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SOCIAL EDUCATION AND SOCIAL TECHNOLOGY PEDAGOGY: CONVERGING AND INTERDISCIPLINARY PATHS

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Abstract: The aim of this paper is to reflect on the interdisciplinary dialog between Social Education, Pedagogy and Social Technology, making it possible to understand technology from a critical and social perspective and as a pedagogical field of action for social educators. Based on a perspective of dialectical methodology in education in which the concrete experiences of science educators in schools and non-formal education spaces can shed light on the challenge of this dialog, based on the necessary discussion and practice by educators in the field of technology. To illustrate this reflection, the experience of science educators in the field of social technology in formal and non-formal education spaces and other experiences from the national social technology bank are reported.

INTRODUCTION

How can technology, problematized and contextualized in the social field, bring benefits to the reflection on the work of professionals in the field of pedagogy and education in general? This is the first concern that motivates us to outline this practical-theoretical essay as an object for analyzing the contemporary possibilities for education professionals, going beyond the limits of school performance and entering into the necessary dialogue that schools need to establish with the community, mediated by the work of educators.

It's no news that technological advances are present in various social spaces and the school and its surroundings, the community, are not isolated from all the influences that the most diverse technological apparatuses exert in the educational context. Technologically structured schools, whether public or private, are already a concrete fact. However, what we are reflecting on at the moment is not specifically the importance of these technological resources in school spaces, but rather the process of problematization, involving thinking about how they are used. And precisely by focusing on the objective of this scientific paper is: how can school and community interact mediated by technology, but not just any technology, a technology that helps both spaces and mediated by their subjects to become agents of transformation and critical reading of technological media and that can make local educational spaces creative and constructive, in dialogue with the community to develop and apply more alternative, socially correct and economically viable technologies for the local community?

Since the school is the *locus* of systematized knowledge, and therefore a living space for the creation of science and technology, it is also a social space, since the school has a social function from a democratic perspective. We start from this reflection and understanding that the school and its educators are subjects of action and transformation in the world and can create more coherent paths and solutions to the real problems determined by the advance of science and technology. In this sense, we are going to reflect on these possibilities based on the experiences of an extension project at a technological university, and thus be able to reflect on how educators, teachers and pedagogues can act in the context of social technology in school and non-school spaces, based on a conception that converges on common causes and mediated by the critical and social conception of technology.

THE REAL, THE CONCRETE AND THE DIALECTICAL: SOCIAL TECHNOLOGY AND THE FIELD OF WORK FOR EDUCATORS

Using dialectical research (Severino...) in education as a methodological basis, we begin our discussion with an experience report on an Extension project in the field of social technology, science and education. This project was developed with funding from the MEC/Poext, during the years 2017 and 2018, entitled: Social technology, science and education: interdisciplinary paths of training and action and its objective was "to develop a work of continuous training, action and monitoring in the areas of social technology, methodology in popular education, social function of natural sciences with the popular groups of Solidarity Economy and with the participation of students of Degree courses in the Region of Ponta Grossa collaborating with the construction of a more solidary, egalitarian and democratic education. The intention of bringing to light the work done on this specific project is directly related to reflecting on the field of work for future teachers specifically, but also for educators in general.

The integrated research project was also based on action research, the historical-critical and dialectical approach to educational research.

The historical dialectical approach to educational research was used as a research methodology to investigate the contradictions in the context of social intervention. The reflections of Nosella and Buffa (2005) are pertinent with regard to the limitations of educational research, and some of the naive approaches become concrete to what we intend to question. Nosella and Buffa question: "Addressing this historical totality requires the adoption of the dialectical method and its skillful application, without prejudice to the contributions of new methodologies, because dialectics presupposes, [...] the description of the singular". (p. 355).

Therefore, Nosella and Buffa (2005, p. 362) point out that it is important to understand the infrastructure and superstructure based on the proposed object:

> The fundamental aspect of the method does not lie in the abstract consideration of the terms school and society, which are related a *posteriori*, but in the constitutive relationship between them, since these terms only exist in this condition. Dialectics is not a mechanical relationship that reveals, beyond the appearance (school), a metaphysical essence (society), but rather a reciprocal condition of existence.[...] for the dialectical method, the fundamental thing in research on school institutions is to relate the particular (the singular, the empirical data) to the general, that is, to the social totality.

In this sense, "the dialectical method proposes that the problem arises from concrete reality, since it requires tracing empirical data, their various forms of evolution and their mutual connections".[1]

This project involved students from the interdisciplinary degree courses in Natural Sciences at the Federal Technological University of Paraná, Ponta Grossa Campus. The project provided an introduction for future science teachers to their future workplaces, involving social technology practices in dialog with the field of science.

