

Undergraduate Research for omnilateral formation: training of Professional and Technological Education advisors

ABSTRACT

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Professional and Technological Education (PTE) is characterized by the pursuit of the omnilateral formation of students, connecting work, culture, science, and technology, with work as an educational principle and research as a pedagogical principle. Undergraduate Research (UR), in turn, provides students with the development of autonomy in research and reflective capacity, assimilation of scientific knowledge and research techniques, and the opportunity for an initial encounter with the world of work through science. Federal Institutes of Education, Science, and Technology (IF), by offering high school education combined with professional technical training through an integrated technical course, provide the opportunity to enhance the application of UR in high school. A diagnostic questionnaire administered to teachers at the Federal Institute of Education, Science, and Technology of São Paulo (IFSP) campus Sertãozinho revealed limited knowledge and a lack of practice in activities related to UR. Therefore, to help alleviate these difficulties, an Educational Product (EP) was developed, consisting of bibliographic material and a mini-course to train teachers and Administrative Technicians in Education (TAE) to create and guide UR projects. To be evaluated, the EP was implemented with the sociocultural teaching approach and sociointeractionist learning theory among the staff at campus Sertãozinho. The action research method was employed, characterizing it as qualitative research, with data collection through observations, questionnaires, interviews, field notes, and dialogues/discourses during group discussions, emphasizing a dialogical nature in the activity. Data were analyzed based on content analysis elements, and the results demonstrate that the EP meets participants' expectations, aids in staff training for research project development, and also motivates them to guide students in UR, contributing to awareness of the importance of research as a pedagogical principle and work as an educational principle in student/future citizen formation.

KEYWORDS: Science. Scientific and technological education. Polytechnics. Teacher training.

1 INTRODUCTION

Since childhood, people seek to understand the world around them, a characteristic that distinguishes humans from other animals. Thus, individuals must mobilize to find answers to their questions, an action called research, which "is required when there is not enough information to answer the problem, or when the available information is in such a state of disorder that it cannot be adequately related to the problem" (GIL, 2002, p. 17). Research is conducted to address inquiries in various areas of knowledge and is also fundamental in the educational process, with individuals developing critical and creative knowledge through the act of research (DEMO, 2011). Research, as a scientific and pedagogical principle, contributes to the formation of conscious citizens through the holistic development of individuals (FREIRE, 1996).

Special emphasis should be given to scientific research, characterized by the application of scientific methodology, which is the systematization of scientific procedures to seek answers to more complex questions. The appropriation of knowledge for the application of scientific methodology can (and should) be applied in the school environment to educate students, thereby contributing to a fairer and more conscious society. One possibility for incorporating the practice of science and its methods into the school environment is Undergraduate Research (UR), characterized by the guidance, through a researcher, of students so that they assimilate, learn, and understand the concepts and practice of scientific research (FUENTES-ROJAS; GEMMA, 2021). According to Bridi (2011, p. 350), UR is the "strongest pedagogical aspect for understanding the scientific method as a formation that goes beyond a set of techniques to organize, treat, or analyze data." UR contributes, therefore, to the development and improvement of autonomy, creativity, critical thinking, and awareness of the individual. It plays an important role in the integral formation of the citizen (BRASIL, 2007).

However, neither one form (research as a pedagogical principle) nor the other (UR) is widely disseminated in the school environment (DEMO, 2011). In addition to creating difficulties for the scientific and technological development of the country, this deficiency has immediate political and social consequences for Brazilian society. Due to the lack of reasonable research training, the majority of citizens unconsciously contribute to the spread of misinformation (fake news), which is currently one of the country's major problems (SANTANA, 2022). Thus, the appropriate integration of research and the scientific method into the school should be one of the priorities of the country's public education policies.

