SCIENCE FAIRS AND INTEGRATED PROJECT EXHIBITIONS AS AN INNOVATIVE SPACE FOR RESEARCH, TEACHING, AND OUTREACH: AN EXPERIENCE REPORT WITH VOCATIONAL TRAINING COURSES

FEIRAS CIENTÍFICAS E MOSTRAS INTEGRADAS DE PROJETOS COMO ESPAÇO INOVADOR DE PESQUISA, ENSINO E EXTENSÃO: UM RELATO DE EXPERIÊNCIA COM CURSOS DE FORMAÇÃO PROFISSIONAL

FERIAS DE CIENCIA Y EXPOSICIONES DE PROYECTOS INTEGRADOS COMO ESPACIOS INNOVADORES DE INVESTIGACIÓN, DOCENCIA Y DIVULGACIÓN: UN RELATO DE EXPERIENCIA CON CURSOS DE FORMACIÓN PROFESIONAL

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ABSTRACT

Vocational and Technological Education (VTE), at both technical and higher education levels, faces the challenge of overcoming excessively instrumentalized training models, strongly oriented towards the logic of efficiency and immediate adaptation to the labor market. In this context, science fairs and integrated project exhibitions emerge as pedagogical and institutional strategies capable of articulating teaching, research, and outreach in a critical, contextualized, and socially committed way. This article aims to analyze the experiences of outreach projects, discussing their contributions to technical-professional training and their social impacts. Methodologically, this is a qualitative, descriptive research, based on experience reports, with data production through document analysis, participant observation, and evaluations by participants and the organizing team, analyzed according to thematic content analysis. The results show that extension programs promote broad academic and social mobilization, with significant participation from students, faculty, and the external community, in addition to strengthening student leadership, interdisciplinarity, the articulation between theory and practice, and the development of skills such as communication, teamwork, critical thinking, and social responsibility. It is concluded that science fairs and integrated exhibitions constitute innovative spaces for training in vocational and technological education, contributing to meaningful learning and strengthening the social role of extension programs.

Keywords: Extension Projects. Student Leadership. Interdisciplinarity. Social Responsibility.

RESUMO

A Educação Profissional e Tecnológica (EPT), nos níveis técnico e superior, enfrenta o desafio de superar modelos formativos excessivamente instrumentalizados, fortemente orientados pela lógica da eficiência e da adequação imediata ao mercado de trabalho. Nesse

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contexto, as feiras científicas e as mostras integradas de projetos emergem como estratégias pedagógicas e institucionais capazes de articular ensino, pesquisa e extensão de forma crítica, contextualizada e socialmente comprometida. Este artigo tem como objetivo analisar as experiências de projetos de extensão, discutindo suas contribuições para a formação técnico-profissional e seus impactos sociais. Metodologicamente, trata-se de uma pesquisa qualitativa, de natureza descritiva, baseada em relato de experiência, com produção de dados por meio de análise documental, observação participante e avaliações dos participantes e da equipe organizadora, analisadas segundo a análise de conteúdo temática. Os resultados evidenciam que a extensão promove ampla mobilização acadêmica e social, com participação expressiva de estudantes, docentes e comunidade externa, além do fortalecimento do protagonismo discente, da interdisciplinaridade, da articulação entre teoria e prática e do desenvolvimento de competências como comunicação, trabalho em equipe, pensamento crítico e responsabilidade social. Conclui-se que feiras científicas e mostras integradas constituem espaços inovadores de formação na EPT, contribuindo para aprendizagens significativas e para o fortalecimento do papel social da extensão.

Palavras-chave: Projetos de Extensão. Protagonismo Discente. Interdisciplinaridade. Responsabilidade Social.

