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Mathematics education in professional and technological education: Mathematical Learning Support Program (PSAM)

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ABSTRACT
This research project investigates the difficulties of students in the discipline of mathematics in everyday school life and in the learning processes, in the light of the social contexts that constitute the school, the community and society. From there it proposes the construction of an educational product entitled Mathematical Learning Support Program: in learning, with the intention of subsidizing the treatment of the issue in the scope of Integrated High School. The research will be developed within the scope of the Graduate Program in Professional and Technological Education (ProfEPT / Ifal). The present study is justified by bringing a theme that can contribute to the work of teachers of Integrated High School, recognizing that mathematics is a very important discipline, not only for the curriculum but for life, they go through the learning processes and the school that receives these students, sometimes with the existing difficulties., then through an action-research , carried out with general data of teachers who act as teachers of especially in mathematics which is the objective. The data collection instruments adopted will be questionnaires, interviews, conversation circles and observations. The analysis of the data will be qualitative-quantitative, made in the light of the theoretical framework, which will involve knowledge necessary for the reception and teaching methodology for these students who arrive at the Institute with some difficulty, now existing, to teaching in general and to ETC, in particular. The results indicate that through a learning support program, students and teachers understand their place within the EPT, until then there is no systematic action in the course to qualify teachers and to work in the EPT.

Keywords: Integrated High School, EPT, Mathematics, Learning Support Program, Teacher Education.

1 INTRODUCTION

Professional and Technological Education (EPT) is an educational modality conceived by vocational education. In the historical path of its constitution, the split in Brazilian education is evident: for the children of the elite, a propedeutic education is intended for the continuity of studies at the higher level; for work, technical education, for immediate insertion in the world of work and life in society.

Duality is a pillar of class division in the capitalist system of production, since workers retain the privileges of the elite. Thus, this duality was generated by the differentiation between manual and structural work, separating those who think (plan) from those who perform the craft.

According to Manfredi (2002), the society segmented into classes and the institutionalized school education are structured in a dual way, since, in the beginning, it was intended to prepare the people of the ruling class, that is, there was a formation aimed at those who exercised power, and another for the executors of the work, with the primary purpose of preparing "for the exercise of professions.

Considering the evolution of society and the need to form an active, critical, conscious and prepared subject for the challenges of life in society, education assumes the role of promoting the construction of these competencies, aiming at the full development of its learner. Thus, this article aims to present a program named as: Mathematical Learning Support Program, which allows us to reflect on how these students arrive at the Federal Institute of Alagoas and how this influences the learning process, considering the context of Integrated High School in Professional and Technological Education. This reflection is part of the research carried out at the Master's level in the Graduate Program in Professional and Technological Education – ProfEPT. We start from the assumption that young people arrive with some difficulties of some basic themes of elementary school, but must also take responsibility for their integral development, recognizing and setting in motion different dimensions of the human experience to which the program plans to remedy some difficulties in which these students appear. From this premise, the text is organized in order to present, at first, a contextualization that goes through the history of the Federal Institutes and their founding conceptual bases, discussing the meaning of integral and omnilateral education for different authors (Marx, Frigotto, Ramos and Ciavatta). In a second moment, it goes through works of important authors who thought about the role of mathematics in the learning process, a debate that leads us to reflect on the importance of the treatment of this human dimension when we propose the realization of integral education. We intend, therefore, to contribute so that future research can be implemented in order to deepen the studies on the theme, whose results will be used to re-signify the teaching and learning processes, with a view to the integral development of students.

2 BRIEF HISTORICAL CONTEXTUALIZATION OF PROFESSIONAL AND TECHNOLOGICAL EDUCATION IN BRAZIL

The Vocational Technical Education, in the current EPT conjuncture, is so titled by virtue of Law 9394/96 (LDB). Since then, it has undergone profound resignifications, during the twentieth century, in the 1990s and, above all, in the 2000s. There was a motion for the training of the worker in technical schools in a merely fragmented and technical way; and another education of a propaedeutic character, reserved for the children of the bourgeoisie. However, with the creation of the current LDB and the Federal Institutes of Education, there is a proposal to overcome the purely technical model.