Characterized by the combination of work, culture, and science, Professional and Technological Education (PTE) aims at the omnilateral formation of students through integrated and polytechnic education. In other words, it seeks to train autonomous, creative, critical, reflective citizens who are aware of their importance in society (CIAVATTA, 2014; RAMOS, 2010). With work as an educational principle and research as a pedagogical principle, PTE has the Federal Network of Professional, Scientific, and Technological Education in Brazil since 2008. This network includes Federal Institutes of Education, Science, and Technology (IF), Federal Centers of Technological Education (CEFET), Federal Technological University of Paraná (UTFPR), Technical Schools linked to Federal Universities, and Colégio Pedro II.

The Federal Institute of Education, Science, and Technology of São Paulo (IFSP), the largest representative of the Federal Network with over 44 thousand enrolled students (IFSP, 2023a), recorded around 500 UR projects in 2021 (IFSP, 2023b; 2023c; 2023d), representing an approximate average of one project for every 87 students. Considering the importance of UR in student formation, it would be desirable to improve this ratio, especially in high school, a level that corresponds to 50% of the vacancies in IF courses. This percentage is guaranteed by Law No. 11.892/2008 (BRASIL, 2008), which prioritizes the offering of integrated education articulating work, science, and culture from the perspective of human emancipation (PACHECO, 2011; SCHIEDECK; FRANÇA, 2019).

In this context, this paper presents an Educational Product (EP) aimed at contributing to the formation of researchers by raising awareness about the importance of UR, as well as motivating and training them to develop, submit, and guide UR projects. The EP consists of a 12-hour mini-course (six in-person and six hours of distance learning for reading and understanding the material) and an instructional bibliographic material in digital document format (.pdf). The evaluation of the EP took place through its application to the IFSP campus Sertãozinho staff in the second semester of 2022. As qualitative research, data related to the application of the EP were collected through questionnaires, field notes, interviews, and, primarily, the recording of dialogues during group discussions. The analysis was carried out using elements of content analysis (BARDIN, 2011).

2 METHODOLOGY

Initially, a literature review was conducted on books and scientific articles related to the topic, using the following descriptors: scientific methodology, UR, and PTE. The review was carried out between 2021 and 2023, primarily using the SciELO and Google Scholar databases. Additionally, documentary research was conducted to gather data on IFSP and the implementation of UR in the institution, specifically at campus Sertãozinho. Documentary analysis was performed on files, documents, and reports available on the IFSP's electronic pages.

Based on the results of the literature review, a preliminary analysis was conducted, considering titles, abstracts, and keywords, to selectively and analytically choose the texts for study. The literature review supported the understanding of related topics and contributed to the development of the diagnostic questionnaire (GIL, 2002). The documentary research involved examining normative documents and funding agency announcements to understand the rules, regulations, and objectives for UR implementation. Management reports were also analyzed to gather data on UR projects developed in 2021 at IFSP and especially at campus Sertãozinho (MARCONI; LAKATOS, 2007).

These two stages form the theoretical framework of this research, and the information gathered contributed to the development of the EP, as well as the design of its application and the instruments for data collection and analysis. Considering that the research naturally involves human subjects, the project was submitted to and approved by the Ethics Committee on Research with Human Beings of IFSP (CEP-IFSP), with a Certificate of Presentation for Ethical Consideration (CAAE) 55470322.0.0000.5473. Thus, participants (research

subjects) received the Informed Consent Form (ICF) for understanding and agreement to participate in this research.

2.1 Diagnostic research

To identify the challenges, needs, and motivations of teachers regarding UR guidance, a diagnostic questionnaire incorporating open-ended and objective questions (multiple-choice and Likert scale) was formulated. Due to the constraints imposed by the COVID-19 pandemic in 2021, the survey was administered to teachers at IFSP campus Sertãozinho using Google Forms. Invitations to participate were emailed to the 93 campus teachers, and responses were received from one-fifth of them (18 teachers). The collected results and their analysis are detailed in the Results and Discussions section.

2.1 Educational Product

The Educational Product (EP) resulting from this research, designed to support the training and motivation of staff regarding UR, comprises a learning object and a proposed application in the form of a mini-course. The learning object, titled "Guidance for Undergraduate Research in Professional and Technological Education" (ARAUJO; MENIN; DIAS, 2022), can be accessed on the EduCAPES Portal via the link <http://educapes.capes.gov.br/handle/capes/738938>.

