

**THEORETICAL APPROACHES OF THE HISTORICAL-CRITICAL
PEDAGOGY TO UNDERSTAND THE UNIVERSALITY OF
MATHEMATICAL KNOWLEDGE: IMPLICATIONS FOR TEACHING.**

APONTAMENTOS TEÓRICOS DA PEDAGOGIA HISTÓRICO-CRÍTICA PARA
COMPREENSÃO DA UNIVERSALIDADE DO CONHECIMENTO
MATEMÁTICO: IMPLICAÇÕES PARA O ENSINO

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ABSTRACT

The purpose of this article is to present some reflections on the question of the universality of mathematical knowledge, its concept, procedural logic and some implications for teaching. The theoretical reference is the Historical-Critical Pedagogy (Saviani, 2003; Duarte, 2011; Oliveira, 2005 and others), pedagogical trend that adopts the dialectical historical materialism as a method of analysis of the educational process.

Keywords: Mathematics; Universality; Historical-Critical Pedagogy; Mathematics Teaching.

RESUMO

O objetivo deste artigo é apresentar algumas reflexões acerca da questão da universalidade do conhecimento matemático, sua conceituação, lógica processual e algumas implicações para seu ensino. A referência teórica é a Pedagogia Histórico-Crítica (Saviani, 2003; Duarte, 2011; Oliveira, 2005 e outros), tendência pedagógica que adota o materialismo histórico dialético como método de análise do processo educativo.

Palavras-chave: Matemática; Universalidade; Pedagogia Histórico-crítica; Educação Matemática

1.Introduction

The Historical-Critical Pedagogy (Saviani, 2003; Duarte, 2011; Oliveira, 2005 and others), is a pedagogical trend of Marxist foundation and, as such, adopts the dialectical historical materialism as a method of analysis of the educational process. It presents an intrinsic relationship with the Historical-Cultural Psychology in that both use the categories of dialectical historical materialism as a reference for analysis and improvement of education.

In current times, the Historical-Critical Pedagogy constitutes, after more than three decades of its creation, a reference in the field of Marxism, to think and conduct a school education that contrasts with the pedagogical trends aligned to the neo-liberal policy of the capitalist society. Such pedagogies, named pedagogies of "learning to

learn" (Duarte, 2000) are: constructivism, pedagogy of projects, pedagogy of skills, pedagogy of reflective teacher and multiculturalism.

With the multiculturalism advent, all a negative charge was launched to the task of assuring of school knowledge appropriation. It was spread in its relativistic bases the idea that there are no established truths, without even sticking to the perception of its survival as a relative historical validity and, not absolute, of/in social practice. The school knowledge stops being an expression of the most developed forms of knowledge (Saviani, 2003, p.09), becoming only one knowledge among many others. Science becomes a convention, expression of a civilization.

In the pedagogies of "learning to learn", the critical perspective to the capitalist society is not scored (Duarte, 2011, p.33) or, as in the case of multiculturalism, such a criticism comes to be considered, but in the immediate restricted level of cultural clashes more immediately obvious.

The author of this work understands that the teaching of mathematics, as well as other school subjects, has been strongly influenced by the pedagogies of "learning to learn". In such pedagogies, teaching has been guided by practices that elect the everyday as reference to the realization of the educational work to the detriment of a perspective of a teaching that promotes the abstract thinking, which incorporates by overcoming the pragmatic thinking, empirical present in everyday life (Duarte, 2003; Giardinetto, 1999). So, the school contents to be recognized are those that are required by everyday, whether for a small school to promote "skills and abilities", which aims to satisfy the interests of the capitalist market logic; whether via realization of projects hostage of emerged everyday themes and confined to it; whether the influence of multiculturalism with its cultural and epistemological relativism. Thus, the teaching has been marked by the devaluation of access to school mathematics in all its complexity.

In Duarte (2010, p. 116), the author points out what he calls being the "didactic and philosophical challenges in building a Marxist pedagogy":

analysis of the dialectic between the contextual nature of knowledge production and the universal validity (in greater or lesser degree) of knowledge as a product [...] the question of the objectivity of scientific knowledge [...] dialectic between the abstract and the concrete, or rather, the role of the abstract as a mediator in the process of appropriation of the concrete by thinking.

