible for new ways of

3 Authors such as:

alternative research to surge. In addition, as the same Kuhn wrote: “History of science may contribute to close the gap between the philosopher of science, and science itself, which may be for them a source of problems and data as well” (Kuhn, 1983:24), in this manner, history turning into a methodological complement necessary to understand the science, before the inability of methodologies represented then for inductive and deductive Kuhn, instead of these methodologies intends to identify how other sciences serve from the historical record on a lot of resource and evidence for construction of his empirical theories about the world, since:

New philosophers find that both hypothesis evaluation criterions procedure standards are also modified through development of the various scientific traditions. This is, changes of research frameworks – within which theories are developed, also imply change of methods. But then, if methods are not fixed or capable of becoming universal, any theory about, (that includes a methodology), must be able to account for its evolution and diversity. Therefore the task is now conceived as the one of building models of scientific dynamics, which allow to explain the change, not only in the level of hypothesis and theories (content level), but also in the level of experimental procedures and evaluation-level criterions of methods (Perez Ransanz, 2000:24).

Such methodological turn promotes relationships between history and philosophy of science, without forgetting that these are different disciplines, and there is no reason to unify them to form a continuous in which their incidence ambits are not clearly and differently perceived; but Kuhn states: “I am convinced that much of what is written on philosophy of science would be better if history prepared the way in advance” (Kuhn, 1987:36), over all if evolution of scientific ideas, its methods and techniques were studied.

In this sense, Kuhn intends the approach to the real science, as it has been practiced by scientists, expressing against formalist approaches derived from logic empiricism, the Inherited Conception. For this purpose he discusses one of the conceptual bulwarks of logic positivism, and which has already been censured few years before by Quine: It deals with the dichotomy between the two contexts of *discovery* and *justification* of scientific practices, another way

of presenting the division between *synthetic and analytical*, thus contrasting the distinction initially proposed by Hans Reichenbach, in the 30s, according to which, the truly important thing was *justification* of knowledge; that is, logic formal relationship which made it possible, adding: “once knowledge is acquired, a theory prepared, the question is how to justify that any one is true (a), or false (a)” (Guerrero Pino, 2007:76-77). Such aspect is not important for this naturalization project in which the context of discovery has an essential function, since, understanding the way leading a theory, is what interests.

Now, the purpose of this turn consists of: “designing an outline of the concept absolutely different from science what may surge from historical records of the research activity itself” (Kuhn, 1983:21), recovering the role of history and, with it, how the one of discovery context has been exposed.

In this context of discovery all of those social, historical and psychological considerations are fundamental regarding production of scientific knowledge, being notable aspects in the historian work, which in turn, are found in the pedagogic job.

According to Kuhn, the historian interested in scientific development seems to have two main tasks:

First, he should determine who and when each event was discovered or invented, law or contemporary scientific theory. (Connatural activity to the historical)⁴. Secondly, he should **discover and explain** the number of errors, myths, and superstitions which prevented a faster accumulation of components of scientific modern content. Many researches have been oriented toward these purposes, and still there are some oriented to such purposes.

This is why Kuhn’s posture is clear, when he doubts about existence of such *apriorist* logic, considering according to Giere, that: There is no logic of justification. Everything existing is the historical process of competence among sectors of the scientific community” (1992:54). From the above, it is possible to probably infer, that if pedagogy is science, there

4. Parenthesis is by authors

are scientific communities in it, who affected by their interests, values and historical circumstances, create theories approached to their concerning objects.

Understanding and interpreting science in the light of history, which turns to be considered as the main method, and information source to build and test models on science, becoming an essential tool in the judgment process regarding scientific knowledge, which implies that *regulating and evaluative* principles regarding teaching –learning processes, discussed hereunder, are arranged in the light of historical records and contexts where subjects are immerse (the academic community represented by teachers and students).

This history allows to identify difficulties, doubts, and vicissitudes accompanying scientists, academic communities and pedagogic at the time of doing science, thus allows to create a new image on knowledge construction and accompanying circumstances at the time of doing a paradigm, theory or theoretic model.

From this horizon, in which logic of discovery has a meaningful commitment regarding knowledge construction, it becomes obvious how learning, experience and education within an academic community full of values and diverse achievements condition individuals' experiences; historical and circumstantial aspects which determine scientific communities, as Kuhn describes through this anecdote:

A researcher expecting to learn something about what scientists believed atomic theory to be, asked a distinguished physicist and a prominent chemist, whether a simple atom of ice was or not a molecule. Both of them answered without hesitating, but their answers were not the same. For the chemist, the atom of ice was a molecule, because it behaved as such regarding kinetic theory of gases. On the other hand, for the physicist, the atom of ice was not a molecule, since it did not display any molecular spectrum. It may be supposed that both men were talking about the same particle; but each represented it through their own preparation and practice of research. Their experience in resolution of problems told them what a molecule should be. Undoubtedly, their experiences had much in common, but in this case, their experience did not indicate them exactly the same. (Kuhn, 1983:91).

