Revista Brasileira de Educação do Campo
The Brazilian Scientific Journal of Rural Education
ARTIGO/ARTICLE/ARTÍCULO
DOI: http://dx.doi.org/10.20873/uft.2525-4863.2018v3n2p519-2

Mathematical education of young and adults: pedagogical implications of historical-cultural theory

José Carlos Miguel[1]
[1]Universidade Estadual Paulista Júlio de Mesquita Filho - UNESP. Departamento de Didática/Programa de Pós-Graduação em Educação. Faculdade de Filosofia e Ciências. Avenida Hygino Muzzi Filho 737, Mirante. Marília - SP. Brasil.
Author for correspondence: jocarmi@terra.com.br

ABSTRACT. The present study addresses some pedagogical implications of historical-cultural theory for the exploration of mathematical ideas in the field of youth and adult education (EJA). Starting from an analysis of the state of the art regarding the difficulties of teachers and students for teaching and learning of Mathematics throughout the schooling process indicates elements to the debate that return to the explanation of the problems listed and to refer a process of constitution of mathematical learning subjects within the scope of the EJA. It is a bibliographical and documentary research, besides the analysis of usual mathematical situations in EJA classes, whose results show the difficulties of the basic school culture to overcome didactic actions still strongly marked by the association of models. It points to the theoretical construct of the historical-cultural perspective as a perspective for the realization of a broad process of production of meanings and negotiation of meanings of teaching and learning of Mathematics in the EJA.

Keywords: Youth and Adult Education, EJA, Mathematical Education, Formation of Concepts, Production of Meanings, Negotiation of Mathematical Meanings.

Educação matemática de jovens e adultos: implicações pedagógicas da teoria histórico-cultural

RESUMO. O presente estudo aborda algumas implicações pedagógicas da teoria histórico-cultural para a exploração de ideias matemáticas no âmbito da educação de jovens e adultos (EJA). Partindo de uma análise sobre o estado da arte no que se refere às dificuldades de professores e alunos para o ensino e a aprendizagem da Matemática ao longo do processo de escolarização indica elementos ao debate que se voltam à explicação dos problemas elencados e para encaminhamento de um processo de constituição de sujeitos de aprendizagem matemática no âmbito da EJA. Trata-se de pesquisa bibliográfica e documental, além da análise de situações matemáticas usuais em aulas de EJA, cujos resultados mostram as dificuldades da cultura escolar básica para a superação de ações didáticas ainda fortemente marcadas pela associação de modelos. Aponta para o constructo teórico da perspectiva histórico-cultural como perspectiva para a efetivação de um amplo processo de produção de sentidos e de negociação de significados de ensino e de aprendizagem da Matemática na EJA.

Palavras-chave: Educação de Jovens e Adultos, EJA, Educação Matemática, Formação de Conceitos, Produção de Sentidos, Negociação de Significados Matemáticos.

Educación matemática de jóvenes y adultos: implicaciones pedagógicas de La teoría histórico-cultural

RESUMEN. El presente estudio aborda algunas implicaciones pedagógicas de la teoría histórico-cultural para la exploración de ideas matemáticas en el ámbito de la educación de jóvenes y adultos (EJA). A partir de un análisis sobre el estado del arte en lo que se refiere a las dificultades de profesores y alumnos para la enseñanza y el aprendizaje de las Matemáticas a lo largo del proceso de escolarización indica elementos al debate que se vuelven a la explicación de los problemas enumerados y para encaminamiento de un proceso el proceso de constitución de sujetos de aprendizaje matemático en el marco de la EJA. Se trata de una investigación bibliográfica y documental, además del análisis de situaciones matemáticas usuales en clases de EJA, cuyos resultados muestran las dificultades de la cultura escolar básica para la superación de acciones didácticas aún fuertemente marcadas por la asociación de modelos. Se apunta al constructo teórico de la perspectiva histórico-cultural como perspectiva para la efectividad de un amplio proceso de producción de sentidos y de negociación de significados de enseñanza y de aprendizaje de las Matemáticas en la EJA.

Palabras clave: Educación de Jóvenes y Adultos, EJA, Educación Matemática, Formación de Conceptos, Producción de Sentidos, Negociación de Significados Matemáticos.

Introduction

The historical development of mathematical education as a theoretical field shows us, among other relevant formulations, that the attempts to explain the difficulties with the learning of Mathematics go through the ideas of inadequate working conditions in the school, inadequate teacher training (Ponte, 2003; (Danyluk, 1993; Oliveira & Moreira, 2010), and every aspect of the teaching of Mathematics (Danyluk, 1993, Oliveira & Moreira, 2010), problems of student assimilation, school devaluation, inadequate teaching programs, of this problem deserves consideration and plays a role for students' performance in mathematical learning.

The difficulties of mathematical learning of young people and adults are due in general to the school culture whose methodological procedure is still marked by the association of models, that is, a didactic conduct in which, if the student observes well the teacher does, he must learn, prevailing the utilitarian view and the Platonic view of Mathematics as we can conclude based on Chacón (2003).

By this way of understanding the teaching and learning of Mathematics, interesting logical-mathematical relations for the development of theoretical thought within this science, present in the social relations of working, playing, playing and interacting in the context of the EJA are little explored mathematically or even neglected.

Observation and follow-up of Mathematics classes at all levels, but in the education of youths and adults, in particular, reveal a certain distance between the evolution of mathematical thinking, clearly marked by contextualization and the attempt to solve problems that are for humanity throughout its historical trajectory. One loses sight of the fact that mathematics education is a social practice of an interdisciplinary nature, and therefore obliged to dialogue with other social practices, somehow disregarding in the methodological form of its diffusion the need to stick more to psychological and sociocultural bases than to systematic ones.

In spite of the acknowledged efforts to overcome the problem in the formative contexts, the organization of educational programs and public policies for education, this way of understanding the constitution of mathematical thinking, clearly marked by the attachment to the formal systematization, and the form of its diffusion in the school still marks, impregnates and determines the relation between content and form in this area of knowledge. Strictly speaking, it is necessary to understand how students think from the analysis of their supposed errors (Cury, 2007).

The most notorious didactic behaviors in schools indicate that since mathematics is a hypothetical-deductive science, it must predominate in its diffusion, from the first steps in the schooling process, the explication of its logical-formal chain and, therefore, students are required a level of abstraction and formalization that is beyond their capacity for understanding. In the case of the students of the EJA there is another contradiction: they mentally make interesting mental calculations, which usually do not know how to register in writing and, as a rule, in the school they seek the appropriation of formal models sometimes distant from their ways of thinking.