RESUMEN

La Educación Profesional y Tecnológica (EFP), tanto en los niveles técnico como superior, se enfrenta al reto de superar modelos de formación excesivamente instrumentalizados, fuertemente orientados a la lógica de la eficiencia y la adaptación inmediata al mercado laboral. En este contexto, las ferias de ciencias y las exposiciones de proyectos integrados emergen como estrategias pedagógicas e institucionales capaces de articular la docencia, la investigación y la extensión de forma crítica, contextualizada y socialmente comprometida. Este artículo busca analizar las experiencias de proyectos de extensión, discutiendo sus contribuciones a la formación técnico-profesional y su impacto social. Metodológicamente, se trata de una investigación cualitativa y descriptiva, basada en relatos de experiencia, con producción de datos mediante análisis documental, observación participante y evaluaciones de los participantes y del equipo organizador, analizadas según un análisis de contenido temático. Los resultados muestran que los programas de extensión promueven una amplia movilización académica y social, con una significativa participación de estudiantes, docentes y la comunidad externa, además de fortalecer el liderazgo estudiantil, la interdisciplinariedad, la articulación entre la teoría y la práctica, y el desarrollo de habilidades como la comunicación, el trabajo en equipo, el pensamiento crítico y la responsabilidad social. Se concluye que las ferias de ciencias y las exposiciones integradas constituyen espacios innovadores para la formación en educación vocacional y tecnológica, contribuyendo al aprendizaje significativo y fortaleciendo el rol social de los programas de extensión.

Palabras clave: Proyectos de Extensión. Liderazgo Estudiantil. Interdisciplinariedad. Responsabilidad Social.

1 INTRODUCTION

Professional and Technological Education, which encompasses technical courses and higher education courses, has historically faced the challenge of overcoming an excessively instrumental education, guided by logics of efficiency, productivity and immediate adaptation to the labor market. This orientation, although relevant from a technical point of view, tends to limit students' critical understanding of the social, environmental and ethical impacts of their future professional performance. Excessive focus on theorizing in the classroom can also distance students from the real world where they will work professionally.

In this scenario, research and university extension are presented as a fundamental strategy to tension this logic, by promoting the dialogical interaction between the educational institution and society. Within the scope of the Federal Institutes, extension takes on even greater relevance due to its historical commitment to regional development and social inclusion.

Scientific fairs and integrated project exhibitions are configured as privileged spaces for innovation in the context of Professional and Technological Education, especially when understood not only as occasional events for the dissemination of results, but as pedagogical and institutional strategies that articulate teaching, research and extension.

The innovative character of these initiatives is not restricted to the introduction of new technologies or exhibition formats, but is manifested, above all, in the ways of organizing the training process, in the pedagogical practices mobilized and in the relationships established between institution, students and society.

In the pedagogical sphere, innovation is expressed by the rupture with traditional teaching models centered on the transmission of content and merely reproductive evaluation. By mobilizing active methodologies and problem-solving teaching, fairs and exhibitions move the student from the position of receiver to that of protagonist of the learning process. The investigation of real problems, the collective construction of knowledge and the need to communicate results to different audiences favor significant learning, the development of critical thinking and the articulation between theory and practice, configuring an innovation of a formative nature.

It is in this context that the Integrated Week of Safety and Environment and the I Journey of Knowledge and Diversity (I JSD) held at the Federal Institute of Piauí (IFPI) – Teresina Campus South Zone in 2025 are inserted. They were scientific, cultural and extension events, conceived as spaces that integrate teaching, research and extension activities and promoted with the support of scholarship funding from PIBEX – Institutional

Program for Extension Scholarships and CNPq – National Council for Scientific and Technological Development.

In this article, the objective is to discuss the contributions of events of this nature to technical-professional training, and their social impacts.

2 THEORETICAL FOUNDATION

The national policy of university extension, as recommended by the Forum of Pro-Rectors of Extension (FORPROEX, 2012), is presented as an educational, cultural and scientific process that articulates teaching and research in an inseparable way, promoting a transformative relationship between university and society.

From this point of view, the extension aims to develop citizenship training and strengthens skills such as empathy, communication, teamwork and social responsibility. One of the most significant results is contextualized learning, which is important for professional courses (FORPROEX, 2012).