In the category of instructional bibliographic material, the learning object was developed in the electronic text format (.pdf). Serving as a reference for those entering this field, it is segmented into six themes/chapters, each encompassing contextualization, fundamental concepts, illustrations, graphs and/or tables, bibliographic references, and links for accessing digital content, as outlined in Table 1.

Table 1 – Content of the bibliographic material constituting the Educational Product

Theme	Title
1	Introduction
2	Undergraduate Research and Professional and Technological Education
3	Funding agencies and announcements
4	Research project development
5	Practice of guidance
6	Dissemination of results

Source: Developed by the authors (2023).

In Theme 1, the instructional bibliographic material is presented, providing information about its target audience (teachers and administrative-technical staff in education - TAE), its objectives, and the proposed application (format, methodology, necessary equipment, etc.). In Theme 2, the relationship between UR and PTE is explored, as well as its application. Theme 3 introduces, in addition to IFSP, the main funding agencies (National Council for Scientific and Technological Development - CNPq and São Paulo Research Foundation - FAPESP)

and their respective calls. Theme 4 focuses on the elaboration of a research project, specifically according to items requested in the Unified Public Administration System (SUAP), used for submitting research projects at IFSP. In the fifth theme, the practice of guidance is discussed, covering the scientific method, UR objectives, and the advisor-research student relationship. Theme 6 addresses the conclusion of UR, emphasizing the dissemination of results as crucial for completing the activity (reports, presentation at events, and publication of scientific articles). The material concludes with the bibliographic references used in its elaboration, and each theme provides references and links for access to documents and materials of interest on the subject.

This bibliographic material serves as the basis for conducting a formative activity. The proposal for its application is presented in the form of a suggestive guide for the realization of a "Mini-course for the training of undergraduate research advisors in Professional and Technological Education" (ARAUJO; MENIN; DIAS, 2023), available at the link <http://educapes.capes.gov.br/handle/capes/738923>, also in pdf format.

Aligning with the principles of PTE, it is proposed that this activity be carried out in a dialogical manner, aiming for the sharing of information and collaborative knowledge construction. The conversation circle is one of the most applied techniques to achieve these objectives. It is suggested that the mini-course lasts for 12 hours, with half being in-person and the other part at a distance so that participants have contact with and knowledge of the learning object before and during the mini-course.

On the first day, it is recommended to present the EP (Theme 1) and contextualize and discuss the relationship between UR and PTE (Theme 2). In the second meeting, in addition to IFSP, the main funding agencies (CNPq and FAPESP) and their respective calls are presented (Theme 3), and there is a discussion about the elaboration of research projects (Theme 4). To conclude the mini-course on the third day, experiences related to the practice of guidance (Theme 5) and the dissemination of results obtained with UR (Theme 6) are discussed.

2.3 Application of the EP and data collection

To apply the EP, a mini-course with three in-person meetings of two hours each was conducted, with the complementary workload allocated to knowledge and reading of the bibliographic material. This activity was part of the programming of the 19th National Week of Science and Technology (SNCT 2022) at IFSP campus Sertãozinho, held in October 2022. The venue (classroom) where the mini-course took place was equipped with tables, chairs, an image projector, a whiteboard, markers (brushes), an eraser, air conditioning, internet, good lighting, and electrical outlets for participants. The equipment used, in addition to those available on-site, included a computer/laptop (for presenting content), paper, and pens. Out of the twenty available slots for all staff, there was participation from one TAE and six professors from the campus, as well as an external professor (a graduate of the campus high school).

After the presentation of the EP, participants were asked to fill out a questionnaire to collect the characteristics of the research subjects through objective and open-ended questions. As one of the purposes was to identify the

perceptions of IFSP staff regarding UR (difficulties, needs, motivations, etc.), qualitative research was chosen, which aims to investigate how people consider an experience (CÂMARA, 2013). Thus, a semi-structured interview was conducted, in the form of a conversation circle, for participants to share their knowledge, experiences, and insights regarding UR.