The above implies that the context of *discovering* allows to understand conditions accompanying scientific changes and how before a paradigmatic change the world changes, denying every ideal of accumulation in science, being so, that scientific progress from Kuhn's perspective is accumulative on in normal science, while in times of crisis it is revolutionary, with achievements and failures, since, in these scientific revolutions, paradigmatic changes surge, which, seem from contemporary historiography, show that the world itself changes with them, which allows to infer that science is an enterprise which rationality may not be determined a priori, its rationality is understood just in the light of historical records, thus recognizing all of those aspects considered as external to the scientific practice. The above would make impossible every evaluative intend which ignores recognition and valuation of the context in correspondence with the structure, theory, theoretic-pedagogic or paradigmatic model, which would account for a type of strange rationality toward intends of homogenization and standardization of learning, seen regarding the world, as intended by Skills Tests (*Pruebas Saber*).

¿How rationality and election of theories are understood?

According to Kuhn, science is a rational activity, which implies recognition of scientific chore as the expression by excellence of rationality, which in turn leads to compare and challenge *a priori* conditions of rationality given in traditional philosophy; the notion expressed by Kuhn, is better understood:

It parts from the phenomenon of individual variability. The claim that two competent scientists may differ in their judgment – in the same situation of election of theories, none of them proceeding on irrational basis, is directly against a very rooted principle or rationality, which constitutes the nucleus of traditional conception: if it is rationality for any subject *S* to elect *A* in certain situation, then it may not be rational for another subject *S'* to elect *B*, with *B* being different from *A*, in the same situation. Rationality implies, then, that all subjects facing the same *objective* circumstances *should* make the same decision /Kuhn, 1983:137).

Such rationality proposed by Kuhn, is strongly linked to scientific practices performed in scientist communities; criteria defining rationality, then will not be applied to an individual in particular, but to the scientific community as a whole, and then to the individuals member of such community; therefore, any individual not behaving within canons and criteria defined in his scientific community, will be seen as an irrational one; this explanation rejects all *a priori* condition regarding the rationality that insulates the scientist from its *context*.

Now, let's treat the concept of *Rationality* as Kuhn does, that is, as *rationality in election of theories*. In this context, irrationality means a lack of arguments of seeming unconcern by Kuhn, when he passes from descriptive generalizations to normative ones, which involves distinguishing between explaining the conduct and justifying the conduct. Also, evaluation rationality in terms of relationship between any theory and another in order to achieve an identical objective purpose (resolution of enigmas or desiderata). Seemingly, in this passage Kuhn answers our question for the place from which he judges, or the criterion parting from which he measures: Resolution of enigmas or desiderata (Kuhn, 1893:137-151). But, for us, behind this place or this criterion, as well as behind his expression <<local holism>> his meritorious tautology or his virtuous petition of principle: knowledge is for man, is hidden. This interpretation leads to the most feasible way elected by the scientists at the time of achieving any purpose, in one hand Kuhn, because this one: highlights the role of good reasons, in election of theories, but in the other hand, he insists that such reasons are not determining or concluding, that is, they are not enough to impose univocal elections" (Kuhn, 1983:122), thus abandoning any decision systematic procedure intending to install, from a status of superiority, in the election process of rival theories, to, in turn, understand decision making as values, standards created in order to resolve problems, through election criteria independent from algorithmic processes. Therefore, it deals with election methodological criteria, which allow to evaluate sufficiency of any theory, such as: accuracy, coherence, amplitude, simplicity and fecundity, which will not be deeply expanded in this work. However, we may infer that such predicated regarding pedagogy, defines problems

involved in electing among opposed theories, and being involved in such list of criteria of election, in spite of this, may lead to different conclusions:

Perhaps they differently interpret simplicity, or have different convictions on amplitude of the fields within which the criterion of coherence should be met. Or perhaps, they agree on these matters, by differ regarding relative weight that should be assigned to these ones, or other criteria, when several of the same try to follow at the same time. Regarding divergences of this kind, any criterion of election is useful. It may be explained, as the historian uses to do, why certain men made determined elections at certain times. But for such purpose, it is necessary to pass the list of shared criteria, and deal with characteristics of those individuals making such decisions. This is, characteristics which vary from a scientist to another should be treated, by so doing, not endangering canons which make that science is scientific (Kuhn, 1987:348).