National and international studies indicate that extension practices contribute significantly to the development of socio-emotional skills, critical thinking and social responsibility, by promoting contextualized learning and direct contact with real problems in society (Forproex, 2012; Silva & Vasconcelos, 2018; Bielefeldt; Paterson; Swan, 2010).

Participation in extension projects broadens students' social awareness, providing experiences that lead them to develop socio-emotional skills, such as listening, dialogue, and professional ethics, which are important for their professional lives (Silva & Vasconcelos, 2018). In the same perspective, Lima, Almeida & Santos (2019) recognize the importance of extension to develop socio-emotional skills and strengthen awareness of social responsibility. This contributes to promoting autonomy and protagonism of the future professional who needs to develop interpersonal skills that are usually little worked on in traditional education.

Experience-based practices (such as extension) broaden critical reflection on professional practice and favor the development of ethical values and social responsibility **(**Godoy & Antonello, 2017). This dialogues strongly with the adoption of active methodologies in technical and professional courses.

Paulo Freire (2020) also reinforces the importance of dialogue, the problematization of reality, and the valorization of popular knowledge as central elements of emancipatory educational practices, which is strongly present in extension projects.

In the field of technical and professional education, all these didactic and pedagogical contributions of extension projects challenge the logic of strictly economic efficiency, which

has characterized teaching in recent decades, proposing an education more committed to social justice, sustainability and human dignity.

3 METHODOLOGY

This work is characterized as a descriptive study, of a qualitative nature, based on reports of experiences. The research was based on the conception, realization and evaluation of the Integrated Week of Security and Environment and the I Journey of Knowledge and Diversity, events of an integrative nature aimed at the articulation between teaching, research and extension.

The production of data occurred through the documentary analysis of the projects of the events, the programming and the execution reports, as well as the participant observation during the activities developed, with systematized records. In addition, the evaluations carried out by the participants and the organizing team, responsible for the two events, were analyzed, considering perceptions about the training processes experienced.

The data were analyzed in the light of thematic content analysis, with the support of the Atlas TI software, to identify categories related to student protagonism, the integration between teaching, research and extension and the development of critical thinking and social responsibility. The analysis focused on the formative contributions provided by the event to students of technical and higher education courses, in the context of Professional and Technological Education.

4 DESCRIPTION OF THE EXPERIENCE

The events were held with the aim of integrating different institutional actions, including project exhibitions, workshops, lectures, scientific exhibitions and cultural activities that were distributed on various dates, creating an interactive and creative environment for students and teachers, but without intervening in the class schedule. The proposal of the events was conceived in an interdisciplinary way, involving technical courses, higher education and the external community, considering the best way to use financial resources to integrate the entire academic community of the campus as much as possible and involve different social segments.

The events aimed to articulate themes related to Science, Technology, Sustainable Citizenship and Professional Training, promoting interaction between the training axes offered by the campus — Food, Civil Construction, Fashion and Clothing, Informatics and Sanitation. This diversity of areas favored an interdisciplinary and transdisciplinary approach, stimulating the exchange of knowledge and the collective construction of knowledge aimed

at understanding and solving challenges in the world of work, such as: sustainable citizenship, inclusive education, social responsibility, dignity of work and appreciation of diversity.

Both events were aligned with the Sustainable Development Goals (SDGs) and current educational guidelines. This was mainly due to the involvement of the Center for Afro-Brazilian and Indigenous Studies (NEAFRO) and the Center for Assistance to People with Specific Educational Needs (NAPNE).

NEAFRO, a group registered on the CNPQ platform, is an institutional nucleus, common in Federal Institutes and Universities, aimed at promoting studies, educational and extension actions related to Afro-Brazilian history and culture, indigenous peoples, ethnic-racial relations, combating racism and all forms of discrimination and valuing cultural and identity diversity.