In this legislation, there are indications of a formation in the critical and transformative perspective, with a context of integration between technical education and high school, as well as curricular reform in the other levels of this modality of education. In addition, propaedeutic education for the children of the bourgeoisie, which directed them to higher education and, after this training, to the functions of management and command; while the workers performed routine and repetitive tasks determined by this bourgeoisie.

Based on the assumption of RAMOS (2004), MOURA (2007); CIAVATA and RAMOS (2012), the current LDB, in terms of EPT, is conceived as a specific educational process, not necessarily linked to the stages of schooling, focused on the permanent development of skills for productive life" By the way, RAMOS (2004, p. 63) points out that in this same education proposal, "[...] The notion of competence has taken center stage in the curricular guidelines." Marx (1979) goes further, being interpreted by MANACORDA (2007) and discussed by Saviani (2012), when they affirm that education and work are not a natural process, disjointed from man, but is ontological, a process of humanization.

> [...] Because it has a historical character, work thus creates the material elements for the development of a rich individuality, which is both omnilateral in its production and in its consumption, and work does not appear as work but as the full development of the activity itself, in which the natural need disappears in its immediate form, because in its place a historically developed form has been placed (MANACORDA, 2007, p. 68).

In this way, in the EPT, training is concerned with work in the productive system, with the maintenance of capitalism. However, we defend that its proposal of formation can assign a fundamental role in the life of the workers, from an education that has emancipatory bases and that overcomes the fragilities of its conception.

In this context, work and education reflect human action on nature, the social relations of production, historical and social human development, in order to achieve qualitative leaps for human formation. The integral formation, promulgated by Marx, also inscribes the first stage of a whole society traced in justice, with equal opportunities, where work and education would be definitively merged in a single key of social transformation. Marx (1989) believed that the germ of the education of the future, producer of fully developed men through the elevation of social production, had an important place in the factory system.

According to Gramsci, the relationship between work and education is historical-social, since it was formed by each society until it reached the form in which it is based today. The latter, like Marx, also wanted a society in which the contexts of life were egalitarian and that there was no longer exploitation-subordination between classes. Thus, in reformulating Marx's thought, Gramsci brought up the educational question and idealized the unitary school, in which everyone, without exception,

would have the right to culture, parallel to manual labor. The school, then, would be an essential means for the construction of a society that is based on work as an educational principle.

Educating for a critical/reflective understanding of/in the world and for the construction of emancipation requires an educational process that provides individuals from their individual singularities to collective issues, the understanding of their emotional conditions, life, schooling, work and the relationships that can be built in their daily lives.

3 THE ROLE OF MATHEMATICS AND ITS IMPORTANCE IN THE LEARNING PROCESS

The importance of the study of the exact sciences is a consensus, not only in Brazil, but throughout the world, especially in the most technologically advanced nations, and mathematics is conceptualized as a general basis for practically all technologies. On the other hand, it is also evident the difficulty in developing mathematical knowledge in young people, especially in the phases that correspond, in Brazil, to elementary and secondary education.

Technical and vocational education, whether at secondary or higher level, is the basis for the technological development of a country, generating human resources, not only capable of maintaining a level of industrialization, but also of generating important technological innovations in the most diverse areas of development of a society.

Technical education is a complement to the regular, being the elementary school a prerequisite for entry, while high school is a prerequisite for its completion, there are also the so-called technological courses of higher level, for which high school becomes a prerequisite already at admission, that is, the student must have completed elementary school to be able to start the technical course, And at the end of this must have completed high school to be able to obtain the diploma of the technician, while the technological courses are of higher level, and for this it is necessary that the incoming student has already completed high school. According to the portal of the Ministry of Education (MEC), we have the following modalities planned:

> "The Technical Courses can be developed in conjunction with the High School or be subsequent to it. The articulated form can occur integrated with high school, for those students who have completed elementary school, or concomitant with it, for students who will start or are attending high school. The offer can be either in the same school or in different educational institutions. It can also be developed in a regime of intercomplementarity, that is, concomitant in form and integrated into a joint pedagogical project. The subsequent form is intended for those who have already completed high school" (BRASIL, 2018).