This project has given students on the Natural Sciences degree course the opportunity to become socially involved with the partner communities they work with, such as: state schools, the Institute for the Care of Children and Adolescents supported by the municipality's Social Services, the Solidarity Economy Incubator in partnership with a state university in the same city, and the Organic Food Production Farm. In this work of social insertion and dialog with the external community,

1. Ibid, p. 366

the students were able to take part in courses, technical visits, the development of teaching materials and training together with the external community, immersed in the concrete reality they experienced. As a result, the group of students had the opportunity to take part in interdisciplinary training in addition to the science teaching curriculum. At first, the students researched and helped to implement social technology such as rainwater harvesting systems (cisterns), 3 (three) cisterns were implemented in public institutions to organize and revitalize organic food gardens. Biodigesters for domestic use, 2 (two) implemented to monitor use and maintenance. Revitalization of organic food gardens in some primary schools in the city of Ponta Grossa. Participation in a Solidarity Economy training course and monitoring of Solidarity Economy groups in the region via the Solidarity Enterprise Incubator, a project partner.

We will describe some of the issues that justified and justify the need to develop this work in the region and, above all, to contribute to the training of educators.

Indices of social and educational exclusion are also demonstrated by the level of access the population has to the social and cultural goods produced and developed through scientific and technological progress. However, it is clear that levels of inequality are accentuated in the face of economic development that exponentially increases access to basic social policies, such as education and access to scientific and technological knowledge. This assumption is important to emphasize, because against the backdrop of an exclusionary economy, alternatives are also growing to guarantee the population, by the population, projects that demonstrate principles of solidarity, sustainability and balance between social levels. There are countless alternatives and research in the country and around the world on the Solidarity Economy, Social Technologies and the permanent dialog around the social function of Science for a more egalitarian and inclusive development. In this context, it is up to education, through social inclusion policies, to create spaces for ongoing training, monitoring and dialogue with the groups and associations that have been using more humanized alternatives with regard to the economy, technology and science. In other words, it is necessary to train more professionals who can accompany, dialog and build a fairer and more equal society together with many socially excluded groups. To this end, it is necessary to develop projects that increasingly meet this growing demand in the country.

The project phases involved:

Some significant and positive aspects of the project:

1. Bringing universities and the community closer together;

2. During this time, the work carried out was able to assist at least 120 families in low-income communities and 25 social technology and solidarity economy groups. Some of the groups that have developed partnerships with the project and that students on the degree course have made technical visits to in order to keep up with the real situation and develop joint actions. ETEC/2017 Partner Groups: Chácara Maria Emília de Produtos Ecológicos. Nossa Senhora das Graças State School. Polivalente State School. Itaiacoca Rural State College. IESOL/UEPG (Incubator for Solidarity Enterprises). Instituto Duque de Caxias- Cidade dos Meninos (Municipality of Guaragi). The aim is to extend partnerships with other public schools to develop seminars, workshops and other municipal projects in the city of Ponta Grossa. In 2017, an optional subject on Social Technology was included in the Biological Sciences degree course, as a result of the project's development.

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3. With regard to the students involved in the project, what can be covered in their training?

a. Social Technologies;

b. Popularization and dialogue between Science, Technology and Society;

c. Environmental education;

d. Interdisciplinary theory and practice;

e. Social aspects of science and technology;

f. The social function of public universities;

g. Research in the teaching of Natural Sciences;

h. Learning and assessment in science teaching;

i. Social Studies of Science and Technology;

j. Science teaching in non-formal spaces;

k. Interdisciplinary approaches in Science;

l. Environment and society;

m. Complementary activities;

4. The pedagogical approach adopted in the project overcame the traditional view of passing on information in the classroom and teaching focused solely on the theoretical aspects of science;

5. Evaluation of the teaching and learning process of the group involved in this work took place in the various meetings used to analyze the progress of each phase of the project. In the field, by the dialogic approach adopted by those involved with the external community. The interaction with training during classes and the use of scientific knowledge in the classroom to put into practice with the project. At the end of each semester, the students presented reports with a critical analysis of the project's progress, showing their appreciation and self-evaluation. Therefore, the principles of emancipatory evaluation were used, as some aspects were highlighted: it has a diagnostic function. It favors the student's self-knowledge. It helps the student to become the subject of their learning process. Commitment to democratic education, with the purpose and practice of including students. Concern with the democratic pedagogical relationship between educator and student. Helped the student to learn and the teacher to teach. Helped teachers to redesign their actions. It prioritized the qualitative aspects of the student's development. Emphasized the learning process and outcome. It was participatory. The concern that the student critically appropriates the knowledge and skills necessary for their realization as a critical subject