This tendency to exaggerated formalism in the teaching of Mathematics, a tradition that is due to the inadequate understanding of the formal Euclidean model (Imenes, 1987) by teachers, crosses practically all the themes of this area of knowledge and has reduced the approach of the mathematical notions to a axiomatic treatment that consists much more of seeking the algebraic formulation of this idea by the attachment to logical-formal reasoning than to an attempt to know and interpret the properties involved as fundamental concepts for the understanding of significant phenomena of students' lives.

In our view, the competence to deal with mathematical ideas is presented to the subjects before their inclusion in school and should be emphasized throughout schooling, starting in the literacy process by understanding that Mathematics is an important support component to reading and writing processes. From birth the person establishes relationships with the environment, developing, structuring and perfecting the intelligence through the development of basic structures of thought, ie, topological, algebraic and order.

It seems to us that the EJA school has little explored such relationships that are fundamental for the development of theoretical thinking and already in the first school experiences, therefore, teachers need to pay attention to the need to favor this construction since the EJA student brings for the school wide range of experiences of appropriation of mathematical ideas, although not systematized from the formal point of view.

The relative disregard for the development of the aforementioned thought structures and the school way of dealing with the diffusion of mathematical thinking neglects the fact that the good performance of pupils in the first years of formal schooling and their successful stay in school implies the careful work of stimulation of the senses, coordination, attention and direction of the construction of a symbolic language guided by activities that favor the development of theoretical thinking, a fundamental aspect for the effectiveness of the formation of mathematical concepts.

Data from the INAF, National Indicator of Functional Literacy, reveal over the last two decades the need to incorporate mathematical skills into the constitution of functional literacy indicators in order to reflect the diversity and progressive sophistication of reading and writing demands subjects must meet to be considered functionally literate in contemporary society.

Nevertheless, what has been seen over the last two decades is a mismatch between such needs imposed by the mode of production defined in the context of the proliferation of technologies, and especially of microelectronics. Thus,

> ... the INAF 2004 results indicate that only 23% of the Brazilian young and adult population is able to adopt and control a strategy to solve a problem involving the execution of a series of operations. Only this portion is also capable of solving problems involving proportional calculus. Even more disturbing is the revelation that only in this group are the subjects who demonstrate certain familiarity with graphical representations such as maps, tables and graphs. (Ação Educativa, 2004, p. 8-9)[i].

Despite the efforts of technical staff of education secretariats and education and training agencies, these indicators remain virtually unchanged. Why does it happen?

It is our hypothesis that in the multisecular tradition of a schoolized approach to mathematical knowledge, the traditional form of diffusion of mathematical facts does not give due importance to the experiences developed by the students from a very early stage of sensory exploration of the physical environment, interpreting the environment in which they live, knowing and transforming the relations present in it. As a consequence, Mathematics teaching programs are much more concerned with activities related to language, symbolization and quantification, failing to explore the development of the capacity for logical reasoning possible in a pedagogical work with the subject in question and that perpasses the practical activities of daily life, play activities and mathematical experiences, via mental calculation and estimation, so recognized in the context of the EJA.

That said, two distinctive marks of the didactic activity regarding the teaching of Mathematics in the EJA in the Brazilian context are evidenced. On the one hand, in the set of teachers who overestimate the role of mental calculation and estimation in mathematics teaching, this stage of basic training should emphasize the process of appropriation of reading and writing. But to what extent, the articulation and the diffusion of mathematical ideas cannot be formed from the processes of reading and producing texts? Of what Mathematics should we speak regarding the teaching of youth and adults of the EJA? A quick foray into the reality of school will show that these issues are not very clear. On the other hand, there is a current clearly affected by the mercantilist perspective of education, reinforcing the EJA students' rush to learn, and putting into practice a pedagogical action that is part of the formal systematization of mathematical models, neglecting the specificities of the intellectual development.

Both positions prove to be inadequate, judging by the main indicators of the evaluation of the results obtained by the students in the continuity of the schooling process. It is a problem that, despite the various invariants that compose it, has a position marked by the formation of the educator in its constitution. In discussing the role of research as an element of teacher's professional culture, Ponte (2003) states that

> The valuation of a research culture among teachers does not depend only on a more or less voluntaristic action at the individual level. It presupposes, on the contrary, a fundamental role of the collective instances where the professors carry out their professional activity, emphasizing the schools, the pedagogic movements and the associative structures. One of the major obstacles to the affirmation of a research culture in teachers is the old opposition between theory and practice. In this opposition, theory is something fanciful, unsuitable for the interpretation of reality, useless or even pernicious. Practice is the realm of normality and the inevitable, where all problems always find external justification (whether students, caregivers, explainers, lack of working conditions or Ministry policy). It is a bizarre conception of theory and practice. In fact, theory and practice are two sides of the same coin. They always coexist. Where there is a theory there is a practice and where there is a practice there is a theory. What is needed is whether the theory serves or does not serve and whether the practice is commendable or problematic. (Ponte, 2003, p. 18-19)[ii].

The citation is long, but it is illuminating for our discussion as the teaching practices in Mathematics teaching and the EJA need to be placed at a level that contemplates the recent advances of the research in Education, especially, as far as the sociocultural contributions of mathematical learning.

Overcoming in the EJA the utilitarian and merely instrumental conception of mathematical knowledge requires thinking the formation of an epistemologically curious teacher, willing to reflect on the meaning of mathematical knowledge, how it is constituted and to insert students in a process of meaning production and negotiation of learning meanings through establishment of a dialogic relationship:

> The relationship between thought and word is a living process: thought is born through words. A word devoid of thought is a dead thing, and a thought not expressed by words remains a shadow. The relationship between them is not, however, something already formed and constant: it appears throughout development and also changes. ... The word was not the beginning - action already existed before it: the word is the end of development, the crowning of action. (Vygotsky, 1991, p. 131)[iii].

Based on the author's thinking, it is necessary to consider that the development of language skills is carried out in conjunction with mathematical activities, which has consequences for the planning of actions in schools. In addition to the scientific and technological dimensions, Mathematics is consolidated as a component of the general culture of the citizen that can be observed in everyday language, in the press, in laws, in advertising, in games, in games and in many other everyday situations.

Thus, the present study aims to analyze the theoretical and methodological assumptions of the pedagogical action to be developed in the education of youths and adults with a view to sustaining the process of formation of concepts in Mathematics. For that, it discusses the theoretical foundations involved in the construction of the fundamental vocabulary of Mathematics and its implications for the teaching practice in the EJA in order to contribute to mathematical literacy in the first years of elementary school.

It is a bibliographic and documentary research that starts from the assumption that the EJA student is an active being who thinks, perceives things, facts and objects; elaborates mental images; establishes and formulates relationships; operating mentally and formulating concepts. It is a theoretical-conceptual construction that results directly from our work as coordinator in the context of the UNESP Program for Youth and Adult Education, PEJA, developed since the year 2000 and the Institutional Program for the Initiation to Teaching, PIBID-EJA, post in practice starting in 2009, both projects being aimed at the initial and continuous training of EJA educators and the articulation between teaching, research and university extension in this area of knowledge.