This research group works to: (i) support the implementation of Laws No. 10,639/2003 and No. 11,645/2008; (ii) promote anti-racist, inclusive and critical education; (iii) articulate teaching, research and extension with a focus on diversity; and, (iv) dialogue with communities, social movements and traditional knowledge.

The participation of NAPNE, the sector that constitutes the institutional structure of all *IFPI campuses*, contributed to the promotion of accessibility and equity, ensuring that activities were planned and executed in an inclusive manner.

The organizing team of the events was formed by 15 teachers from all teaching centers, in addition to a group of 60 students who acted as monitors; The events had institutional support in various ways, characterizing an action that integrated the academic community of the campus.

The program was planned so that two activities were organized per week, seeking not to interfere with the school calendar. Teachers from different disciplines were invited to develop projects with their students to be exhibited in the scientific exhibitions, and several activities were carried out in the classroom, integrating with the planned contents.

The records of the activities (confirmed registrations and attendance lists) pointed to the participation of about 1,800 participants, including students from the municipal and state school system. It is important to mention that the exhibitions and shows were available to students at different times (morning, afternoon and evening).

The dissemination carried out mainly through social networks was the responsibility of the volunteer students and this made it possible to create creative posts in a language that reached several social groups.

5 RESULTS AND DISCUSSION

This section presents the results and the discussion based on the analysis of the event reports, institutional records and information systematized by the organizing team, with a descriptive focus on the activities developed and the formative contributions observed.

5.1 EXTENSION ACTIONS AS PEDAGOGICAL DEVICES FOR MEANINGFUL LEARNING AND THE DEVELOPMENT OF CRITICAL THINKING

The activities developed within the scope of the Integrated Week of Security and Environment and the I Journey of Knowledge and Diversity show the potential of extension actions as expanded pedagogical devices, capable of articulating teaching, research and extension in an inseparable way. Unlike occasional events of scientific dissemination, the experiences analyzed were conceived as continuous training processes, integrated with the pedagogical practices of technical and higher education courses.

The data from participant observation and evaluations indicate that the diversity of activities — lectures, workshops, project exhibitions, science fairs and extension actions — favored significant learning, to the extent that teaching contents began to be mobilized in concrete, socially contextualized situations. This configuration reinforces the role of extension as a strategic training space in Professional and Technological Education, as recommended by national guidelines.

The analysis of the programming and the practices carried out allows us to identify important convergences in relation to the formative indicators considered in the analysis: student protagonism, investigation of real problems, collective construction of knowledge, scientific and social communication, development of critical thinking and articulation between theory and practice, as can be seen in the synthesis presented in tables 1 and 2.

Table 1

Types of activities developed and training objectives

Type of activity	Training objective
Thematic lectures	Critical reflection on science, technology, sustainable citizenship and professional training.
Workshops and short courses	Development of practical and technical skills in an applied way.
Science Fair	Stimulus to scientific research and student protagonism.
Project Shows	Socialization of teaching, research and extension productions.
Thematic tables	Deepening of interdisciplinary debates.
Extension actions	Interaction with the community and social application of knowledge.

Source: The author.

Table 2

Areas and thematic axes involved

Training axis	Approaches
Food	Food safety, production processes and sustainability.
Civil Construction	Sustainability, safety and socio-environmental impacts.
Informatics	Technology, innovation and digital solutions.
Fashion & Apparel	Sustainable production, creativity and cultural identity.
Sanitation	Environmental health, waste management and quality of life.

Source: The author.

5.2 STUDENT PROTAGONISM IN THE LEARNING PROCESS

In both events, it was observed that the student moved from the position of passive receiver to that of active subject of the training process. Student protagonism was manifested in an expressive way in the presentation of projects, in the conduction of workshops, in the mediation of exhibitions and in direct interaction with the academic and external community.

In the Integrated Week of Safety and Environment, students acted as agents of awareness and guidance, especially in actions related to environmental education, health and safety at work. In the I Journey of Knowledge and Diversity, the protagonism was expanded by the centrality of student productions in the programming and dissemination of the event, strengthening autonomy, collective responsibility and social engagement.