In general, it is to understand the specificity of the universal character of the knowledge acquired from local context, as well as its temporal validity; the non-identification between the objectivity of the knowledge and its depletion in the reached level of complexity, but rather, the procedural dynamic of progressive achievement of the most developed forms of knowledge. Finally, the importance of abstractions as mediator element of the progressive appropriation of the concrete in thinking showing the relevance of school activity in access to the students of the scientific, artistic and philosophical abstractions.

Given the limit of the pages of this work, it was decided to present some reflections on the question of the universality of mathematical knowledge, its conceptualization,

procedural logic and implications for teaching having as reference authors engaged in the construction of historical-critical pedagogy.

2. On the universality of mathematics: conceptualization and procedural logic

A determined mathematical knowledge is universal because it is a "historical product of all human social practice" (Marsiglia, 2011, p. 28). Regardless of non-covered social contexts, via observation by history objectively performed, a particular mathematical result originated from similar activities in different social contexts.

This means that the universalization of a particular concept was due to the historical process occurred in certain places of the planet and because of that historical process, it is now present as a possible legacy to be appropriate for all. (Giardinetto, 2014, p. 36)

The historical process of mathematical development shows in some cases a similarity between the obtained results of the diversity of mathematical production in particular social contexts. There is a similarity, in diversity (Giardinetto, 2014, pp. 85-99).

It is also possible to consider the possibility of the historical process analysis of development of mathematics to show a unique mathematical knowledge regarding the historically constituted and today universal reference. However, such a possibility, if it occurs, will not necessarily point to a more developed form of mathematics, not generating significant change in the constituted mathematics. In fact, in Gerdes (2007, pp. 196 - 206), the author presents researches, throughout the world, which show a variety of social contexts investigated for the production of mathematics. It is verified that all the researches point out the production of mathematics in several social contexts in everyday life. And the social contexts reveal low degree of changing of natural reality in humanized reality (Giardinetto, 2012, p. 32).

Also, it should be noted that the access to the universal knowledge is only possible thanks to its necessary universal language, in this case, the mathematical symbology with their logical-conceptual systems.

The need for a logical and conceptual language of reference is the key for the decoding of the mathematical knowledge from the social practices. Without this language the production of knowledge cannot be decoded, systemized. How could we detect a certain mathematical procedure in the sphere of everyday life without the corresponding already systematized concept?

Only the most complex form of mathematics can explain the less complex forms, because the former has the instrument that enables this explanation: the systematization of mathematical knowledge through its universal symbolic language. It is through the universal mathematical language that the mathematics that individuals practice can be decoded. (Giardinetto, 2012, p. 32)

It is interesting to draw a parallel with the music. It could not be different to determine that the historical genesis of the musical scale was made by the appropriation of the musicality of different people. How could we capture the musicality of people without an ("imposed") universal language, the musical scales? How could we disclose the

musicality of specific social context without a universal language that allows us to access it?

It is through the universal mathematical language that the mathematics that individuals practice can be decoded. Production of knowledge is different from development of knowledge:

Development of knowledge is not synonymous of production of knowledge. The production of knowledge is social, takes place within social relations. The development of knowledge implies in expressing elaborately the knowledge that comes from social practice. This elaborate expression assumes the field of the development and systematization instruments. Hence, the importance of school: if the school does not allow the access to these instruments, the workers are blocked and unable to rise to the level of development of knowledge, although they remain, to contribute to the production of knowledge. (Saviani, 2003, p. 77)

The universality of knowledge relates to its objectivity.

In fact, to say that certain knowledge is universal means it is objective, that is, if it expresses the laws governing the existence of certain phenomenon, it is something whose validity is universal. And, this applies both natural and social phenomena. (Saviani, 2003, p. 57)

Yet, another issue to be considered about objectivity of knowledge in view of the universality of mathematics is that the objectivity of knowledge does not mean depletion of complexity degree of the obtaining process of knowledge. According to Duarte (2010, p. 117) the "objectivity of knowledge is achieved by a historical process of continuous appropriation of the object of thought." In the case of mathematics, the objectivity of mathematical knowledge as gnosiological question reflects a historical process of gradual constitution of the most developed forms of Mathematics (Giardinetto, 2012).

As for intrinsic procedural logic to the rise of mathematical concepts to the status of universality, here some aspects are important to consider.