The developmental systematic of both programs involves intervention processes in the school reality and permanent reflection on the school context of the EJA. It is in the debate about the difficulties that the teachers in initial or continuous formation face that the possibilities of change in the form of methodological treatment of the diffusion of the mathematical knowledge are obtained. In this way, the present article discusses issues that daily apprehend in this process of action-reflection-action.

We also believe that mathematical knowledge can be taught, but that its appropriation must be based on the relations that the subject establishes between objects, facts and events. Knowledge, therefore, imposes on the subject who learns interaction and exchange with others, and in particular with the object of knowledge. The appropriation of the mathematical fact is simultaneously collective, active and individual action.

Finally, we consider that the understanding of these relationships is a central element for the formulation of proposals to address the difficulties faced by teachers and students in the teaching and learning process of Mathematics and for the consolidation of pedagogical principles aimed at an adequate epistemological formulation with a view to the organization of the Mathematics curriculum as an organic, articulate and flexible whole, highlighting its relations with the formation of concepts in the area. In this sense, in addition to the symbolic registration, the pedagogical work in Mathematics should contribute to the development of reasoning skills that begins with the support of oral language and, over time, incorporating more elaborate texts and representations.

We start from the belief that it is only from our own experience that the appropriation of mathematical knowledge is facilitated. Only a methodology based on the subtlety of one's own reasoning can lead to more abstract propositions and to the use of formal, logical, and deductive reasoning typical of mathematics.

Based on the assumptions of the Historical-Cultural Theory, it is our conviction that in organizing the teaching of Mathematics according to the needs of the students of the EJA, it is imperative to consider that the teaching activities organized by the teachers must focus on the development of the human personality.

In order to do so, the activities of EJA students are directly linked to the process of appropriation of the bases of mathematical concepts, such as the control of different quantities, quantities, space and form in their direct relation with the world and with things, of a physical nature or symbolic.

These activities are crucial for the appropriation of mathematical concepts involving the topological, algebraic, and orderly relationships so evident in people's daily actions such as orientation, location and notion of boundary, numbering, problem solving, and occupation and exploration of space, effective in the relations of people with the physical environment, with objects, with other people and, finally, with the world that surrounds them.

The production of meanings and meanings in the teaching and learning of Mathematics

A discussion about meanings and meanings in the teaching and learning of Mathematics in EJA is fundamental because teachers and students find themselves in their daily activities with problems of great complexity, both teaching and learning, affections to the dimensioning of what they do daily. In fact, the central element of the issue is the lack of attribution of meaning to what is done in the educational process.

Bishop (1999) points to three levels of culture that in their perspective determine the production of mathematical meanings and meanings: technical, formal and informal. According to the author, the technical culture of Mathematics involves the set of symbols and arguments used by mathematicians in their formulations. Formal culture relates to systematically organized mathematical concepts. On the other hand, informal culture considers the particular mathematical knowledge of an individual or social group.

To illustrate, let us take as examples mathematical situations of addition or subtraction of natural numbers effected mentally by EJA students. Almost always, in the heuristics they develop, they make an analogy to the use of money. In addition, we note that in expressing the heuristics they put into practice in mental calculus they reveal decomposition calculations, generally beginning with the higher order of the numeral, based on how they speak or interpret amounts of money:

200 + 40 + 9
+ 100 + 30 +5
300 + 70+14
300 + 70 + 10 + 4
300 + 80 + 4
384

600 + 40 + 2	500 + 140 + 2	500 + 130 + 12
- 300 + 90 + 7	- 300 + 90 + 7	- 300 + 90 + 7
		200 + 40 + 5
		245

Note that the idea of decomposition can also be maintained in multiplication and division, and in the latter it is also used to estimate:

20 + 2	20 + 2
X 20 + 3	X 20 +3
6	60 + 6
+ 60	400 + 40
40	400 + 100 + 6
400	506

1000 + 100 + 2	29
- 870	30
130 + 100 + 2	+ 8
200 + 30 + 2	38
-200 + 30 + 2	
0	

Obviously, it is the school's role to lead pupils to the development of the usual arithmetic algorithms, both for their social use and for the possibility of generalization that it holds, but one cannot ignore the knowledge they bring to school as a starting point for didactic-pedagogical action.

For Leontiev, the psychology of man is linked to the activity of concrete individuals included in the system of relations of society. Activity cannot be considered unrelated to social relations, for in this way it does not exist. The author explains this by stating: "Man finds in society not only the external conditions that must accommodate his activity, but also the social conditions contain the motives and ends of his activity, his procedures and means." (Leontiev, 1978, p. 68).

I turn to Leontiev to establish that the activity of knowing involves figurative, operative, and connotative aspects. Figurative knowledge relates to the external real and does not require the establishment of relationships. The subject forms an isolated mental image in which colors, sizes and shapes stand out. It is in this way that initially the students of the EJA can recognize the notes of the money or determined urban bus line. It is a kind of knowledge that focuses on memorization, repetition and tricks. Thus a pupil can see or utter numeral 209, but not know what 209 has to do with 208 or with numeral 210.

In turn, connotative knowledge relates to the formation of concepts, of meanings. It goes beyond the figurative knowledge, involving the establishment of relations, raising hypotheses and drawing conclusions. Thus, as an example, the car ceases to be just a four-wheeled vehicle, body and seats, as a means of transportation, and is also seen as a medium for production and services on a larger scale, qualitatively different from a scooter or of a stroller. The subject apprehends the real, giving meaning to it, using the concepts elaborated and using the objects according to their meaning.

In the operational context, knowledge is the interaction of the learning subject with other people and reality, characterized by active thinking, in order to overcome conflicts and contradictions arising from interaction.

All psychic activity, then, is a reflection of the practical activity, transporting to the subjective activity all the activity with objects realized in the cultural world, objective. Obviously, this transport does not occur mechanically, but implies the active participation of the subject, a process called historical-cultural theory as objectification, always determined by the social relations in which the subject is involved.

In this sense, Vygotsky (1995) explains that the formation of concepts does not take place mechanically, as a simple overlapping of photos taken from reality. There is a whole elaboration on the part of the subject in the constitution of the natural thought, that occurs in the exact moment in which it attributes sense to that all moment of experience.

For the author, psychic functions are internalized social relationships, that is, they are originally constituted in social processes. Therefore, the mediating function of the meaning of words constitutes a system of reversible signs allowing the two main functions of language, interrelated, communicative and representative, articulating thought. These functions are related to the processes of contextualization and decontextualization, giving meaning and value to the meanings of words. It should be noted, then, that the author highlights both the nature and its constitution, from and by the socio-cultural reality, which attributes to the concept of semiotic mediation a social and historical density.

