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EXPERIENCE REPORT

Impact of scientific initiation in undergraduate studies for professional training

Impacto de la iniciación científica en los estudios de pregrado para la formación profesional

Impacto da iniciação científica na graduação para a formação profissional

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Abstract

The aim was to report on the impacts of including scientific initiation programs in undergraduate programs for professional development. This is a descriptive, narrative, experience-report study addressing the impact of scientific initiation programs on professional development in undergraduate programs. A scientific initiation project may have its particularities, but, as a rule, it follows a single general model with similar steps, regardless of the topic or field of study. Research based on an original idea or emerging from a research perspective requires a review of the scientific literature to understand and delve deeper into the topic. Following this, submissions to an ethics committee, if necessary, and to Plataforma Brasil are processed. The conclusion is that scientific initiation programs during undergraduate programs have a significant impact on students' academic careers, fostering skills development, familiarity, and affinity for scientific research.

Descriptors: Scientific Initiation; Research; Undergraduation; Research Project; Impacts.

Resumén

El objetivo fue retratar los impactos de la inclusión de programas de iniciación científica en programas de pregrado para el desarrollo profesional. Este es un estudio descriptivo, narrativo, de tipo experiencial, que aborda el impacto de los programas de iniciación científica en el desarrollo profesional en programas de pregrado. Un proyecto de iniciación científica puede tener sus propias particularidades, pero, por regla general, sigue un único modelo general con pasos similares, independientemente del tema o campo de estudio. La investigación basada en una idea original o que surge desde una perspectiva de investigación requiere una revisión de la literatura científica para comprender y profundizar en el tema. Posteriormente, se procesan las presentaciones a un comité de ética, si es necesario, y a Plataforma Brasil. La conclusión es que los programas de iniciación científica durante los programas de pregrado tienen un impacto significativo en las carreras académicas de los estudiantes, fomentando el desarrollo de habilidades, la familiaridad y la afinidad con la investigación científica.

Descriptores: Iniciación Científica; Buscar; Graduación; Proyecto de Investigación; Impactos.

Resumo

Objetivou-se retratar os impactos da inserção de iniciação científica nos cursos de graduação para formação profissional. Estudo descritivo, narrativo, do tipo relato de experiência referente à visão sobre o impacto da iniciação científica na graduação para a formação profissional. Um projeto de iniciação científica pode ter particularidades, mas, via de regra, segue um modelo geral único com passos semelhantes independente do tema e da área de estudo. Uma pesquisa a partir de uma ideia original ou pode sair de um ponto de pesquisa, após essa fase, deve realizar um levantamento na literatura científica para conhecer e aprofundar mais sobre o tema. Após isso, há o seguimento de trâmites referentes a submissões em comitê de ética, caso necessário, e na Plataforma Brasil. Conclui-se que a iniciação científica durante a graduação apresenta um impacto significativo na carreira acadêmica do aluno para o desenvolvimento de habilidades, familiaridade e afinidade pela pesquisa científica.

Descritores: Iniciação Científica; Pesquisa; Graduação; Projeto de Pesquisa; Impactos.

Introduction

Scientific Initiation (SI) programs, widely used in academia, provide students with the opportunity to deepen their knowledge of a topic and develop skills such as writing and scientific research. Thus, SI research conducted by students from various fields has the potential to generate social impact, contribute to the image of the educational institution, and enrich the student's resume, which is crucial for building their professional future[1].

From this perspective, undergraduate research represents a redefinition of the training of more objective, capable, and research-oriented professionals. Thus, student involvement in research groups and close ties with a supervising professor can contribute to student integration and the dissemination of scientific research. Thus, conducting scientific research by students and faculty encourages knowledge production and the development of scientific learning[2].

In this sense, it is worth noting that the inclusion of scientific research in training courses occurred in Brazil through the creation of the National Council for Scientific and Technological Development (CNPq) in 1951. This body still functions today as an agency that encourages research through the creation of paid scholarships at Higher Education Institutions (HEIs). Furthermore, it is important to understand that encouraging research also meant building a two-way street between research and teaching[3].

Given the above, it is understood that research is of paramount importance for the construction of new knowledge. To this end, the Institutional Scientific Initiation Scholarship Programs (PIBIC) serve as a gateway for students into the scientific world. Furthermore, faculty also benefit from the development of critical-reflective thinking through a theoretical-practical connection[4].

Thus, following the creation of PIBIC by the CNPq in 1988, the Scientific and Technological Development Program (SI) was standardized and officially recognized as a program focused on developing scientific thinking and initiating undergraduate research. Consequently, there was a substantial increase in the number of scholarships offered to students and faculty. This reality provided an analysis of the direct correlation between a student's being a SI scholarship holder and their subsequent entry into a stricto sensu graduate program[5].