The dynamics of the historical process of natural reality transformation in humanized reality has pointed out the humanization of human species performing itself under alienated social relations. This is a contradictory procedure since in this universalization carried out in the class struggle over time (between slaves and lords; servants, nobles and clergy; proletariat and bourgeoisie) the development of human species is seen, but sacrificing most people. The more human species expanded with production increasing knowledge, enriching; more and more singular individuals moved away from the access to such knowledge, impoverishing. This is the dialectic of humanization and alienation.

The concept of "human species" expresses "the result of human social history - the history of objectifying activity of human beings" (Duarte, 1993, p. 15), the activity that depicts the degree of universality reached in the considered historic time.

the social division of work opened a contradictory period in the humanization process: the advancement of human activity starts setting, at the same time, as a humanization factor and as alienation factor.

The type of production process of existence opened with private property determined radical changes in the human development process. In general, this process is characterized by radical expansion and diversification of human activities and, consequently by the growing possibility of development of human universality provided by a reality increasingly rich of objectifications, for a more intense and broader relationship with nature increasingly humanized. However, it is also marked by extreme impoverishment of the majority of people in relation to the possibilities created by the human development. (Mello, 2000, p.39)

It is important to highlight that the expression “human species” is here understood as “the human characteristics determined by genetic code and those produced and reproduced culturally” (Duarte, 2006, p. 213).

A look at the genesis of the social-historical process of mathematical knowledge development allows highlighting the dynamics of the human species development in the dialectic between humanization and alienation. In Giardinetto (2010, p. 763 - 767) two examples of this dialectic of this development were presented: the standardization of measurement systems and the adoption of a positional Hindu-Arabic numerical system.

The alienating aspect showed in the dynamics of the socio-historical process of standardization of measures occurred because of the concerns of international trading activities arising from the expansionism over time, which led to the practice of imposition of this measurement system over the planet. This is the alienating aspect.

But the humanizing aspect, was due to the historical fact of having finished the "commercial abuse and restored metrological order at the time of its creation" (Silva, 2004, p. 80) allowing "the possibility of systematization of sciences" (Silva, 2004, p.80). As for the adoption of the positional Hindu-Arabic numerical system, the alienating aspect was the concerns of European commercial expansionism from the cities of Florence and Pisa (Ifrah 1989, p.317; Struik 1998, p.24).

The humanizing aspect, the adoption of the Hindu-Arabic system ensured the democratization of calculation.

The production of mathematics to its universal forms often occurs by a process of overcoming by incorporation among conceptual topics, via qualitative leaps.

Exemplifying. Considerations about the qualitative leap of Euclidean geometry to analytic geometry are presented in Giardinetto (1991). In the historical development of mathematics, the concepts of analytic geometry were generated from the use of algebraic concepts in the analysis of the results of Euclidean geometry. From this use, algebra and geometry unified by the inclusion of their fundamental concepts, which led to a greater understanding of their specificities. Thus, as a product of this relationship, the reciprocity emerged between the geometric curves and their respective algebraic equations. Analytic geometry is the dialectical synthesis between algebra and geometry. Similarly, this process of overcoming by incorporation occurred in the genesis of differential and integral calculus (dialectical synthesis between algebra and geometry in the study of magnitude change rate and the accumulation of quantities) and in the differential geometry (dialectical synthesis between differential and integral calculus and geometry) and also the expansion of numerical sets (Caraça, 1984).

Giardinetto (2000) showed that the development of mathematics was through maximum depletion of certain moments of conceptual instruments to overcome via their incorporation. Following this dynamic, the development of mathematics processing through three stages was considered: "The origin of mathematics occurring in the limits of the human body dimension"; "The mathematical conceptual expression with reference to the utilitarian practice" and "mathematical knowledge as a process of abstractions of abstractions: the relationship".

At first, the instrument for the first counting and measurement procedures occurred with the human body as a reference. The development of mathematics at that time happened until the depletion of the body resource. The need to overcome of this instrument is what generated the second stage in which the abacus was created as a counting instrument and calculation and the standardization of measures. Again, a third stage of the development happened with the use of the abacus with the maximum depletion with the advent of the Hindu Arabic system. In this stage, the accumulation of mathematical results in social practices with the consequent logification of mathematics in "science of relationships" is verified (Prado Junior, 1952).