In fact, it is

> ... access to objects necessarily passes through semiotic representation. Moreover, this explains why the evolution of mathematical knowledge leads to the development and diversification of registers of representation. (Duval, 2003, p. 21)[iv].

It is essential, however, to recognize that, in fact, the issue is not restricted to the problem of registers of representation, given the fact that students recognize a certain numeral but do not know the relation between it and its predecessor or successor. However, Duval's contribution is relevant as regards the strict context of symbolic registers, that is, as regards the forms of representation of mathematical concepts, since the semiotic representations are external and conscious of the individual, that is, they constitute the explicit understanding of a given object, and such perceptions are formed in different ways and is a problem of development.

Thus, if the variety of forms of registers and representations indicates, marks, and characterizes, to a certain extent, the functionality of human thought, it does not seem to us sufficient to expressly express our understanding of the object under study. And it is precisely at this point that the school sins because it places weight precisely in the formal systematization, read strictly in the symbolic representation, neglecting aspects related to the historical evolution of mathematical ideas, the production of meanings of learning and the negotiation of meanings mathematicians.

Thus, it is necessary to consider the complementarity of functions between thought and language and the fact that, strictly speaking, it is the semiotic function that enables thought, which is supported by Vygotsky (1995) of mental representations, is associated with the internalization of semiotic representations initiated by the mother tongue.

The difference in understanding the problem is subtle, but fundamental. While for Vygotsky (1995) the representative function is a function of language, together with communicative function, in the other way of thinking, although it is agreed that representation is the result of semiotic activity, such a function appears as autonomous, from which emerges representative intelligence.

Hence language, an articulated system of signs, historically and socially constructed, involves relatively stable, but changeable, instituted meanings, forming itself in the polysemy of words. It is in the context of interlocution that such meanings assume their concrete meaning.

Therefore, to understand the speech of the other is not enough to understand his words, it is necessary to understand how the other thinks and the motivation that mobilizes him.

For Vygotsky (1995), the function of representation is what defines the sign, that is, it is the specific function of sign systems, such as language. Therefore, sensory perception, the primordial manifestation of knowledge of the real, is already delineated semiotically, although the subject of it is not fully aware. It is famous the following passage of text of the author on the question:

> A special aspect of the human species - which comes at a very early age - is the perception of real objects. This is something that does not find correlate in the animal species. By this term I understand that the world is not seen simply in color and form, but also as a mural with meaning and meaning. (Vygotsky, 1995, p. 37)[v].

In this way, when the subject comes into contact with the world of objects and manipulates them, what he perceives is not mere objects, but semiotic objects, that is, things that have names, physical or imaginary entities. Along with the visual image of the object, the subject captures the word that gives it meaning, even though word and object seem to be confused. In other words, the subject in the process of literacy in the EJA is not enough to draw the numeral 20, sometimes related to the social use of money; more importantly, the learner knows what 20 has to do with 19 or 21, or what he can buy with that grade, which is not always considered in school and is meaningful to him.

In the case of imitation, or in the case of symbolic play, what makes semiotics such activities, for Vygotsky (2009a), is the meaning they have for the other, of the social group, and not the similarity with the represented object. This is a fundamental conclusion, with which one can define how obsolete are the didactic procedures that prioritize only the symbolic representation of numbers or geometric entities.

Take, for example, the concept of square, sometimes erroneously diffused in school as a figure or polygon having four equal sides. How or what, in this definition, would a diamond be? Does not a diamond also have four sides of equal size? Pedagogically, it would be more effective to conduct subjects to observe, manipulate, overlap, and compare different geometric figures in order to recognize regularities present in them, so as to establish that every square is, strictly speaking, a rhombus, but not every rhombus is a square. The same problem of model association that does not actually deal with conceptual elaboration can be noted in relation to students' incomprehension of the distinction between circle and circle, or between square and cube, or important conceptual relations of social use between cm^3 and milliliter or between dm^3 and liter, among other difficulties.

Indeed,

> The learning of Mathematics refers to a set of concepts and procedures that involve methods of investigation and reasoning, forms of representation and communication. As a science, mathematics encompasses a broad field of relationships, regularities and coherences, arousing curiosity and instigating the ability to generalize, project, predict, and abstract. The development of these procedures expands the means to understand the world around us, both in situations nearer, present in daily life, and in those of a more general character. On the other hand, Mathematics is also the basis for building knowledge related to other areas of the curriculum. It is present in the Exact Sciences, in the Natural and Social Sciences, in the varied forms of communication and expression. (Brasil, 2001, p. 99)[vi].

Without the necessary pedagogical attitude of contextualization and decontextualization there is no need to talk about meaning production and negotiation of learning meanings. It is about leading EJA learners to understand that mathematical ideas evolve. Thus, the History of Mathematics reveals itself as an important approach and motivation strategy for the teaching of mathematical concepts. For this reason, D'Ambrosio (1996) asserts that the History of Mathematics is central to the establishment of a teaching process that presents Mathematics as a cultural product, contrary to the usual diffusion in the school system that treats it as a ready, definitive truth and finished, exact science that seems unrelated to human vicissitudes.

Also, Miguel and Miorim (2004) emphasize that the History of Mathematics will help the student to realize that Mathematics is not a science isolated from other areas of knowledge, consolidating itself as a human creation and, mainly, indicating to the students the reasons by which people do and practice mathematics, that is, practical, economic and cultural needs are the stimulus to the development of mathematical ideas. It is, therefore, a problem of development, being that in the scope of the historical-cultural theory is the learning that advances it.

Davidov (1988) relies on Vygotsky (2009b) to cite the most recent edition, and in Leontiev (1978) to establish that education is the indispensable and general internal source of development. That is, teaching can only be effective, which, through the content of knowledge to be appropriate, anticipates and guides development.

Therefore, according to Davidov (1988), it is possible to develop in the subject capacities and skills historically formed and essential to contemporary reality. It is not enough to teach the EJA student the social function or use of a particular concept, it is necessary for him to develop (or reproduce) the human abilities that are inherent in this object of knowledge in order to use it properly.

The development of theoretical thinking, particularly in relation to the mathematical context, imposes the students' need to establish relationships between facts and things in order to coordinate actions. It is remarkable the pleasure of the students to sit on wheels to talk, to relate life stories, to make pictures, to participate in some game, to do folds, to play and to listen to stories. All of these situations can be exploited for the formation of mathematical concepts, considering the quantitative, logical, topological and order aspects involved. According to Melo & Cruz (2014), the conversation wheel has the characteristic of allowing the participants to express their impressions, concepts, opinions and conceptions about the proposed theme, as well as to reflect on the manifestations presented by the group.