Dealing in this way, with values strongly linked to contextual, historic-biographic influences, experiences of scientists, in which a mixture of shared or individual criteria surge, as objective and subjective factors constituting members of the community, in this case, pedagogical or academic, and see in the process of election of pedagogic theories according to projected interests.

Discussion results

Let's begin saying, with Perez Ransanz, that the assumption of reality, as independent:

Is the starting point of difference between realists and externalists and realists and internalists (or between metaphysic realism and internal realism). Conceiving reality as a totality of *objects existing* with total independence from our knowledge (mind, language, conceptual schemes or representations), reveals the metaphysic commitment to an absolute notion of –object-, and –existence. The internalist perspective in any of its versions, is distinguished before all, for rejection to this manner of conceiving the reality (Perez Ransanz, 2000:209).

Kuhn advocates for a type of internalist realism, which leads to claim that objects are identified by the conceptual system of the scientific, academic

community, and for this case, pedagogic, which perception is measured by a paradigm that allows not only to perceive, but represent, interpret and understand the world and its structure, subordinating it to the lexicon, and theoretic burden of observation made by members of the academic, scientific or pedagogic community, therefore resigning a metaphysic realism (externalist), with its idea of teleological progress, or teleological truth, since its pretention is that statements describe the world in an independent manner, as Perez Ransanz explains: “From all local perspective, it supposes the commitment to absolute ontological categories, which categories could be only the ones of God Eye point of view (Perez Ransanz, 2000:211). Kuhn, supported on the historical record, makes it clear that there cannot be evidence supporting speculation on scientific development toward a last and absolute theoretic conception, because history has shown that the world changes by undergoing revolutions, and resolve problems, which prevents pedagogy from performing national evaluation processes such as Skills Tests (*Pruebas saber*), since the paradigms (pedagogic models or theories), respond to perhaps different temporal space circumstances which in turn, define observation interests of those immerse un such space, and would ignore dynamics related to situation curriculums. In such a sense, models build from pedagogy would result incommensurable, and therefore, every attempt to evaluate teaching learning would become fruitless, is such situation is ignored.

Kuhn’s explanation of science and reality makes clear that it is not possible to speak of a reality independently existing, since the change of paradigms implies that scientists, and pedagogy itself, through the various pedagogic models perceive the world in a different manner, their purpose of research and, therefore its method, the problem of evaluation of scientific theories, which from this type of internalist realism, acquires a pragmatic character, and therefore, Kuhn refusing any notion of truth beyond the conceptual system constituting the scientific community; therefore: “Kuhn’s suggestion, of conceiving the truth as a language game, and therefore, as lexically dependent, results very suitable for an internalist approach” (Perez Ransanz,

2000:228), separating, as it is clear, from the notion of truth as correspondence with the world, to create, instead, possibility conditions for the truth measured by an evidence shared by a community, which would allow to replevy in this way, the teaching subject and discent, his community and their epistemic function within a paradigm.

This aspect acquires importance within Kuhn’s proposal, and it is pertinent for comprehension and interpretation of the pedagogic work, since in it converge aspects of history, sociology, psychology, anthropology, and philosophy, among other sciences such as cognitive, which naturalize perceptions built within pedagogic models. In opposition, Skills Tests (*Pruebas saber*), at intending to homogenize and standardize skills (learning), they end subordinating *plurality of looks* from pedagogy as a science of teaching regarding the context and teaching and learning dynamics proper of times.

Pedagogy as a science of education

One of the possible philosophic and pedagogic objections to this article could come from the status of scienciality of pedagogy, and the impossibility of approaching pedagogic theories the same as natural sciences, for which, Kuhn, in certain manner, has thought his answer. How, the discussion intends to be moderately passed over in this article.

Any discipline reaches the status of science when it has a method of study, and own methods, for the case of pedagogy, its purpose is to study education, understood as the formation process, which any human being is subject to when enrolls the education process. On this matter, Kant claims: “the purpose of theory of education is the study of objectives and how to achieve them” (Kant, 1985:102).

Societies need to bequeath traditions, therefore, they should create strategies which enable human beings to achieve a number of skills/knowledge, principles and values, which allow them to live in community, as well as develop the intellectual abilities, in such a manner as to achieve sufficient autonomy to become responsible of their actions. Education, understood as the necessary and sufficient training process

to think by itself, is Kant's ideal, this is why the *sapere aude*, continues to be a regulating idea of man formation, Kant claims: "Man can be trained, coached, mechanically taught, or really illustrate him. (...). However, training is not enough; what matters, over all, is that the child learns to think". (Kant, 1985:39).