The universality is a result of historical process that can only be understood in its historical materiality. It stems from the human social history objectively carried out. And the human social history happened by social relations of domination through expansionary civilizing processes.

The logic of such expansionary processes was destructive with the imposition of a civilization over, others. As such, the "acceptance" of the culture of the dominated by the dominator was not expected, but rather the incorporation of what interested the dominator.

The disagreement among the level of mathematical development in different social contexts reveals to be a general phenomenon of knowledge production, particularly a phenomenon called "law of unequal and combined development of society."

According to this law, formulated by Marx and adopted in the conjectural analysis of the Russian Revolution by Lenin and Trotsky, the social historical process would result from the composition of two apparently contrary movements, but closely related, the "different proportions in the growth of social life" and "unequally developed factors in the historical process" (Novack 1988, p.09).

As for the "unequal development" implicit to the "law of unequal and combined development of society," the historical process in its totality occurs by the conjunction between an unequal development in nature and an unequal evolution in primitive societies.

Several elements of social existence appeared in different times, evolved in widely varying rates and developed, under different conditions, in different degrees. Archaeologists divide the human history into Stone, Bronze and Iron Age, according to the main materials used in the manufacture of tools and weapons. These three stages of technological development had huge temporal differences of duration. Stone Age lasted about nine hundred thousand years; Bronze Age lasted three to four thousand years B. C.; Iron Age has less than four thousand years. However, several groups of human species passed through these stages at different times, in various parts of the world. Stone Age ended

around 3500 B.C. in Mesopotamia; about 1600 B.C. in Denmark; in 1492 in America and did not end in 1800 in New Zealand. (Novack, 1988, p.22)

According to this author, a defining moment of evidence of this inequality of world historical development was the meeting of the American natives with Europeans (Novack, 1988, p.23):

In that time, the Stone Age collided with the end of Iron Age and the beginning of mechanization. In hunting and war, the bow and arrow had to compete with the musket and cannon; in agriculture, the hoe and the stick, with the plow and draft animals; in water transportation, the canoe with the ship; in terrestrial locomotion, human legs with the horse and bare feet with the wheel. In social organization, the tribal collectivism against the institutions and feudal-bourgeois habits; the production for the immediate community consumption against a money economy and international trade.

The law of combined and unequal development also applies in observing the inequalities of continents and countries (Novack, 1988, p.26):

Capitalism was highly developed in Western Europe, while in the East it was only implemented superficially. A similar disparity in the capitalist development prevailed between the United States and Mexico.

It is possible to draw a parallel with the development of mathematics. It is known that certain people have developed certain concept, mathematical topic long before the beginning of the same content in other people. About mathematics in China, Needham (1977, p.17) comments:

Before the river of Chinese science disembogued, as other else, in the sea of modern science, it got great achievements in mathematics. The decimal value based on the position and the blank for zero were used in the land of the Yellow river before any other place, and the same applies to the decimal metric system. (...) The Chinese mathematical thinking was always deeply algebraic, not geometric and during times Sung and Yuan (XII to XIV centuries AD), Chinese School was at the head of the rest of the world in solving equations, so that Pascal's triangle was old in China at the beginning of the XIV century.

Also, a stimulating factor of mathematics was the commercial exchanges. The larger the extension and trade openness, the greater the dissemination of mathematics developed. Without this, certain people were isolated in the human species development process:

Certainly in the authentic historical thinking the "if" so attractive to the popular thinking are out of place, but I have reasons to say that if in Chinese society had been possible parallel social and economic changes, had arisen there any form of modern science. And consequently, (...) they could have redone a long way before receiving the great stimulus of knowledge of science and Greek mathematics that would have undoubtedly, provided, becoming something similar to science we know nowadays. (Needham, 1977, p.41)

As for the character of combination of the law

There are two main types of combination. In one case, the product of an advanced culture is absorbed into the structure of an archaic social organism. In

other, aspects of a primitive order are incorporated into a social organism in higher level of development. (Novack, 1988, p.59)

In mathematics, an example of the influence of one culture over another is the eclipse of a calculating episode that occurred in China in 1730. In the end of XVI century and the beginning of XVII century, given the missions of astronomers and Jesuit mathematicians, an exchange between Chinese and Portuguese Jesuits occurred. These had more developed calculation techniques than the Chinese, which allowed the prediction without errors, of occurrence of eclipses in contrast to errors by the Chinese. The episode occurred in 1730, generated decisive reforms in Chinese astronomy. The least developed form of mathematics was incorporated into the most developed form at the time (Lingfeng, 2007).