We note all these activities in the daily life of the EJA. But these activities that populate the universe of the young and the adult need to be further explored in order to know their interests, tastes, difficulties, desires and insecurities. Likewise, all these situations can be quantified and explored mathematically verbal or by the mediation of a scribe who can be the teacher himself, when they still do not master reading and writing. As an example, the wheels of conversation and life histories always present in the EJA situations involving the functions of the number that, in general, are rarely explored in didactic work in Mathematics: codes such as the ZIP code of the streets, the telephone number, the identity folks; ordinality when referring to an apartment in a building or to a historical data or, still, the measure as an extension of the idea of number. But in general, the school treats the number only with quantification.

On the other hand, pictorial registration through drawing or coloring on checkered paper allows the exploration of graphics, tables, paths, maps and other forms of representation absolutely possible and allows the contextualized exploration of notions of number and of fundamental facts of elementary mathematical operations. I mean that the talk wheel can not be limited to the conversation, although this in itself is already important, as Bakhtin (2012) teaches us.

In fact, understanding how EJA students think and how they organize their thinking in different situations enables the teacher to plan didactic referrals that favor them to broaden their thinking strategies.

The complex issue of concept formation and activity theory

Undoubtedly, mathematical learning is conditioned by the internal structuring of that science. The nature of the process of its construction obliges us to return periodically to the same contents with increasing levels of complexity, abstraction and formalization throughout the entire schooling process. However, when the student begins the construction of mathematical notions, he does so by making them cohesive with the concrete situation in which they present themselves. This reinforces the need for a formal presentation from the environment itself and the impossibility of arguing over abstract situations without due discretion.

A concept is not something that is formed a priori, as a ready, finished and undeniable truth. To form a mathematical concept requires taking hypotheses, drawing conclusions about them and observing regularities, recording processes and results and systematizing situations, without losing sight of the playfulness and pleasure of discovery inherent in mathematical thinking.

Undoubtedly, by appropriating the forms historically instituted for the proper use of objects and knowledge, the subject appropriates everything that is found in the sphere of culture. It is through practical activity, with objects of culture, that the formation of what historical-cultural theory calls "ideal," an internalized form of its material, actual existence, whose appropriation is made possible through verbal communication between people, that is, thanks to language.

In this way of conceiving the relations between empirical thought and theoretical thinking, Davidov (1988) thus refers to the thesis of dialectical materialistic logic:

> ... the original, starting and universal form of existence of the logical figure is the real, sensorial - practice activity of man. Verbal thinking can be understood scientifically as a derived form of practical activity. This thesis is, in our view, unacceptable for traditional formal logic and for the traditional psychology of thought. On the contrary, this thesis is completely legitimate for the dialectical materialist logic and for the psychology which is consciously and consequently based on its principles. It is clear that logic and psychology must start from a common understanding of the activity that tends to accomplish the goals of man and his main types. (Davidov, 1988, p. 20)[vii].

It should be noted, then, that dialectical materialist logic proposes a differentiated understanding of human activity, as responsible for the appropriation of historically accumulated culture, for the conditions of objectification of the subject, and for the development of the human psyche.

According to Vygotsky (1991), we infer that everyday and scientific concepts involve different experiences and attitudes on the part of subjects of knowledge and develop by different trajectories, too. Sometimes the subject becomes aware of his spontaneous concepts relatively late, that is, the ability to operate with them at will appears long after he has acquired the concepts, that is, he has the concept, but he is not aware of the his own act of thought. In the case of the development of scientific concepts, the process usually begins with verbal definition and with application in non-spontaneous operations. It is a process that occurs at the level of interactions, teacher-student and student-student, it could be said.

In the context of historical-cultural theory it is observed that the development of the subject occurs in a systemic way, that is, with the development of all the psychic functions taking place in an integrated, joint way. Thus, in historical-cultural theory there is no specific approach to the development of logical reasoning in students, and this type of reasoning is considered, together with the other higher psychic functions, a product of the type of activity that is provided to the subject since the beginning of its development. Logical reasoning would therefore be a specific form of organization of broad thinking, theoretical thinking.

Leontiev (1988) calls activity not to any student's doing, but that it is meaningful and especially, that it has a purpose. According to him,

> By activity, we designate the processes psychologically characterized by that to which the process as a whole is directed (its object), always coinciding with the objective that stimulates the subject to perform this activity, that is, the motive. (Leontiev, 1988, p. 68).[viii]

There will only be activity, therefore, when the motive and the goal coincide. It is important, then, that mediator teachers consider the concept of activity and its implications for the teaching process, which brings us back to the problem of training.

The study activity then reports to a specific form of activity directed towards the assimilation of theoretical knowledge, with a view to the formation of theoretical thinking.

For Davidov (1988), psychic activity develops as the subject plans and selects the objects (instruments) and the way (strategy) to use them, according to the purpose of the moment. The ability of planning, in turn, depends on the development of needs, which are always social.

Every activity is triggered by a need. Activity always seeks, as purpose, that which is not yet real, but that there is possibility of being real - this is the main characteristic of vital activity. Thus Davidov (1988, p. 33, my translation of the original in Spanish) refers to the subject:

> To seek what does not yet exist, but which is possible and which is given to the subject only as a purpose, but not yet realized: this is the main characteristic of the vital activity of any sentient and thinking being, that is, of the subject. The paradoxical character of the quest consists in the combination in itself of the possible with the real. ... The subject organizes his actions in dependence of what can happen in the future and a future that does not exist yet! Here the purpose, as an image of the future, as the image of what is to be determines the present, defines the real action and state of the subject.

It is commonplace that we find in basic education mistaken assertions by students about geometric forms. A circle is sometimes referred to as a ball, a sphere may also be a ball or circle, and a cube is sometimes taken as a square, among other vicissitudes of that nature. Among other reasons, this is due to the fragmented way in which the geometric entities are presented to the students, starting from the flat forms to reach the spatial forms. It is a consequence of the multifaceted presentation of mathematical fact in school and a contradiction, since knowledge is constituted from what is general to what is specific, from what is broad to what is particular.

In this perspective, the formation of geometric concepts is inversely related to the way in which the school usually explores the geometric concepts, besides disregarding that the knowledge process is established by the force of social and interpersonal relations.

Thus, Davidov (1982) considers that the objective of schooling should be the parsimonious pursuit of the development of theoretical thinking, beyond empirical thought. In its formulation, the study activity, through specific tasks, has as a goal to lead the student to the appropriation of more general laws that involve a mathematical concept, so that they are directed towards the concrete relations being, through the appropriation, the relation is transforms into abstraction with content.