In his article "Why Is Mathematics Taught?" (D'AMBRÓSIO, 2000), D'Ambrósio defends the use of mathematical modeling, and that it develops as learning requires, always focusing on the problem-solving part. The modeling to which D'Ambrósio refers, has little relation to that discussed in the academy, it is about practical models of everyday life. He advocates the use, for example, of data relating to the student's journey from home to school, that the student imagine the graphical

representation of this route, measure the distance travelled, measure the time needed and even, finally, can determine its average speed.

Mathematics Education presents itself as a complex area of action, because it brings, in a structural way, in its constitutive core, Mathematics and Education with its specificities. These specificities are revealed in the practical activities based on these sciences, such as those of teaching, or application of knowledge, as well as with regard to the process of knowledge production itself.

Before entering into reflective analyses on philosophical aspects that are imposed on the didactic-pedagogical performance and the research carried out in the area of Mathematics Education, we dwell on the ontological, epistemological and axiological issues that, historically, have inhabited the regions of Mathematics and Education.

We are simplifying and talking only about this trio, not because we do not consider the sociocultural aspects important for the understanding of Mathematics Education, but because we understand that when we consider specific issues of ontological studies, which aim at the study of reality, in an appropriate way, those aspects are present.

This is the central idea of this article: to present ways of seeing Mathematics, Education and Mathematics Education and to alert to the complexity of pedagogical and investigative activities that call for a search for understanding the ontological, epistemological and axiological aspects of their practice and the knowledge they produce.

This project aims to investigate the feasibility of using a course for the permanence program and learning support as a tool to improve the teaching and learning process in the practical classes of the mathematics disciplines of the Integral High School of the Federa Institute of Alagoas.

4 METHODOLOGY (OR MATERIALS AND METHODS)

The present study is assumed to be of the action-research type, characterized by a qualitative and quantitative approach with a collaborative bias. This type of investigation is described as a type of "social research that is conceived and carried out in close association with an action or with the resolution of a collective problem and in which researchers and participants representative of the situation of the reality to be investigated are involved in a cooperative and participatory way" (THIOLLENT, 2005).

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The research proposes to fulfill the following steps: i) The research is qualitative and quantitative, because it will account for the participation, that is, the quantity of participants, and will also say what are the difficulties of each participant in a real and existing way, giving quality and credits to the research in its essence; ii) statistical analysis, there will be graphs accounted for using software programs, such as Excel; iii) variables that will be analyzed and/or correlated for the appropriate organization for the course and the Learning Support Program; iv) The strategy used will be the extraction of information from each participant, not for mere data, but for didactic purposes, also during the interviews, conversation circles and dynamics, photographs will be taken with the researcher's own cell phone camera which is a smartphone Iphone model 11 we will make some records of the moments and the whole event of the research with the participants, for the purpose of remedying the difficulties, now existing, following the discourse analysis and also content analysis, grounded theory, narrative analysis, collective discourse analysis, literature review, v) Evaluation of the Educational Product made in conjunction with all those involved, in addition to the feedbacks of each stage completed, preparation of the research project and submission to the Research Ethics Committee (CEP) of IFAL; Following after approval by the CEP, interventions will begin in the class of the discipline of "mathematics" within the learning support program that will take place in the classes of the 1st years, as mentioned above, in how to emphasize the importance of the participation of the target audience in the research procedures. After this appeal, the ICF and TALE will be proposed (if there is a minor) and questionnaires will be applied to identify the awareness of students and teachers about the importance of mathematics in this new proposal, especially in the context of education, with the aim of improving proposals and seeking new ideas that add to the perspective of the research.

If there is interest on the part of the students, this course will be built with the help of the students, in a demonstration of affirmation that this research has a collaborative character, discussing the educational reality in which they are inserted and defining, together with the researcher, the implementation of changes and analysis of problems, sharing the responsibility of decision-making and its developments, Always in a perspective of continuous improvement.