It is important to note that social practices in specific social contexts show, in an analysis that overcome its immediate manifestation, the particularity of a time of forming historicity of human species. As Saviani states (1985, p.122): "What differentiates one culture from another is the direction followed by the cultural process; it is, in short, the type, the characteristics of which are of the instruments, ideas and techniques."

Thus, the direction of the historical process carried out by the formation of human species must be understood. A "mathematics" present in a particular community in Brazil, for example, a particular measurement, a particular form of calculation; that is not worked in school, carries the history of the investigated community immigration processes (such as Polish, Italian, etc, communities), mathematical practices in their countries of origin in the past. Understanding this fact as similarity in the constituted diversity, we must rescue these particular directions from the historical process.

Yet, on the procedural issue of the universality of knowledge, it is necessary to observe that by the processed historical-social dynamics, each individual in his/her singularity is related to the universality of human species, relates to the genericness. The way to relate is given by the particular circumstances of his life, for his/her particularity. It is necessary to understand as "the singularity is constructed in the universality and, at the same time and in the same way, as the universality is realized in the singularity, having the particularity as mediation" (Oliveira, 2005, p.26).

The individual-society relationship is part of a larger relationship, the individual genericness (human species):

In the social-historical conception of the people, this relationship [individual-society -JRBG] can only be understood as an inherent relationship to a wider one, which has this first relationship cited as its mediation with the pole called "singular". It is about the individual-genericness relationship, i.e. a person's relationship with the human species, which necessarily includes the relationship of each unique individual with human objectivations, which are, the objectivations historically achieved by the people through the generations, throughout the history of mankind. They are objectivations that need to be appropriated, for the individual, to dominate the context of the reference system in which he/she lives and thus, to objectify as an active subject and participant of the changes of that context. (Oliveira, 2005, p.28)

In other words, every single individual expresses, in his particularity, the universality contained in the human species. The relationship between the individual and the society "is the relationship between the individual (the singular) and human species (the universal) becoming real in the relationship that the individual has with the society (the particular)" (Martins, 2006, p. 03).

It happens that in the capitalist society, we have a society based on the split between the appropriate objectivations by the singular individual and objectivations produced by human species. The more human species produces, the more single individuals become unable to use these products, the more this majority is restrained of objectively existing possibilities.

For the access to the objectivations of the human species, the single individuals need to overcome the limits of the social structure, which they live, to overcome the circumstances of life that limit them.

In other words: the human species has become increasingly free and universal, but this freedom and universality have not been checked in the most singular people's lives. Thus, today there are already generic objectivations (objectivations of human species) to solve the great problems of humanity, but the structure of the society in which we live does not allow the vast majority of individuals to have access to them. In this sense, these individuals are alienated when facing these products of human activity. As Duarte states (1993, p. 112) "In fact, the individual never immediately relates to the human species. Such relationship is always intermediate by the individual's relationship with the concrete historical-social circumstances in which he lives. "

It often happens that individuals in their uniqueness and particularity are not perceived as part of the universal:

It should be noted, again, that - to expand his control over nature - the man can turn, according to new forms, an increasingly wider field of reality, becoming an object of individual need. However, when the immediate need of the individual form only a part of the overall set of social needs, it follows that the individual conscience cannot contain itself concretely social conscience in its totality. It, on the other hand, cannot even match with a certain part of the latter. The individual, in a certain way, already finds "ready" the fundamental schemes of his behavior and his activities; the individual should not do more than take possession of them in the proper sense of word. Such schemes, having been formed in the course of a long historical process, require and contain a precise level of knowledge of the world; but for the individual who already finds them given and that appropriates them such as they are, escaping the fact that they are historically mediated. (Markus, 1974, p. 71)