Since the purpose of this EP is for its application to occur through dialogical interaction between participants and facilitators, the sociointeractionist learning theory was applied. As an educational approach, the sociocultural approach originated with Paulo Freire and is characterized as an interactionist approach between the subject and the object of knowledge, focusing on the subject as a collaborator and creator of knowledge. Considered a broad process of teaching and learning, it provokes and creates conditions to develop an attitude of critical reflection and commitment to society and its culture (SANTOS, 2007).

The collection of descriptive data occurred through direct contact between researchers and research subjects to understand the phenomenon from their perspective (GODOY, 1995 *apud* CÂMARA, 2013). During the mini-course, observations were made, and notes were taken in a field diary, in addition to recording participants' statements. The open-ended responses were analyzed using content analysis (BARDIN, 2011), which is characterized as a methodological technique applicable to various discourses and forms of communication, whereby the researcher seeks to understand characteristics found in fragments/excerpts of messages considered for analysis. Thus, the analyst/researcher has a dual effort to understand communication as a normal receiver and, essentially, to seek another meaning in the same message (CÂMARA, 2013).

3 RESULTS AND DISCUSSION

In this section, the results obtained from the diagnostic questionnaire, which informed the conception and design of the EP, as well as the results obtained from its application, are presented and analyzed.

3.1 Diagnostic questionnaire

Among the respondents, the majority (55%) did not engage in UR as students, confirming that, unfortunately, the development of this activity does not include the majority of students (MASSI; QUEIROZ, 2010). Despite not having participated in UR, there was a prevalence of considering this activity as very important in individual formation (89% of responses). Most of the surveyed individuals (72%) have already advised UR students, with an average of seven students among these teachers. Regarding motivations for advising UR students, "Contributing to the student's education" was the most mentioned (89%). Following that, "Promoting research in the institution" was indicated by 83% of teachers, and "Promotion of the academic career as a researcher" was also mentioned by the majority (55%).

Concerning difficulties in UG guidance, "Lack of incentives and resources" was reported by 39% of teachers. Next, "Limited experience in research," mentioned four times, demonstrates a connection with the fact that more than half of the participants have no experience with UR as students. Following that, "Lack of didactic/instructional material" and "Difficulty with documentation" were each

indicated three times. These two difficulties can be minimized by providing material that includes instructions, guidance, documentation, and references related to the elaboration of research projects and student guidance in UR.

Regarding actions that can contribute to encouraging the development of UR guidance, the option "Career incentives" was the most indicated by participants (10 mentions). Following that, the options "Courses/training" and "Supporting materials (publications, videos...)" were pointed out by half of the teachers as incentives for promoting UR. These are related to the difficulties "Lack of didactic/instructional material" and "Difficulty with required documentation." It is evident that there is indeed difficulty among teachers in guiding UR due to a lack of knowledge and experience regarding UR practices related to unfamiliarity with bureaucratic/administrative issues associated with the activity.

3.2 Application of the EP

At the beginning of the mini-course, the "Questionnaire for collecting participant profile data" was applied to collect data from the participants. The eight research subjects were identified in the order of receipt of responses and are identified by the letter "P" and respective numerical participation number (Participant 1 - P1, Participant 2 - P2, etc.). Five participants engaged in UR as undergraduate students, and five have already guided students in UR. The vast majority of participants (seven teachers) consider UR very important for student formation.

Applying elements of content analysis (BARDIN, 2011) to the speeches during the conversation circles, it was possible to select record units to identify categories, as indicated in Table 2.

Table 2 – Categories identified in the speeches of mini-course participants based on elements of content analysis

Categories
Importance of UR in personal and professional development
UR Funding
Motivation to participate in the mini-course
Mini-course
Bibliographic material
Training for guiding students in UR
Motivation to guide students in UR
Collaborative and dialogical construction

Source: Developed by the authors (2023).