These findings corroborate approaches of active learning methodologies, by showing that the active participation of students contributes to the development of cognitive, social and ethical skills that are fundamental to professional training. Extension projects stimulate a dynamic that breaks with the banking logic of education criticized by Freire (1996).

5.3 INVESTIGATION OF REAL PROBLEMS AND CONTEXTUALIZATION OF KNOWLEDGE

Another convergent aspect between the events analyzed refers to the anchoring of the activities in real, socially situated problems. The topics addressed — such as environmental sustainability, health and safety at work, waste management, inclusion, diversity, social inequalities and relations between work and the environment — emerge from concrete demands of the territory and the institutional context.

This approach dialogues directly with Freire's (1996) problematizing pedagogy, according to which knowledge emerges from the critical reading of reality, and with Dewey (1979), who argues that learning occurs in a more meaningful way when linked to experience. By starting from real situations, the actions favor the attribution of meaning to academic content and expand its social relevance.

In the Integrated Week, the environmental and ergonomic blitzes, the practical workshops and the round tables enabled the critical analysis of situations observable in the daily life of the campus, partner schools and the productive sector. In the I Journey of Knowledge and Diversity, the projects and debates started from real experiences of students and the community, highlighting social, cultural and educational problems often made invisible in traditional curricula.

5.4 COLLECTIVE CONSTRUCTION OF KNOWLEDGE AND INTERDISCIPLINARITY

The two experiences were characterized by a strong emphasis on the collective construction of knowledge, mediated by the dialogue between different subjects and knowledge. The conversation circles, round tables, interdisciplinary exhibitions and collaborative activities favored the interaction between students, professors, external professionals and the community in general.

The I Journey of Knowledge and Diversity stood out for the articulation between academic knowledge, popular knowledge and community experiences, promoting interdisciplinary and transdisciplinary approaches. Similarly, the Integrated Week on Security and the Environment integrated different areas of knowledge, breaking with fragmented approaches and favoring a systemic understanding of socio-environmental problems and the world of work.

This collective character strengthened collaborative learning and contributed to the formation of subjects capable of acting in complex contexts.

5.5 COMMUNICATION OF RESULTS AND DIALOGUE WITH DIVERSE AUDIENCES

The communication of the knowledge produced was a central axis of the two extension actions. The students were challenged to translate technical and scientific concepts for different audiences, including the external community, basic education students, workers, managers and public servants.

The exhibitions, oral presentations, open workshops, educational actions and cultural activities required language adequacy, argumentative clarity and social sensitivity. This exercise contributed to the development of communication skills fundamental to professional training, in addition to reinforcing the social commitment of the public university to the democratization of knowledge.

5.6 MEANINGFUL LEARNING, CRITICAL THINKING AND ARTICULATION BETWEEN THEORY AND PRACTICE

The joint analysis of the two experiences shows that the combination of student protagonism, investigation of real problems, interdisciplinary dialogue and social communication favors significant learning, as recommended by critical and active pedagogical approaches.

The strong presence of conversation circles, round tables and interdisciplinary activities evidences the collective construction of knowledge as a structuring principle of the two experiences. This perspective is close to the notion of ecology of knowledge, proposed by Santos (2005), by recognizing the legitimacy of different forms of knowledge — academic, popular, professional and community.

From the point of view of Theories of Practices, learning can be understood as a socially situated phenomenon, produced in interactions between people, artifacts, discourses and contexts (Schatzki, 2001; Gherardi, 2012). Thus, the extension actions analyzed are configured as social practices that produce knowledge in use, going beyond the simple transmission of formal contents, tensioning the technicist logic still present in Professional and Technological Education.

The activities allowed students to articulate theoretical content discussed in the classroom with concrete practices, promoting critical reflection on topics such as sustainability, ethics, work, diversity and social inequalities. By problematizing these issues in real contexts, the events contributed to the development of critical thinking and to the training of professionals who are more sensitive to the social, environmental and human dimensions of their work.