In general, the individual perceives his relationship with the society, but he does not realize this society as a private mediation of the universality in the constituted form of human species. The relationship individual-human species is mediated by the individual-society relationship, since "history has shown that a given society does not incarnate, unequivocally, all the existing development of human species and not even part of it at one time" (Oliveira, 2005, p.30). Consequently, each single individual is not perceived as part of the universality of human species in formation. According to Oliveira (2005, p.32):

As a result, this obscuration takes the thinking to several errors. Two of them refer, immediately, to the subject of today. The first refers to the definition of what would be the extreme poles of the singular-particular-universal relationship. The category "society" is, in general and without great mental effort, conceived as the pole representing the collective, the wider, the universal, since this category ("society") is more immediately perceived than the category "human species". In this reasoning sequence based on obviousness, the immediacy of what is perceived, the relationship between individual-society becomes the relationship considered in the analysis as if it matched to the singular-universal relationship. Obviously, as an immediate consequence of this choice, the human species category is discarded. As this process is driven by the obvious, this discard is not even noticed by many. The second error refers to the fact that the reality of the category "individual" and "society" is conceived as what is being expressed, what can be seen, measured, observed, immediately. As we are in a society of class, the poles of the individual-society relationship is necessarily shown antagonistic, since this antagonism is a reflection of the social relations of production that serve to the subordination and domination – the society of classes. In this way, in which the reasoning is restricted to the immediately given, the mere phenomenal manifestations, the life of the singular person is seen as something opposed to the social totality. And the social mediations that, in society of classes, are alienating and alienators, are forgotten in this formal-logical fighting "either ... or" i.e. on one hand the individual and the other hand the society, as if this (the society) could be away from the individual's life, or even eliminated, for that (individual) could realize his individuality, fully and freely.

We understand that many researches in Education carry on the equivocal conjectures indicated above by Oliveira (2005). These misconception occur for example in certain ethnographic researches that simply portray the restrictively investigated reality to empirical phenomenal manifestations of the sphere of alienated everyday life (Martins, 2006).

For the Marxist conception of knowledge, individual and reality supported by the method of historical-dialectical materialism

the empirical world represents just the phenomenal manifestation of reality in its outer definabilities. The immediately obvious phenomena, i.e. the primary representations arising from its projections in the consciousness of the people, develop at the surface of the essence of the own phenomenon. (...) The construction of knowledge demands so, the understanding of the content of the phenomenon, full of concrete historical mediations that can be only recognized in the light of the abstractions of the thinking, that is, of the theoretical thinking. It is not discarded the way in which the data is manifested, on the contrary, it is necessary to know it as a partial, superficial and peripheral dimension of the same. Therefore, the knowledge based on the overcoming of the appearance towards the essence requires the discovery of the inherent tensions in interconnection and interdependence between form and content. (Martins, 2006, p.10)

Consequently,

if we want to discover the hidden essence of a given object, i.e. overcome its understanding as empirical real, it is not enough for us accurate descriptions (written, filmed, photographed, etc!!!), it is not enough for us intimate

relations with the context of research, that is, it is not enough for us to do the phenomenology of naturalized and particularized reality in individual meanings assigned to them.

We need to go through primary representations and consensual meanings in its sensitive immediacy toward the discovery of multiple ontological determinations of the real. Therefore, it is not enough for us what is only visible to the eye, because the knowledge of reality in its objectivity, requires the visibility of the maximum intelligence of men. (Martins, 2006, p.11)

3.About the universality of mathematics: implications for its teaching

School knowledge are expressions of objective truths historically constructed. The systematized knowledge in the school version is a "classic", as Saviani says (2003). So, it is part of the curriculum in our schools. Similarly, the mathematical contents that make up the curriculum in elementary school and high school (Giardinetto, 2010).

The educational practice in this perspective should reflect the socialization of what different social contexts produced through a common core logic (Giardinetto, 2010, p.758). For example, "Pythagoras Theorem" became universal in time, since it is synthesis of various social practices in which used the mathematical relation that defines it as such, for example, African "Pythagoras Theorem" (Gerdes , 1992).

Through the appropriation of a certain universal mathematical result via school activity, the student has access to something coming from a specific activity in contexts that are not necessarily the context of his/her life.

In Giardinetto (2014, pp.102-108), this aspect was properly analyzed from the reflection of an ethnographic research conducted in an Indian village on the systematization of practices, in the case, of fishing, in various social contexts, systematized practice that originates the equation of the refraction phenomenon, known as the "Law of Snell-Descartes."