The category "Importance of UR in personal and professional development" examined, based on the participants' reports who engaged in UR as students, the significance of UR in their personal and professional development:

"[...] It was the undergraduation research that encouraged me to continue in this academic and research area as well, right?! So, it was because of having

done undergraduate research that I pursued a master's degree and now a doctorate. So, it was essential for my education." (P2)

"[...] My experience with undergraduate research was very good, right?! So much so that later, I wanted to do a master's and... Guide students. So, this experience of undergraduate research, even though it was a bit rushed, was very important for me. I consider it very, very important for my formation, and I think it is extremely important for any student, from high school, and especially in graduation, to build an academic career. Not just an academic career but a perspective of understanding what scientific research is." (P7)

The accounts emphasize the importance of UR for continuing academic life after graduation, highlighting that UR served as a foundation for entering a master's program and continuing with a doctorate. With this background, individuals are prepared to pursue an academic career as educators, especially in universities, and/or researchers, thus remaining in the research, academic, and scientific environment.

The category "UR Funding" denotes the issue of UR funding (through granting research scholarships to students) as one of the motivating components for more students to enter the so-called research world:

"I just wanted to contribute by mentioning that... The issue of funding is very important, right?! I, for example, am at an older age, and I remember that when I did my undergraduate degree, opportunities for UR were very rare, right?! I remember from my class, one or two did it, during undergraduate studies... In high school, this wasn't even considered, right?! So... I think that... Funding has also increased a lot, perhaps in the last 20 years, 20, 25 years, but I think it is still insufficient, right?! In our own institution, you have the calls, and... There is always a waiting list, right?!" (P8)

"[...] I registered for the undergraduate research project, we received a scholarship from Fapemig [Foundation for the Support of Research in the State of Minas Gerais] at the time, which was very important for conducting the research." (P5)

"Really, the change from 2001 until now has been significant! So, today, several scholarships are institutionalized. Undergraduate research, in particular, even for high school, right?! So, there was a very significant change in this period. [...] And I think that, well, P8 talking about the funding issue is... It reminded me a lot of reality because [...] The first scholarship we had, as an Institute [Federal], didn't have this; we received it as an internship." (P7)

Statistics on student retention in Brazil show that, even in the 21st century, unfortunately, around one-fifth (22%) of school-age youth in high school provide data on dropout rates (BRANCO et al., 2020). Generally, young people need to work at the expense of their school lives because they need to contribute to the household income for family subsistence. Thus, one way to keep young people in the school environment is by providing scholarships so that they do not stop attending school for paid work. For research, there are so-called UR scholarships that contribute to maintaining the student in school, encouraging the young person to enter the world of research and that can be the young person's first contact with paid work through science (BRASIL, 2018; CNPq, 2016; IFSP, 2022).

The category "Motivation to participate in the mini-course" aims to identify the main motivations of the research subjects to participate in the mini-course, especially those without experience in guiding students in UR projects:

"[...] And now, as a teacher [in High School in the state network], I also want to learn how to guide because it's very difficult, right?! It's different [guiding instead of being guided]." (P2)

"[...] And then, I got really curious about this guidance training because I never stopped to think that I'm going to guide, and I don't know! If I were to guide students today, I would be completely lost! I think I'm here trying to find myself!" [laughs]. (P5)

Participants were questioned about the motivations that led them to participate in the mini-course (application of the EP). The reports indicate the motivations of those who have not yet guided UR due to being in academic training or not having had the opportunity to guide students. P2 illustrates the difference between being a student (orientee) and being responsible for the students' training (advisor). Despite being educators, P2 and P5 demonstrate that, despite extensive academic training (undergraduate, master's, and doctoral degrees), there is a need for continuous training for teachers (NÓVOA, 2017).