By this way of conceiving the appropriation of scientific knowledge, mathematical knowledge and geometry, in particular, is taken as human, historical, and social production. Being in study activity requires that teaching material should prioritize the solution of cognitive tasks in a context of investigative and exploratory action in order to ensure the creative experience.

The EJA student seeks to satisfy his / her cognitive interests by communicating with others and by observing their surroundings. It is with the process of formal schooling, according to Davidov (1988) that there is a new stage of development whose main activity becomes the activity of study.

Under the guidance of the teacher, the learner systematically assimilates the theoretical content in the form of scientific concepts, moral values and artistic images, the developed forms of social consciousness observed in science, art, and morals and capacities to act in accordance with the demands of these organized forms of thought.

Therefore, Davidov (1988) considers that the organization of the study activity requires the introduction of new forms for full realization, and the general cultural habits of reading, writing and calculation are not enough. They must constitute a general psychic development in the form of capacity to study.

It is a question of seeking an organization of teaching in the EJA that contemplates appropriations of scientific concepts, not just everyday ones. This is an essential condition for the development of theoretical thinking. It is the coexistence with representations that allows the students to elaborate thinking capable of articulating the various conceptual meanings, be they arithmetic, algebraic or geometric. This requires the insertion of the student in investigative activity, assuming the development of his ability to elaborate questions, starting from the mediation of the teacher who is responsible for elaborating and organizing particular tasks aimed at achieving this goal.

Once these considerations have been made it is necessary to establish that, according to Duval (2003), the understanding of information or mathematical activity lies in the simultaneous mobilization of at least two registers of representation, or in the possibility of changing at any moment of registration of representation. The coordination of at least two registers of representation is manifested by the speed and spontaneity of the cognitive activity of conversion. This, in theory, explains a great part of the students' difficulties with the mathematical activity because a process of teaching by association of models is still manifest in school, practically devoid of the foundations of the dialogical relation necessary for the production of meanings and for the negotiation of meanings in mathematical education as we defend throughout this article.

As learning can be understood as the possibility of making connections and associations between different meanings of each new idea, it depends, then, on the multiplicity of relations that the student establishes among these different meanings. Hence communication is a resource that helps the learner to establish the connections between his spontaneous conceptions and what he is learning again with a view to establishing meaningful learning in Mathematics.

Incoherently, sometimes the school still explores in the schooling process the work with the reproduction, without understanding, of ideas and concepts, of texts, of copies, in short. On the one hand, it loses the possibility of exploring in the process of mathematical literacy the rich body of symbols that the pupil lives even when he leaves for the streets or to organize the physical space destined to the construction of his own dwelling; On the other hand, when the school inserts the EJA student in the mathematical world it seems that it does it starting from nothing and it usually sins by the repetition of symbols devoid of meaning, losing the possibility of thinking the negotiation of mathematical meanings.

Researches such as those developed by Bruner (1997) or Lins & Gimenez (1994), for example, emphasize the processes of signification in the historical-cultural perspective, emphasizing that the production of meanings and negotiation of meanings are concepts that encompass both meanings already consolidated as the meanings that things, words, events, gestures, actions, etc., can assume for people.

In this way, all signification is a social production. From this point of view, producing meaning for mathematical concepts implies linking them to other factors internal or external to the Mathematical discipline. It is a didactic-pedagogical action that involves activities of investigation, contextualized action, comparison, and observation of mathematical facts of reality, relations between the constituent elements of objects created by humanity and, in particular, the relation between informal knowledge and systematized mathematical knowledge.

Therefore, the teaching of Mathematics for the subjects of the EJA can be initiated by the coordination of quantitative relations of the cultural universe of students such as those involving quantitative data of reality, play activities and sensorial exploration of the physical environment, spatial perception, from the moment the subject identifies and perceives their location in space, even if this space is as close to it as the classroom, home, street where they live, among other things.

From the exploration of the sensory space it is possible to lead the students to observe the objects that also occupy this space, to make relation between one and another object, the size that they have; identify and relate similarities and differences; recognize the geometric forms, dates or times; and other mathematical ideas present in the daily routine, in particular, those that go back to the numbering.

However, the study activity aims at the appropriation of socially elaborated experience, knowledge and skills, which presupposes the formation by the students of the abstractions and generalizations that form the basis of theoretical thinking. Yet according to Davidov (1988), content is the basis of teaching that promotes development.

In this way, subjects of the EJA need to establish the connection of the universal or the general with the particular or singular, that is, operate with the concept in the transition from general to specific. In the words of the author,

> By its content, the theoretical concept appears as a reflection of the processes of development, of the relation between the universal and the singular, the essence and the phenomena; by its form, appears as a procedure of ascension from the abstract to the concrete. (Davidov, 1988, p. 152)[ix].

Thus, to teach geometric concepts in the EJA we can organize ourselves from relations between Space and Form and Greatness and Measures, without the preoccupation with formalization too early as it happens, but with the development of geometric ideas that can throughout the development sustain the structuring of mathematical thinking. Activities of recognition of physical space, indications from objects, locality, near, far, right, left, above, below, here, there, etc., are revealed as necessary for the development of what can be called fundamental vocabulary of Mathematics.

To direct the conclusion of the text, we emphasize that in the daily activity the student develops the capacity of imagination, being that when getting involved in the activity of study, appropriates the capacity to think theoretically. It should also be noted, however, that such capacities are not innate, they are developed in a process in which the individual reproduces, by his own activity, the human capacities historically formed.

It seems to us fundamental to consider in due proportion theoretical elements that point to the game as a phase of transition to more developed stages of thought, that is,

> ... in the later stages of game development, the object already manifests itself as a sign of the thing through the word that dominates it, and the action with gestures abbreviated and synthesized concomitantly with speech. Thus, ludic actions have an intermediate character and gradually acquire that of mental acts with meanings of objects that take place in the plane of speech aloud and still rely on external actions that nevertheless have already acquired the character of gesture- synthetic indication. (Elkonin, 2009, p. 415)[x].

Again as an example, from activities aimed at the exploration of the environment, which for students is a game, they do not only learn about space, but also exercise and learn the vocabulary necessary for such communication. Constructions with different materials, setting up models, routes and labyrinths and the exploration of larger spaces, which can be done from the explanation of the path they make from home to school, from classroom to bathroom, from where they live for work, the path they have taken on a tour they have done, and several other paths, can enable EJA subjects to relate reality and mathematical ideas. Likewise, measuring shapes and paths with the most different nonstandard quantities such as the span, the foot, a piece of string or wood may prove salutary so that they gradually understand the need to use a tape measure, instruments of standardized measures. Likewise, the exploration and quantification of work reality data can relate the mathematical concepts that are explored daily and the school mathematics.