In order to more comprehensively study pedagogy, contribution of many disciplines is necessary, among them, it is worth to mention: Psychology, History, Politics, Sociology; Philosophy; Anthropology; Biology, etc. A pedagogic model intends to reflect on how to learn, how to teach, what methodologies are suitable for learning, what are the epistemic fundamentals, what is the proper way of evaluating pedagogy.

As it is known, the origin of "pedagogy" as a science is fully established, since its registry of birth coincides with publication of *Didactic Magna* in 1630. In this manner, it is claimed that in the antiquity there was no pedagogy or science of philosophy. It is also claimed in this manner, coincide in the time the *Cartesian Moment (Foucault)*, with its clinical look and his tendency to enclose the pathological or abnormal, to observe, treat and intervene it, in order to cure and return it to its proper state of operation; arising of modern science, and the very holy trinity of the subject, the object and the enunciate, with its corollary, tautology (If truth is the *adequatio intellectus et rei*, everything turns mental); and the State, that is to say, the reality done of manufactured, turned into *arte factus*, because the policy was since then administration of individual and collective life.

In turn, the idea of pedagogic models is related to the epoch of the illustration (Abbagnano and Visalberghi), and in particular to that temporality ended by colonialist geopolitics of the British empire in confrontation with the other European nations. In the context of this reflection the decisive is coming from Capitalism as a way of dominant life, and *critical* experience suffered by European intellectuals, articulated in various ways, but properly expressed in the early XX Century, through expressions such as *sunset* (Spengler) *nihilism* (Nietzsche), *chaos* (Valery). Remember the phrases; "God has died" and "All solid disappear in the air". Supremacy

of the capital will give the school the talent so expressed today in the language of pedagogic model offer, as something proper and natural, which the educative ambit belongs to; in turn, the spiritual crisis will anchor in the firm ground of the *curriculum* (Bobbit), which will make of cognitive psychology, in its articulation with language of competences, the predominant paradigm.

In summary: ¿How do we approach to the concepts of incommensurability, rationality and pedagogic models from Kuhn? Using a word: Humanism. Placing this word in the historical perspective: It is born with Platon, becomes perverted in the Modernity, and does not mean anything since the second half of XIX Century (Heidegger), because as said since then, words such as "God", "Philosophy", "Metaphysics", "Truth", among other, became addle, peels, (Arendt), or has Nietzsche said, worn out coins.

The demarcation criterion for the paradigm of humanism was found in the point of view parting from which man considered as separated from nature. Since then, all traditional dualities were established: spirit and world, soul and body, good and evil, word and thing.

It has recently said: explanation and comprehension, quantitative and qualitative methods. But these latter dualities did not transcend the predominant point of view, which is the existential one, through which, a solution of continuity is established since the Big-Bang so far. Therefore, the need of naturalizing the pedagogic knowledge.

According to the above reasons, it may be stated that from the contents of a particular pedagogic model, it is not possible to perform evaluative processes commensurable with other model, therefore, it is necessary to take into account at the time of evaluating teaching processes given by teachers, and students learning, internal difference between each model, its context, history, purposes and scopes; in addition, to consider students as beings with particular horizons of meaning.

The educative process emphasizes on some very accurate aspects, depending on the pedagogic model which is used, this is why, from the traditional model humanist formation is the purpose in order to develop

intellectual abilities by setting the example, where teacher-student is vertical; therefore, the teacher authority prevails, in addition, practices are realized on order to memorize data (repetitive), and evaluation is qualitative.

Another pedagogic model is behavioral, which seeks a technical-productive formation through accumulation and association of learning, where acquired skills become observable; in this model the teacher's function is as an intermediary, practices are reinforced, in such a manner that they are inserted in the individual's habit, behaviors are predictable, in addition, both formation and progress are evaluated.

En these two models incommensurability is evidenced in the evaluation method, in addition, there is a different role of the teacher and the student, resulting in difficulty to treat to homogenize, since according to the number of practices performed within each model, both, intended tasks and purposes are determined. And not because of this, one results to be irrational regarding the other.

Conclusions

According to the above, we should conclude that Kuhn, in a *methodological* way, on one hand, at defending a role for history, using historical records as resource and evidence for construction of his empirical theories about the world, shows the important imbrication between sciences and the context of discovery (history); and on the other hand, linked to epistemic situation of scientific communities, where scientific theories are evaluated, and which leads to the thesis of incommensurability from which, he places on the table discussions on the change of conceptions about the world rethinking, in a naturalized manner, problems related to the process of election of theories on decision making, and with this the problem of rationality within the scientific – academic practice, and for the particular case of this article, the pedagogy, creating parting from everything expressed herein, the conditions of possibility for construction of knowledge in a contextual manner.

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