The main motivation identified in participants with no experience as advisors was the desire to learn how to guide students in UR projects. This EP does not intend to "format" advisors of UR students by depositing information in the style of "banking education" and contrary to the principles of Freire (1996). The intention is to collaborate in the training of new advisors (without practical experience in conducting UR projects), as well as in the improvement of experienced advisors. Through the application of this EP, with the participation of experienced advisors and specialists in the themes/topics addressed through collaborative and dialogical construction among participants in the Freirean mold (FREIRE, 1996). Throughout the mini-course, it was demonstrated that this activity (application of the EP) does not have a rigid *modus operandi*, presenting flexibility in application, as all EPs should be adaptable by new implementers (RIZZATTI *et al.*, 2020).

At the end of the third meeting, participants were encouraged to express their opinions about the mini-course/application of the EP. The EP is considered the set formed by the learning object (bibliographic material) and its form of application (mini-course). However, based on the reports of the research subjects, two distinct categories related to the EP are identified. The first category is the "Mini-course" (application of the EP):

"[...] As a student, right, and analyzing the [educational] product, I thought it was very nice, met my expectations! I had a different perspective, as you guide." (P2)

"[...] This [mini]course that you gave, with all this dynamics, is very important for us... To disseminate among the teachers in the institution, it... Teachers and administrative technicians, right?! This is important, we have to... I think at the beginning, maybe in the planning [...] [this course should be applied] At the beginning of the year." (P1)

"Ah, I can only corroborate everything P2 said because she said exactly what we expected from the course! [...] I didn't have the opportunity to do undergraduate research when I was in college... [...] You brought [the topic "The practice of guidance] very well, right?! It was excellent!" (P6)

Participants positively evaluated the application of the EP through the mini-course, as reported by the research subjects present in the third meeting. P2

begins by showing that the exchange of experiences, through a conversation circle, was very interesting for her training in the mini-course, as she noticed nuances between her experience at another institution and the culture presented by the advisors at IFSP campus Sertãozinho. In this way, it is evident that the dialogical interaction had the expected effect, both in educational and research functions, as presented by Pinheiro (2020) in the functional characteristics of conversation circles. P6 emphasizes that, not having conducted UR, the EP addressed interesting topics for their development as a researcher/advisor. Both, who have not yet guided UR, evaluated that the EP met their expectations.

From the considerations about the EP, a category exclusive to the "Bibliographic Material" component of this EP was identified:

"I liked the [bibliographic] material! I thought it was very didactic because you linked it online, right, which the Facilitator passed on to me via WhatsApp, you linked all the report templates, all the websites we should access. So, everything is well explained in the physical product, right?! I think it was very cool! And I think it was excellent because that's it: if I were entering the Federal Institute now, with the material I saw from SUAP, it has the whole step-by-step, where to go, everything, I wouldn't need to ask someone how to do it! I think the [bibliographic] material already meets this need." (P2)

"[...] as P2 said, the didactic material you provided can help the teacher who is entering or even me, who is already an administrative technician, if I am going to participate as a co-advisor, with some teacher, it will also help a lot! It will even help me in my dissertation writing that I'm currently doing, and I think the work is excellent!" (P6)

"With regard to the [bibliographic] material, it is extremely important. In this aspect, it will play a very important role in helping these teachers on how to guide their students, right?" (P1)

The bibliographic material, an integral part of the EP, received separate considerations from the mini-course (application of the EP), as observed in the reports of the research subjects. It was positively evaluated by the mini-course participants, both experienced advisors and those entering the guidance activity. They indicated the breadth of topics and documents related to UR guidance as one of the positives for those entering this activity. This discourse relates to the collaborative nature of the elaboration of the bibliographic material based on the results obtained with the diagnostic questionnaire.