The teacher trainer was also evaluated based on the principles of Emancipatory Evaluation. As the project was organized around a general coordinator and collaborating teachers, the intense dialogue between the group of students, project coordinator and collaborating teachers gave the trainers the opportunity to self-reflect on their work. The ongoing fortnightly meetings gave the students the opportunity to critically analyze the teacher trainers and discuss the project's objectives so that everyone could help each other collectively. Although there was a hierarchical organization for managing the project, everyone collaborated to improve the actions and made suggestions for redirecting the methodology. In this sense, the teacher trainer and general coordinator could analyze the dialogical practice adopted in the meetings, technical visits and perceive their relationship with everyone, focusing on the objective of the project in question. During this time, students were able to talk openly to the project coordinator about their difficulties, limitations and criticize the approach supported by concrete suggestions for improvement. Therefore, the practice adopted by the teacher trainer was based on active, continuous dialog, self-reflection

and, above all, dialogicity based on liberating pedagogy.Continuity...

In fact, this experience has allowed us to identify important aspects that can form a concrete dialog with the field of social education.

A BRIEF REFLECTION ON SOCIAL EDUCATION:

We know that the Charter of Social Pedagogy, voted on and approved in 2006 at the First International Congress of Social Pedagogy, highlights the importance of the "non-formal education practices" of NGOs and social and trade union movements, reinforcing that "the elevation of non-formal education to public policy is a requirement of the Brazilian social reality" (In: SILVA, Roberto da, João Clemente de Souza Neto e Rogério Adolfo de Moura, eds, 2009, p. 317).

According to Gadotti (p.9):

> If we understand popular education as social education, taking into account its long tradition in Brazil, we can't say that social education is exactly new in Brazil today. What is new is its recent development and the growing debate around social pedagogy. Perhaps the novelty lies more in the academic interest surrounding this issue and the consequent structuring of social education as an area of academic production and professional training.

The author continues (p. 11): "The field of social education is very broad and includes the school and the non-school, the formal, the informal and the non-formal. Paulo Freire did not dichotomize the formal and the non-formal, the school and the non-school". Therefore, the integration of these spaces and the possibility of developing actions and projects that allow for dialog between school and community is necessary. In this context of the social educator's work, it is possible to think that this professional is always dealing with issues related to technology.

Souza and Catani (2017, p. 56) point out that 'Social education was born in Europe with the aim of restructuring a debilitated society after the First and Second World Wars, and is implemented through the assumptions of social pedagogy. They emphasize that for Caliman (2014, p. 43) social pedagogy has "its origins in the charitable actions of Christianity and in pedagogues such as Pestalozzi and Froebel".

For Ortega (2005), social education is the object of social pedagogy. It takes place in socio-educational and community contexts and establishes links with different areas of human knowledge such as sociology and psychology.

Graciani, quoted by Souza and Catani (2017), points out that social pedagogy translates into human development in the democratic, transformative, supportive and participatory dimensions and into an emancipatory liberating characteristic, leading the subject of the action to discuss, understand and accept, in a dignified manner, the rules and limits necessary to exercise citizenship for the (re)construction of identity, self-image and self-esteem.

In fact, these concepts shed light on the role of educators in formal and non-formal education spaces and how their work involves continuous dialog with the needs of the region and each community. Such dialog requires educators to be able to move across different fields of interdisciplinary study and find space to help strengthen democratic, supportive, inclusive and participatory education. It is in this sense that we reflect that such dialogue and the construction of this democratic space involves thinking about how science and technology are matters of interest to these professionals, so that they can raise awareness in each community and its surroundings of the capacity they have to solve their concrete and local problems, placing themselves as active subjects in this process.

THE PEDAGOGY OF SOCIAL TECHNOLOGY

Before I start talking about the term adopted, I want to report on other national experiences involving the field of Social Technology and its relationship with education. This report is based on a documentary study of the Banco do Brasil Foundation's social technology bank, with a focus on education and experiences in this context, which can be found on the following website: https://transforma.fbb.org.br//

Here we will give an initial presentation of3 experiences to contextualize and problematize the field of work of the social educator.