When students begin to recognize geometric forms, it is common to use names created by them, names that are not specific, and it is then up to the teacher to know how to respect the nomenclature created by the subjects, but as soon as the opportunity arises to speak the name of the form that the subject he has to explore the regularities of the figures in order to lead the students to recognize the specific name of a geometric form in recognition of their particularities.

Elkonin (1987) warns, however, that the child does not live his work as the adult; in the same way, I would say that the adult cannot be infantilized, that is, he has his own form of experiences in the context of his cultural activity, his work and even in the act of playing or playing. Therefore, based on the author's thinking, it is important to approach the game as fundamental to psychic development, without limiting it to the merely didactic question. I emphasize that an analysis based only on the skills, abilities and notions that the game can contribute to form in the students restricts its possibilities, putting in second place its specificity by the observation and representation of the social relations of adults in the game.

In light of the above, we need to develop actions in order to mobilize the groups constituted in the school of EJA, directing them to reflection, so that the contradictions between thought and action, between the lived and the conceived , become explicit, driving them to change. This leads us to think that:

a) the disinterest and low achievement of students in Mathematics, historically due to the traditional way of transmitting mathematical knowledge, contrasts with the playful content and formal beauty of Mathematics;

b) the exaggerated emphasis on the logical-formal symbolism of Mathematics reinforces the pedagogical tendency to "pass content" to the detriment of a process of formation of mathematical concepts;

c) the preoccupation with routine operations and memorization impairs the cognitive development of the student determining, in association with other factors, the failure of teaching;

d) the lack of integration between the themes according to the linear organization of the curriculum ("ladder curriculum") contrasts with the idea of "spiral organization" or with the contemporary conception of curriculum as a "network of meanings" and reinforces the fragmentation of Mathematics teaching programs.

To summarize, the discussion about the problem of the formation of mathematical concepts must consider as central theses of the action in the teaching situation a broad process of production of meanings of learning and negotiation of meanings based on the pedagogical implications of the historical-cultural theory for education mathematics of young people and adults:

a) Contextualized problematization: consideration in the pedagogical work with Mathematics of the socio-cultural contributions of the student to be considered in the school situations experienced by students outside it, what could be called cultural mathematics, that is, the various forms of mathematization developed by the various social groups, in order to allow the interaction between these two forms of mathematical thinking.

b) Historicization: to show students how mathematical ideas evolve and complement each other in an organic and flexible whole, is a basic assumption to understand mathematics as a construction process.

c) Transdisciplinary entanglement: organization of mathematical ideas in articulation with the various areas of knowledge since they do not arise from nothing; on the contrary, many mathematical ideas did not even arise in exclusively mathematical contexts.

Mathematical learning is conditioned by the internal structuring of this science. The nature of the process of its construction forces us to lead the student to return periodically on the same contents with levels of complexity, abstraction and formalization increasing. When the student begins the construction of mathematical notions, he / she makes them cohesive with the concrete situation in which they present themselves. This reinforces the need for a formal presentation from the environment itself and the impossibility of arguing over abstract situations without due discretion.

In such a way, to form a mathematical concept demands to raise hypotheses, to draw conclusions about them and to observe regularities, registering processes and results and systematizing situations, without losing sight of the playfulness and pleasure of discovery, inherent in mathematical thinking.

Possibly, when observing the speech, the experiences and the usual mathematical knowledge of the students of the EJA, the teacher will see that even when registering incorrectly, the adult may be understanding the content presented to him, and manifesting this learning in his own way. To what extent has this been considered in the daily pedagogical practice of the initial years of schooling, in particular, in what concerns the teaching of mathematical concepts in the EJA?

Conclusion considerations

In recent theoretical formulations, the attempts to renew Mathematics teaching programs in the Brazilian context, especially in the last thirty years, seem evident in recent theoretical formulations. In general, the teaching programs planned in this period address issues that can be considered as current in this curricular context such as the notion of mathematical literacy, the quest for overcoming linearity of the curriculum, the perspective of meaningful learning, relations of mutual impregnation between the mother tongue and mathematical language, and in particular the understanding of problem solving as the matrix that generates a process of formation of concepts in Mathematics.

In this sense, we highlight throughout the article some contradictions that stand out in the daily life of mathematics education and the implications for the initial schooling of the youth and adults of the EJA. On the one hand, one loses the possibility of exploring in the educational process the symbolic richness that the subject experiences even when going out into the streets; On the other hand, when the school inserts the adult in the world of numbers, he thinks that he does it out of nothing and sins again by the repetition of symbols devoid of meaning and does not consider the possibility of thinking about the production of meanings and the negotiation of meanings in Mathematics. Not infrequently, we observe in some classes of the EJA the eagerness for the introduction of the symbolic language of way too precocious.

We start from the idea that, given these findings about the recent curricular movement in mathematics education, EJA and academic debate in a national context, the analysis of teachers' representations about these attempts to renew the teaching process still turns out to be somewhat contradictory, to be judged by the chosen pedagogical behaviors and the mathematical learning evaluation indicators.

Analyzing some invariants of this situation we establish that the development of theoretical thinking, in the historical-cultural perspective, consolidates parallel to the sensorial development and it is the task of the teacher of the EJA to contribute to the development of both through a pedagogical action that puts as a perspective the problem of the sense and meaning of teaching and learning of Mathematics.

We consider that the predominant preoccupation with the development of a symbolic language that is excessively abstract and patterned by repetition and memorization still prevails, practically at all levels of mathematics teaching. Thus, topics that should be dealt with in an integrated way with other areas of knowledge, involving practical activities, have been approached in isolation from each other, making it difficult for students to learn and synthesize.

Thus, the contemporary tendency of curricular organization sees the formation of concepts as a vast field of decisive formulations for the development of logical reasoning, in the resolution of problems that require visualization and manipulation of mathematical facts as well as for the establishment of relations between facts of other knowledge areas.

The work with mathematical notions significantly from the first steps in the schooling process also contributes to the expansion of number and measure ideas, since it stimulates the student to observe, perceive similarities and differences, and identify certain regularities inherent in mathematical thinking.

Thus, without the pretension of exhausting the discussion on the subject, we establish throughout this article that it is from the exploration and manipulation of ideas and data of the physical world that the student will be allowed to establish connections between Mathematics and other areas of knowledge. Basically, a process of teaching and learning Mathematics significantly in the EJA, as discussed, cannot do without the broad process of negotiation of meanings and production of senses of learning; of historicization that allows to consider the process of evolution of the mathematical ideas and, also, of transdisciplinary treatment of the themes developed in the mathematical education that can make possible for the students the perception that the Mathematics is, primordially, a science that deals with the search of solution of problems faced by humanity in the course of historical development.