As part of the evaluation of the EP application, participants were asked to elaborate on their perceptions of the possibility of this EP assisting in training for the development of research projects and in guiding students in UR, thus identifying the category "Training to guide students in UR":

"So, if one day I do the same, I already have different views, besides my professor, because we tend to follow the master, right, the one who taught. So, now, I have other, other reports to be able to build my own, my own 'modus operandi,' right, how to do it. [...] because when we enter a place, we need to know how it works, everything is difficult! Sometimes, finding a dedicated person to donate those hours there to explain to you, to show you the systems and everything else. So, I think the physical product [bibliographic material] already does that, and the [mini]course complements that, right?!" (P2)

"I never participated, never had undergraduate research as a student, and I think, as a co-advisor and possibly in the future [as an advisor], I think it would be possible to [guide students in UR]." (P6)

"Yeah, the course gives a nice base that we didn't have, right?! Including, to guide, sometimes, not only undergraduate research but the thesis itself, right?! We look back, and we think 'How much could have been... avoided, right?!' So, we do a lot of things in trial and error, right?! [...] If we imagine ourselves back then, for sure, this course would give... a much better perspective for us to work... The content, the guidance activity throughout the process..." (P8)

One of the objectives of this EP is to contribute to the training of staff for the development of research projects and the guidance of high school students in UR. From the reports, both from those new to the activity and from more experienced individuals, it is observed that the objective has been achieved. As emphasized by P2, through the mini-course and, especially, with the experiences of other participants, she realized that she could build her methodology for guidance through the best practices reported. Once again, the effectiveness of the dialogicity of conversation circles is perceived, and its importance for collaborative knowledge construction (PINHEIRO, 2020). This report confirms the achievement of the objective of dialogical knowledge construction, as stated in Theme 1:

"It is suggested that researchers with experience in UR guidance report their experiences and practices developed so that the public perceives the nuances of work as an educational principle, in order to assist in the development of each researcher's practice (ARAUJO; MENIN; DIAS, 2022, p. 7)."

To find out if the EP motivated participants to guide UR, participants without guidance practice were asked: "How much did the mini-course increase your possibility, your potential to want to guide UR?". Here are the considerations of P2 in identifying the category "Motivation to guide UR":

"Yes, it encouraged me! It motivated me to want to guide! [...] Because I took it and said like this: 'Guys, maybe I could [guide], right?!' [...] And then, let's see how the next years will be, but I felt like [guiding]." (P2)

"And then, seeing the course, I said: 'I think I can, do I handle [guiding UR]? I think I do!' Because some things I already know how to do. So, it would be a challenge and a new learning, but the [mini]course, for sure, aroused that desire!" (P2)

For P2, the EP motivated her to guide I research through the provided reflection. Many of the activities carried out for student guidance already constitute her knowledge, as she conducted UR in undergraduate and received guidance in master's and doctoral programs. Thus, once again, the principle of PTE as an educational principle was implicitly used by participants to describe their UR training, in addition to the reflective character that conversation circles provide (PINHEIRO, 2020). According to P2's reports, it is evident that the objective of motivating participants to guide students in UR has been achieved.

Finally, a category about the "Collaborative and dialogical construction" of this EP was identified in the participants' reports, indicating that this intention was achieved in the activity:

"I had a schedule to do one thing on Tuesday, one on Wednesday, one on Thursday [three days of the meeting], but... All in my head, all right, everything perfect, but it didn't happen. But, it happened much more, maybe more than that, with more richness!" (Facilitator)

"I thought the discussion was very rich, both today's and yesterday's, right?! Because, I think, it worked different looks, right?! [...] I think this enriched a lot, everyone collaborated a lot, it was very, very cool! Yeah, since it's a first course, too, we always later improve, right?! Adjusting... And the cool thing, like you put it at the beginning, something built, worked on... That is... That is within the WPT philosophy, right?! Of dialogical interaction... This is something, like, that pleases me a lot, right?! No, it wasn't something that, in many organizations, is something more imposed, 'No, it's like this!', right?! So, that bunch of pre-ready rules... So, we built it ourselves, that was very cool. [...] Very good!" (P8)

One of the intentions of this EP was for its construction to occur collaboratively, with diverse contributions so that the majority of those interested in the subject could have their aspirations addressed. Mentioned at the beginning of the first meeting with participants, collaborative construction was applied in the development of bibliographic material, aiming to meet some of the needs identified in the results of the diagnostic questionnaire and open to contributions from this research. During the mini-course, due to the participants' levels of knowledge and experience, coupled with dialogical interaction during the meetings, the EP schedule was adjusted to the participants' aspirations, as mentioned by the facilitator (PINHEIRO, 2020; RIZZATTI *et al.*, 2020).