Experience 1: A Escola É Cidade & A Cidade É Escola: TS "A Escola é Cidade e a Cidade é Escola" is a series of art exhibitions that take place in schools and other public educational spaces and leave behind paintings and other art installations. In association with the exhibitions, educators and/or cultural agents receive artistic and cultural training to continue the process of improving the educational space that began with the exhibition and to integrate other artistic and cultural actions that are already taking place in and around the space, expanding its potential as a cultural facility. Link to the systematization of the methodology:. https://transforma.fbb.org.br/storage/socialtecnologies/658/files/A%20ESCOLA%20E%20CIDADE%20_%20A%20CIDADE%20E%20ESCOLA-web-%20FINAL%20PQ.pdf. Focus on Educommunication applied to Art.

Experience 2: The Transformative Organization and Pedagogy of the Florestan Fernandes National School. Link to the project: https://transforma.fbb.org.br/tecnologia-social/a-organizacao-e-pedagogia-transformadoras-da-escola-nacional-florestan-fernandes. Objective: To build an organizational and pedagogical model for the existence, maintenance and continuity of a school that belongs to workers.

Experience 3: Notebook 1: Seminars with the Thematic Notebook: Social Technology, Science and Education: UTFPR/PG

I have adopted this term because it refers to a few specific concepts. First, to think about the concept of technology from a critical perspective, and then to think about the pedagogical field that social technology makes possible. Therefore, what I call the Social Technology Pedagogue is a theoretical-practical perspective of unveiling the field of social technology in dialogue with the work of educators in formal and non-formal education spaces and, as a pedagogical process under construction, the effects of the practices generated by working with social technology in schools and non-formal education spaces, in this specific case in the community surrounding the school. Making it possible to find ways to solve concrete problems in each community, together and with the community.

Research and practice in the field of social technology has been increasing throughout Brazil. This is due to the increased demand for this area in several countries. This increase is due, above all, to the emergency needs around the world for clean, sustainable, renewable, socially responsible technologies, etc. These are some of the terms adopted around the world and which combine all the discussion and practices on Social Technology. Ensuring that technological development is in dialogue with the most pressing environmental and social issues is a crucial necessity in this century, given the increasing devastation of nature, renewable energy sources, environmental imbalance, in short, all the social inequality resulting from unbridled technological progress. Because of this situation, countless alternatives are sprouting up within grassroots groups, in the most vulnerable communities, demonstrating, through the knowledge of citizens, ways to solve local and immediate problems for the population. Some of these alternatives range from sustainable soil management, renewable and popular energy sources, waste reuse, cisterns, popular projects to generate self-sustaining work and income for

communities, etc. Searching for methodologies that dialog with popular Solidarity Economy practices is an urgent challenge for all Brazilian public universities in order to be able to express their social function.

There are some important concepts to reflect on in the field of social technology studies:

For DAGNINO, BRANDÃO E NOVAES (2004, p.) it is a question of thinking about social technology from a critical reflection on what conventional technology is. They also criticize the concept of alternative technology, considering the neutrality of science, proposing a critical and emancipatory reading and moving towards a proposal based on a critical theory of technology (based on Feenberg's studies). They offer some reflections so that historically determined terms can be bought into play in technological progress worldwide and in the country. In particular, Dagnino makes a comparative analysis between conventional technology and social technology: Conventional technology would be More labor-saving; has ever-increasing optimum production scales; environmentally unsustainable; intensive in synthetic inputs and produced by large companies; its production cadence is given by machines; has coercive controls that reduce productivity; alienates work. Social technology: Adapted to small physical and financial size, non-discriminatory (employer vs. employee); oriented towards the internal mass market; liberating the potential and creativity of the direct producer, capable of making self-managed enterprises and small businesses economically viable; emancipatory.

NOVAES (2009, p. 20, 21 and 36) uses the term appropriate social technology to contextualize the reality in India at the beginning of the 19th century:

> India at the end of the 19th century is recognized as the birthplace of what came to be called Appropriate Technology (AT) in the West. The thoughts of the reformers of that society were focused on the rehabilitation and development of traditional technologies practiced in their villages, as a strategy to fight against British rule. Between 1924 and 1927, Gandhi dedicated himself to building programs to popularize manual spinning on a spinning wheel recognized as the first technologically appropriate equipment, the Charkha, as a way of fighting social injustice and the caste system that perpetuated itself in India. (p. 20)

He also reminds us that:

> Gandhi's ideas were also applied to the People's Republic of China and later influenced a German economist - Schumacher - who coined the term Intermediate Technology to designate a technology that, due to its low capital cost, small scale, simplicity and respect for the environmental dimension, would be more suitable for poor countries. The emergence of the Appropriate Technology Development Group he created and the publication in 1973 of his book *Small is beautiful: economics as if people mattered*, which was translated into more than fifteen languages, had a major impact, making him known as the introducer of the AT concept in the Western world. (p. 21)