It is demonstrated through this example, the systematization of fishing practices that, with respect to the student, it is not necessary that he/she has some fishing experiences to justify the appropriation of this "classic" because,

It is not the individual's life context the condition of access to such knowledge. He [the student - JRBG] does not need to perform the specific human activity that results in such knowledge [of fishing activity - JRBG], so that he can have access to it. The universality "guarantees" the access to this knowledge independently to the generating social contexts. The student can have access to what the Indian of village Tapirapé practices [fishing - JRBG], but he does not know. In addition, the student can learn, even without practice. One of the merits of school activity is the democratization, via appropriation of systematized knowledge, of what are resulting of practices in different social contexts. (Giardinetto, 2014, p.107)

As noted here, the genesis of mathematics to its universal forms often occurred by a process of overcoming by incorporation among conceptual topics. The Mathematics teaching should accomplish a didactic that highlighted such specificities of the mathematical development process, which would contribute in this case, for the students did not see other mathematical topics without relation among them.

In accomplishing the pedagogical act of socialization of school mathematical knowledge, the mathematical concepts, object of appropriation by the students, are expression of the universality achieved, systematized version, in a given possible historical moment.

The appropriation of the universal character of a given concept by the student's thinking occurs in the relationship between the logical structure that composes the concept and the development historical process of the concept in their essential historical aspects. This is the dialectical relationship of logic and historic.

The logic guides the historic. Nevertheless, because it is synthesis of historical determinations, the logic reveals aspects of historical development, not entirely processed by advances and retreats in a non-necessarily linear process. The logic embodies in its constitution essential aspects that guide the historical investigation. However, the historical investigation can rescue non-highlighted aspects in teaching, aspects that should be essentials for understanding the concept in its logical version of the product (Duarte, 1987) .

The process of teaching-learning interests this dynamic between the product and the historical process of a concept formation.

Both the elaboration and the accomplishment of a teaching sequence, in which the logical of concepts shows the intrinsic historicity, requires from the educator/researcher the analysis of the historical evolution of the logic of concepts. In general, it can be stated that the logical-historical relation is an indispensable investigation method for the research in mathematical education, since, in the elaboration of teaching procedures, the logical process of elaboration of this content needs to be understood. It is this investigation about the historical development that will provide elements for the elaboration of a logical sequence of teaching, but in a way that this logical sequence reflects the story. Therefore, the point presented here, absolutely, that guides the investigation of the teaching sequence is the logical/historical relationship. (...) It is not on reproducing the story, but rather reproducing, (...) the logical essence of the relations of knowledge in its current form, the essential traits that synthesize logically the historical development of this content. (Giardinetto, 1991, p.32)

The "essential historical features" so mentioned must be decoded in the elaboration of the logical sequence. This logical sequence should respect the history of concepts in its essential aspects. Without this, the education ends up distorting the understanding of history.

An example of this distorted situation is the bad use of the abacus in the teaching-learning process. Mistakenly, this effective educational tool is not used or it is mistakenly used highlighting the differentiation by the color of its columns (Duarte, s/d).

Finally, it should be observed that in mathematics education, researches have pointed to an emphasis on mathematics produced in different social contexts without realizing or not giving the right value to relations, non immediately obvious, between the mathematics production in various social contexts and the school mathematics, this last, resulted of the processed universality. The singularity of individuals, the way the human species is presented, is captured in the circumstances by which composes the

particularity as a mediator between singularity and universality. As people do not adopt in their theoretical assumptions a similar concept of human species, the rescue is restricted to the local society that is presented immediately, "forgotten", "denied" by "Western" society.

The mathematics manifested in the singularity of the surveyed individuals is, in fact, the particularity as the universality presents itself before the circumstances of social inequalities.

For example, the singularity of a mason (or another profession among many social practices investigated), determines the social conditions of his/her marginalized life, universality of appropriation of a particular mathematical knowledge in the limits of everyday sphere given the social marginalization that put him/her away of school. The mason dominates part of the universal mathematical knowledge.

In Duarte (2004), there is an ethnographic research that points to the use of the Pythagorean Theorem by an investigated mason named "Aristotle" (ibidem, p.189).