4 FINAL CONSIDERATIONS

Sustained by work as an educational principle and research as a pedagogical principle, the development of UR projects contributes to the integral and meaningful education of students, making them autonomous, critical, and reflective citizens capable of seeking answers to their questions and those of their community. In this sense, a proposal for an Educational Product (EP) was presented here, composed of bibliographic material and a mini-course, aiming to contribute to raising awareness among educational institution staff about the importance of UR in students' education, as well as to equip them to develop, submit, and guide UR projects.

To be evaluated, the EP was applied to staff at IFSP campus Sertãozinho, and data collection occurred through questionnaires, interviews, conversation circles, and field notes. Through the application of elements of content analysis (BARDIN, 2011) to participants' discourse, it was observed that the objectives were satisfactorily achieved. The EP contributed to the training of new advisors and the improvement of experienced advisors, contributing to the increased awareness of the importance of UR in students' education. It also assisted in the training for the development of research projects and motivated the activity of guiding students in UR.

As future perspectives, it is suggested to continue this work by applying the mini-course proposal to other units of IFSP, as well as to other institutions. Additionally, there is the prospect of creating videos related to each theme/topic covered in the bibliographic material and adapting the mini-course for Virtual Learning Environments (VLE), as this modality can be more dynamic and enable

staff training through asynchronous activities, carried out according to their availability.

INICIAÇÃO CIENTÍFICA PARA FORMAÇÃO OMNILATERAL: CAPACITAÇÃO DE ORIENTADORES DA EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA

RESUMO

A Educação Profissional e Tecnológica (EPT) caracteriza-se pela busca da formação omnilateral do estudante, relacionando trabalho, cultura, ciência e tecnologia, tendo o trabalho como princípio educativo e a pesquisa como princípio pedagógico. A iniciação científica (IC), por sua vez, proporciona ao estudante o desenvolvimento da autonomia em pesquisa e da capacidade de reflexão, a assimilação de conhecimentos científicos e de técnicas de pesquisa, além de propiciar um primeiro contato com o mundo do trabalho através da ciência. Os Institutos Federais de Educação, Ciência e Tecnologia (IF), ao oferecerem ensino médio aliado à formação técnica profissional através de curso técnico integrado, apresentam possibilidade de incremento da aplicação da IC no ensino médio. Identificou-se, a partir de um questionário diagnóstico junto aos professores do Instituto Federal de Educação, Ciência e Tecnologia de São Paulo (IFSP) campus Sertãozinho, pouco conhecimento e falta de prática com as atividades relacionadas à IC. Assim, para auxiliar na diminuição destas dificuldades foi elaborado um Produto Educacional (PE) composto por material bibliográfico e minicurso para capacitar professores e Técnicos-Administrativos em Educação (TAE) a elaborarem e orientarem projetos de IC. A fim de ser avaliado, o PE foi aplicado junto aos servidores do campus Sertãozinho com abordagem de ensino sociocultural e teoria de aprendizagem sociointeracionista. Utilizou-se o método de pesquisa-ação e caracterizando-se como pesquisa qualitativa, a coleta de dados ocorreu mediante observações, questionários, entrevistas, anotações de campo e diálogos/discursos realizados durante rodas de conversa, predominando o caráter dialógico na atividade. Os dados foram analisados com base em elementos da análise de conteúdo e os resultados mostram que o PE atende às expectativas dos participantes, auxilia na formação de servidores para elaboração de projetos de pesquisa e, também, na motivação para orientarem alunos em IC, contribuindo na conscientização sobre a importância da pesquisa como princípio pedagógico e do trabalho como princípio educativo na formação do estudante/futuro cidadão.

PALAVRAS-CHAVE: Ciência. Educação científica e tecnológica. Politecnicia. Formação de professores.

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