However, he recalls the sociotechnical approach and the construction of social technology based on studies in the Sociology of Technology. Influenced by a constructivist view of technology, he brings up a discussion of a new sociology of science. To understand this journey of social technology, he highlights:

> It brings together three contributions - based on the concepts of technological systems by Thomas Hughes; actor-networks, associated with Michael Callon, Bruno Latour and John Law; and the social constructivism of technology by the sociologists of technology, Wiebe Bijker and Trevor Pinch - which have in common the intention of "opening the black box of technology" and the metaphor that places technology alongside society, politics and the economy, forming a "seamless fabric" (Hughes, 1986). Consistently,

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> they refuse to identify mono-directional causal relationships between the social and the technological and seek an alternative to what they consider to be the paralyzing tension between technological determinism and social determinism, incapable of providing a solution.
>
> the complexity of technological change. His central argument is that technology is socially constructed by "relevant social groups" within the "seamless fabric" of society (p. 36)

His discussions highlight the critical and social conception of technology based on the authors treated as a guiding element in the history of the construction of the term social technology.

BRANDÃO (2001, p. 13) lists some of the terms used to unveil what can be understood by social technology:

> alternative technology, utopian technology, intermediate technology, appropriate technology, socially appropriate technology, environmentally appropriate technology, technology adapted to the environment, correct technology, ecological technology, clean technology, non-violent technology, non-aggressive or gentle technology, soft technology, sweet technology, rational technology, humane technology, self-help technology, progressive technology, popular technology, people's technology, people-oriented technology, society-oriented technology, democratic technology, community technology, village technology, radical technology, emancipatory technology, libertarian technology, liberatory technology, under-cost technology, scarcity technology, adaptive technology, survival technology and capital-saving technology. These conceptions, in some way, try to differentiate themselves from those technologies considered to be capital-intensive and labor-saving, objecting to the process of massive transfer of large-scale technology, characteristic of developed countries, to developing countries, which can create more problems than solve them.

In summary Costa and Jesus (2013, p 21) point out:

> Social technology (ST) stems from the concept and practices of appropriate technology, but incorporates elements of critical technology theory and ideas from Latin American thinkers such as Amilcar Herrera, Oscar Varsavky and Jorge Sábato. ST incorporates some elements that are absent from the concept of AT, but which are significant enough to differentiate them. Fraga (2011) presents two of these elements: the perspective that science and technology are not neutral and the refutation of technological determinism. The supposed technological neutrality is based on the idea that ST&I processes are objective and remain distant from their object, so that science and technology do not incorporate values and interests (Dagnino, 2008). Technological determinism stems from the idea that technological development is always positive for society, that it is linear, inexorable, inevitable and follows an autonomous logic, governed by effectiveness and efficiency (Feenberg, 2010).

From the point of view of the structured and developed extension project, ETEC, the relationship between social technology, popular education and natural sciences was expressed through a number of questions: Which science for which society do we want to develop? Which educator/teacher for which society do we want to educate? An economy for which type of society do we want to build? Which model of society do we want to build technological progress on?

These questions have led us to some considerations. With regard to the meaning and function of science, the CTS studies[2] that have advanced considerably in the last ten years show an urgent need to question the standard of science that is linked to a more social and humanized vision of the scientific

2. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-73132001000100001 / http://www.oei.es/salactsi/Livro_CTS_OEI.pdf / http://www.oei.es/salactsi/introducaoestudoscts.php / http://estudosdects.org/bibliografia-que-recomendamos/ http://www.esocite.org.br/

method, even an instrumental one, In spite of non-formal education and popular education, the extent to which scientific knowledge can engage in dialogue, not impose.

FINAL CONSIDERATIONS: PATHS FOR SOCIAL EDUCATORS IN THE FIELD OF SOCIAL TECHNOLOGY

Based on Gadotti's reflections, when he analyzes popular education as social education, because it tends to move through dialogue between community needs and social demands, it is possible to converge with the social demands and technologies present in the historical construction of social technology. Therefore, we believe that social educators need to take ownership of these contemporary discussions already present in their work space, identify the problematizing potential in order to be able to engage in a broader dialogue and incorporate the theme of science and technology naturally into their pedagogical repertoire. In this sense, a pedagogy of technology will provide tools, methodologies and foundations for training social educators from a perspective of democratic education, historical-critical and liberating pedagogy with a view to a critical theory of technology. It is therefore important to think about the interdisciplinary space that has already been highlighted in the relationship between education, technology and society, and in this context we find the social educator.

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