The mason "Aristotle", in his words, provides (since the analysis surpass the immediate investigated) a clear example of the relationship between the mathematics produced in specific social context (the particular) and its school version codified by the Pythagorean Theorem (the universal). The mathematical relationship that today is called "Pythagorean Theorem" was present in the context of a specific production, among other practices throughout the history. A knowledge, a content, becomes universal as it becomes historical product, synthesis of social practices of all human social practice (Marsiglia 2011, p.28).

In Gerdes (2007), this author, committed to the task of rescuing mathematical practices in Africa, shows that African numeration systems use the bases 5, 10 and 20 or compositions among them. As the author does not use the relationship between the particularity of this production and the universality of mathematics made by human species, he does not consider and does not reflect on the implications of the fact that the majority of the people of the planet (Ifrah, 1989) also used such bases. The author points out a counter activity (Gerdes, 2007, p.33) that in Ifrah (1989, p.63) is similar to the counting used in ancient Mexico. He also points out the feature of counting by gestures in certain African people (Gerdes, 2007, p.29), similar resource used in other non-African people (Ifrah 1997, p.107-117). In full view, the similar activities make up moments of procedural logic of the genesis of the Hindu-Arabic number system.

In Jesus (2007), the mathematics produced in a Kalunga community is highlighted. As the community did not know the conventional metric system, it used poor resources to make standard measurements. The community used sticks, strings, parts of the human body, i.e. used similar strategies of the resources used by people until the hegemony of universal metric system of weights and measures.

Yet, Barton (2004, p.48) states that "to believe that all the cultures have components that can be described in terms of conventional mathematics" is a "colonialist assumption." This shows ignorance of the dialectic between humanization and alienation present in procedural logic rise to universal forms of mathematics, whose result is achievement of human species.

In Duarte's (2004), Gerdes's (2007), Jesus's (2007) and Barton's (2004) researches, interpretations restricted to immediately noticeable aspects of the historical processuality of mathematical development are verified. As they do not adopt, as reference, a totalizing category of historical perspective such a Marxian conception adopts, via singular, particular and universal category, researches as the above, identify the individual without the dimension of particularity and, therefore, they do not associate to the universal mathematical in construction by human species. As Mezhúiev (1980, p.139) warns:

Fixing only the cultural peculiarities of one time or another, however does not conduct the research outside the framework of superficial historiography, such simplified thought that behind the trees, the forest is not seen; behind the diversity, the unit is not seen; behind the differences, the meaning and universal content are not seen.

Due to the adopted theoretical concept, restricted to individual dimension and society (local vs. global), researches with such characteristics have, in fact, failed to defend the appropriation of school mathematical knowledge therefore, failed to appreciate it. Consequently, such researches share the ideals of pedagogies called the "learning to learn" with their "negative attitude in relation to school, its methods, its practices and its classic content" (Duarte, 2011, p.33).

4.Final considerations

This article intended to promote some thoughts on the specificity of the knowledge universal character, its concept, aspects of its procedural logic, as well as some implications for teaching.

Thus, it was evidenced that the universalization of knowledge derives from the synthesis of social practices throughout the world, practices carried out in a historical trajectory aimed by human species.

This historical process presents a conceptualized dynamic by the dialectic between humanization and alienation.

The fact that the universality of knowledge is intrinsically related to the objectivity of knowledge is pointed out. It reaches the maximum appropriate level to the objective conditions of the stage of development of human species in that historic moment.

However, this development is unequal. The human species will constitute and shaped through conflicts between more and less developed contexts.

In the individual's sphere of activity, understanding this dynamic is given by the relationship between singular, particular and universal. Hence, to say that each individual in his singularity relates to the universality of human species, he relates to the genericness. The way to relate is given by the particular circumstances of his life, for his particularity.

The dialectic of this dynamic is not often understood in its multiple determinations because of a formal logical interpretation in the phenomenon, which restricts this dynamic to an immediate empirical manifestation. The particularity that raises the

understanding of its universal determinism is obliterated. A formal polarization between individual and local reality is created, losing sight of the human species that was constituted.

As for education, it is important to defend an education that promotes the appropriation of universal mathematics.

Such appropriation requires capturing, in various manifestations of mathematics, of the core of of constitutor universal mathematics, which requires the enhancement of school mathematics via development of logical-historical sequences of education.

5. References

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