It is intended to work with a sample universe with 2 teachers who teach the discipline of mathematics and 60 students, from the two classes of the first years, that is, we will work with 30 students from class A and thirty students from class B, entering in the first semester of 2023 of the Integrated Technical Course of Informatics, totaling 62 participants.

In a later phase, evaluative questionnaires will be applied to teachers and students in order to analyze the application of the practice of the use of pertinent subjects within the context of the classes.

Following Bardin (2011), this analysis will be structured in such a way that the information is gathered and grouped into themes and categories, observing its different phases, whose organization will take place in three moments: pre-analysis, exploration of the material and treatment and

interpretation of the results.

The data and materials related to the research, such as questionnaires, image and audio data, will be stored for a period of 5 years after the end of the research, ensuring the proper integrity of the information and the confidentiality of the data, being used only for the purposes of this project, after this period the researcher will destroy all the data that were obtained through this research.

As described in the execution schedule, already at the end of the activities and research, the educational product will be evaluated, by managers, teachers and students and by researchers before its execution, to better shape it according to the realistic look of all mutual parties, so that there is a collective approval and that later has the acceptance of all, from the perspective of a collaborative bias.

At the end of the research, it is intended to develop an Educational Product of the course type in the format of e-book within the Mathematical Learning Support Program. This will serve as a didactic tool for application in the classes of the discipline of mathematics, of the Integrated Technical Course of Informatics that make up the Integrated High School. The product will be evaluated by the researchers and by all participants at the end of the research phase, so it is intended together to give the approval endorsement and we will have all possible feedback from all parties involved. It is worth mentioning that some intercurrences may occur throughout the research, such as: increase or decrease in the number of participants; reformulation of questions of the questionnaires, external facts beyond the will of those involved that prevent or hinder greater participation, choice of classes among others, in this case, any change that needs to occur in the methodology used in the course of the research will be reported to the Research Ethics Committee via the Brazil Platform, according to item III of Art. 28 of Resolution CNS 510/2016.

5 RESULTS AND DISCUSSION

The results and discussions of this study are incipient, considering that it is still running, but we highlight the importance of the research, considering that at present, the need for teaching practices that aim at the intellectual development of students has been discussed, in relation not only to mathematics, but also and at an equal level of priority, strategies that promote the acquisition of knowledge that favors the condition of being human, as a complex and integral being. As a human formation, what is intended is to guarantee young people the right to a complete education for reading the world and for acting as a citizen worthily integrated into their political society (CIAVATTA, 2014, p. 85), which conceives education as a social totality, imbricated in historical mediations that are concretized in the educational processes.

Given the above, we understand education as a liberating practice, which goes beyond a formation that prepares young people for the job market. Education needs to have a more comprehensive look with those who are involved in the process, this subject should be considered in

its entirety, its life history, its knowledge, since Professional and Technological Education aims to form citizens with intellectual autonomy, having and understanding the power of decision to exercise their choices, able to create and interact with the world on which it operates. In view of the aspects mentioned, the present work, in the search to contribute to reflection, with the educational community.

6 FINAL CONSIDERATIONS

In a practical analysis, it is important to note that disregarding the teaching of mathematics and its importance in the teaching-learning process can produce frustrating interventions from the pedagogical point of view, because to disregard the individual in his concreteness and completeness is to close his eyes to the real problems that the student may face during his or her journey. Provide educational spaces-times and promote learning processes so that the subjects recognize their difficulties in relation to the discipline and are helped by some method, equalizing all aspects and contributing to an omnilateral formation.

In this context, the challenge of the educator is to incorporate these multiple perspectives on the Brazilian "youth" in the pedagogical practice of schools, paying attention to the practices that occur outside the educational institution. It is also necessary to invest in continuing education of teachers, discuss, understand and research on the practice, to enable a closer look at the school community and the adoption of new pedagogical actions.

It is in this socio-political and cultural economic context that one understands the meaning of the reflection on the function of the institute and the teacher in the education of these students that may arrive with difficulties and they need to be identified, observed and possibly remedied.

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