5.7 INTERPRETATIVE SYNTHESIS

In an articulated way, the Integrated Week of Safety and Environment and the I Journey of Knowledge and Diversity reaffirm university extension as a privileged space for the construction of critical, contextualized and socially committed learning.

Table 3

Analytical synthesis of the pedagogical indicators of the extension actions

Pedagogical indicators	Analytical description	Empirical evidence in the activities developed
Student protagonism in the learning process	The student assumes an active role in the production, mediation and socialization of knowledge, overcoming the passive logic of transmissive learning.	Exhibition and presentation of student projects; conducting workshops and educational blitzes; mediation of activities with the community; student participation in the organization, execution and evaluation of events.
Investigation of real problems	The activities are based on concrete situations in the territory, the world of work and social experiences, promoting contextualized learning.	Discussions on environmental sustainability, health and safety at work, waste management, inclusion and diversity; analysis of problems observed on campus, in partner schools and in the external community.
Collective construction of knowledge	Knowledge is produced in a dialogical, interdisciplinary and collaborative way, integrating different subjects and knowledge.	Conversation circles, round tables and interdisciplinary debates; interaction between students, professors, external professionals, social movements and the community; articulation between academic knowledge and community experiences.
Communication of results to diverse audiences	Students practice the translation and socialization of scientific and technical knowledge for heterogeneous audiences.	Scientific-cultural exhibitions, open workshops, free consultancies, educational blitzes and cultural activities aimed at the academic and external community.
Meaningful learning	Learning occurs from the relationship between theory, practice and social reality, attributing meaning to the contents worked.	Practical application of concepts discussed in the classroom; activities based on "learning by doing"; connection between curricular content and real social demands.
Development of critical thinking	The actions stimulate the problematization of inequalities, naturalizations and the dominant instrumental logic in professional training.	Debates on ethics, work, environment, diversity, social inclusion and institutional responsibility; critical reflection on the social and environmental impacts of professional practices.
Articulation between theory and practice	Integration between theoretical foundations and practical experiences in real contexts of social and educational intervention.	Practical workshops, extension actions, project exhibitions and experience reports that show the application of theoretical concepts in concrete situations.

Source: The author

The results highlight the potential of the events as an innovative training strategy, capable of consolidating the articulation between teaching, research and extension, promoting the integral training of students and contributing to the strengthening of the institution's social role. The tables summarize the thematic categories analyzed.

Table 4

Main formative contributions observed

Formative dimension	Observed evidence
Student protagonism	Students' performance as presenters and mediators.
Interdisciplinarity	Integration between courses and areas of knowledge.
Critical thinking	Discussions about real problems and sustainability.
Communication	Presentation of projects to different audiences.
Social responsibility	Participation in extension actions and dialogue with the community.

Source: The author.

Table 5

Articulation between teaching, research and extension

Dimension	Shape of articulation
Education	Projects linked to disciplines and curricular activities.
Research	Investigation of problems and production of knowledge.
Extension	Interaction with the community and social application of knowledge.

Source: The author.

The results indicate that the events contributed significantly to broaden students' understanding of topics related to social and environmental responsibility. Greater student engagement, development of communication skills and critical reflection on real problems of the community were observed.

The interaction with the external community allowed the students to recognize the limits and possibilities of technical action, reinforcing the importance of an ethical and responsible posture. These findings corroborate the literature that points to extension as a privileged space for comprehensive education in professional and technological education.

6 FINAL CONSIDERATIONS

The experience in carrying out and analyzing the results of the events show the potential of extension projects as a training strategy capable of tensioning the technicist logic still predominant in technical and professional education. By promoting dialogue between knowledge, interdisciplinarity and approximation with social reality, extension projects contribute to the construction of a more critical, humane and socially committed education with the demands of the social scenario in which future professionals are inserted.

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