The research in Mathematics Education reports extensively to these particularities of the teaching of this science and denounces the neglect with which the learning of this language in the school has been treated. Among other actions, it is salutary the discussion with teachers and those interested in the subject about the importance of the presence of the transmission of these mathematical ideas in the different levels of education in order to meet the needs of the subjects of the EJA to build knowledge articulated with the various domains of thought and the social imposition of instrumentalizing them better to live in a world that progressively requires the most different knowledge and skills.

References

Ação Educativa. (2004). *4º Indicador Nacional de Alfabetismo Funcional: um diagnóstico para a inclusão social pela educação (Avaliação de Habilidades Matemáticas).* São Paulo: Ação Educativa/Instituto Paulo Montenegro/IBOPE.

Angelucci, C. B., Kalmus, J., Paparelli, R. & Patto, M. H. S. (2004). O estado da arte da pesquisa sobre o fracasso escolar (1991 – 2002): um estudo introdutório. *Educação e Pesquisa*, *30*(1), 51-72.

Bakhtin, M. M. (2012). *Marxismo e filosofia da linguagem.* São Paulo, Hucitec.

Bishop, A. J. (1999). *Enculturación matemática: la educación matemática desde una perspectiva cultural*. Trad. de Genis Sánchez Barberan. Barcelona: Paidós.

Brasil. (2001). Ministério da Educação. *Proposta Curricular para EJA, Ensino Fundamental, 1º segmento*. Brasília: MEC; Ação Educativa.

Bruner, J. (1997). *Atos de Significação*. Porto Alegre, Artmed.

Chacón, I. M. G. (2003). *Matemática Emocional: os afetos na aprendizagem matemática.* Trad. Daisy Vaz de Moraes. Porto Alegre, Artmed.

Cury, H. N. (2007). *Análise de erros: o que podemos aprender com as respostas dos alunos.* (Coleção Tendências em Educação Matemática). Belo Horizonte, Autêntica.

D'Ambrosio, U. (1996). *Educação Matemática: da teoria à prática*. Campinas, SP, Papirus.

Danyluk, O. S. (1993). *Alfabetização Matemática: o cotidiano da vida escolar*. Caxias do Sul, EDUCS.

Davidov, V. V. (1982). *Tipos de generalización em la ensenãnza*. Habana, Editorial Pueblo y Educación.

________. (1988). *La enseñanza escolar y el desarrollo psíquico: investigación teórica e experimental*. Trad. Marta Shuare. Moscú, Editorial Progreso.

Duval, R. (2003). Registros de representação semiótica e funcionamento cognitivo da compreensão em Matemática. In Machado, S. D. A. (Org.). *Aprendizagem em Matemática: registros de representação semiótica* (pp. 11-33). Campinas, Papirus.

Elkonin, D. (1987). Problemas psicológicos del juego en la edad escolar. In: Shuare, M. (Org.). *La Psicologia Evolutiva e Pedagógica em la URSS* (pp. 83-102). Moscou: Editorial Progreso.

_________. (2009). *Psicologia do Jogo*. São Paulo, Martins Fontes.

Imenes, L. M. (1987). *Um estudo sobre o fracasso do ensino e da aprendizagem da Matemática*. (Dissertação de Mestrado). Universidade Estadual Paulista Julio de Mesquita Filho, Rio Claro.

Leontiev, A. N. (1978). O Homem e a Cultura. In Leontiev, A. N. *O desenvolvimento do Psiquismo* (pp. 277-302). Lisboa: Livros Horizonte.

_________. (1988). Uma contribuição para a Teoria do Desenvolvimento da Psique Infantil. In Vygotsky, L. S. et al. (Orgs.)**.** *Linguagem, Desenvolvimento e Aprendizagem* (pp. 59-84). São Paulo: Ícone/Edusp.

Lins, R. C., & Gimenez, J. (1994). *Perspectivas em Aritmética e Álgebra para o Século XXI*. Campinas, SP, Papirus.

Melo, M. C. H., & Cruz, G. C. (2014). Roda de conversa: uma proposta metodológica para a construção de um espaço de diálogo no ensino médio. *Imagens da Educação, 4*(2), 31-39, 2014.

Miguel, A., & Miorim, M. Â. (2004). *História na Educação Matemática: propostas e desafios.* Belo Horizonte: Autêntica.

Ponte, J. P. (2003). Investigar, ensinar e aprender. *Actas do ProfMat,* 25-39.

Oliveira, S. A. C. K., & Moreira, P. C. (2010). Relação com o saber matemático de alunos em risco de fracasso escolar. *Zetetiké, 18*(33), 243-270. DOI: https://doi.org/10.20396/zet.v18i33.8646699

Vigotski, L. S. (1995b). *Obras Escogidas (vol.3).* Madrid: Visor.

Vygotsky, L. S. (1995a). *A formação social da mente*. São Paulo: Martins Fontes.

_________. (1991). *Pensamento e linguagem*. São Paulo, Martins Fontes.

_________. (2009a). *A imaginação e a arte na infância.* Lisboa: Relógio D'Água.

_________. (2009b). *A construção do pensamento e da linguagem*. São Paulo, Martins Fontes.

[i] My translation of the original in Portuguese as referenced at the end of the article.

[ii] My translation of the original in Portuguese as referenced at the end of the article.

[iii] My translation of the original in Portuguese as referenced at the end of the article.

[iv] My translation of the original in Portuguese as referenced at the end of the article.

[v] My translation of the original in Portuguese as referenced at the end of the article.

[vi] My translation of the original in Portuguese as referenced at the end of the article.

[vii] My translation of the original in Spanish as referenced at the end of the article.

[viii] My translation of the original in Portuguese as referenced at the end of the article.

[ix] My translation of the original in Spanish as referenced at the end of the article.

[x] My translation of the original in Spanish as referenced at the end of the article.

Article Information

Received on April 16th, 2018
Accepted on May 17th, 2018
Published on June 23th, 2018

Author Contributions: The author was responsible for the designing, delineating, analyzing and interpreting the data, production of the manuscript, critical revision of the content and approval of the final version to be published.

Conflict of Interest: None reported.

Orcid

José Carlos Miguel
http://orcid.org/0000-0001-9660-3612

How to cite this article

APA
Miguel, J. C. (2018). Mathematical education of young and adults: pedagogical implications of historical-cultural theory. *Rev. Bras. Educ. Camp.*, *3*(2), 519-548. DOI: http://dx.doi.org/10.20873/uft.2525-4863.2018v3n2p519-2

ABNT

MIGUEL, J. C. Mathematical education of young and adults: pedagogical implications of historical-cultural theory. **Rev. Bras. Educ. Camp.**, Tocantinópolis, v. 3, n. 2, mai./ago., p. 519-548, 2018. DOI: http://dx.doi.org/10.20873/uft.2525-4863.2018v3n2p519-2