In this sense, scientific research has the potential to stimulate enrollment in graduate school, as these students, after experiencing scientific research, achieve a more qualified education and a greater chance of pursuing a career involving research. Therefore, it is expected that students who participate in scientific research will develop skills and aptitude for science, contributing to a more successful graduate education than would otherwise have been the case[6].

In short, undergraduate research offers numerous benefits for professional development, including enriching your resume and increasing the likelihood of being accepted into postgraduate programs. Therefore, we conclude that the debate surrounding research, despite the limited research on the topic, is essential to ensuring the validation of its merits. Therefore, this article seeks to portray the impacts of including research initiation in undergraduate programs for professional development.

Methodology

This descriptive, narrative, experience-report study explores the impact of undergraduate research on professional development. It is based on experiences during research initiations that took place from August 2022 to October 2023 at a public university in a capital city in the Northeast region. This experience report addresses the topic from a perspective that highlights the student-researcher's participation in, or perspective on, the events that occurred during the university process. Therefore, it is a research tool that allows for reflection and synthesis of evidence on impacts that address a situation experienced within the academic field of interest to the scientific community[7]. The following techniques were used to collect data and compose this study: structured context analysis, participation in scientific initiation activities, and analysis of the academic immersion process from the beginning to the end of the research process.

Therefore, this study aims to collect and process information about the experiences of nursing, physical therapy, and medical students; and to conduct a situational assessment, aiming to identify positive and negative aspects of the experience, thus providing researchers with support for the construction of knowledge regarding professional academic training.

This study is exempt from the need for submission to the Research Ethics Committee.

Experience Report

Scientific Initiation (SI) represents a constructive and important experience for undergraduate students, due to the introduction into the world of research in a immersive way, placing them as protagonists of scientific work and boosting their interest in research and science, having the opportunity to develop and improve a researcher's investigative sense, in addition to promoting a link between the subjects seen in the classroom and research[8].

Choosing a supervisor, preferably a researcher, is a fundamental part of the scientific initiation project, as their role is to help the undergraduate student through the first steps of the various processes for developing and executing the research project. The supervisor must be available to provide support throughout the project. When choosing a supervisor, preference should be given to positive research-related characteristics and relationships with undergraduate students[9].

Research aims to provide answers to proposed problems, developing through a process that involves numerous phases, from appropriate problem formulation to satisfactory presentation of results. Like any systematic activity, research requires actions developed throughout its process. Planning is generally conceived as the first phase of research, which involves formulating the problem, specifying its objectives, developing hypotheses, and operationalizing concepts[10].

The structure is determined according to the type of problem to be researched and the style of its authors, ensuring that the principles of scientific research are respected, namely: robust methodology, ethics, transparency, truthfulness, responsibility, honesty, objectivity, impartiality, and care. Therefore, it is necessary to clarify how the research project will proceed, what stages will be developed, and what resources should be allocated to achieve its objectives. It is also essential that the project be sufficiently detailed to allow for evaluation of the research process[10]. The issue of the theme, the interest of both in the same theme, will allow a more in-depth study, in which case the supervisor is qualified to better conduct the research.

A scientific initiation project may have its own particularities, but, as a rule, it follows a single general model with similar steps regardless of the topic or field of study. It begins with choosing the area of research which should be done in conjunction with the advisor. It may be an original idea or may stem from a research point of view. After this phase, a bibliographical survey should be conducted to learn more about and delve deeper into the topic. It is recommended to search for scientific articles published in health journals or periodicals, using keywords[9].

Chart 1. Structuring the step-by-step construction of the research plan. Teresina, PI, Brazil, 2022-2023

Introduction	It must be produced based on a bibliographic survey, providing the reader with clear and objective information on the topic you will be researching.
Objective	The objective can be outlined based on primary and secondary items, or from a research question or diagnostic hypothesis. It should be short and clear, restricted to what you will research.
Method	The entire methodology to be used in your work must be detailed, and all processes must be described, preferably presenting bibliographical references when they are used.
Schedule	Describe the different steps to be taken, their workflow, and how long it takes to achieve the proposed objectives.
Ethical aspects	It must be submitted to a Research Ethics Committee (REC) for evaluation of research projects. In cases involving human subjects, the patient will also be required to sign a specific agreement form called an Informed Consent Form (ICF).
Execution of work	The project will be executed according to what was described in the methodology, being put into practice and following the phases set out in the schedule.
Data analysis	After obtaining the data, it must be analyzed critically, meaning it must be understood what the results mean within the context of the study. The information must be organized in a systematic and orderly manner that allows for the understanding of the new information generated.
Disclosure of results	It can be carried out through various means, including scientific articles, reports and presentations at conferences and events, and the results of the research will contribute to increasing scientific knowledge.

Source: Adapted from Silva, 2012, p. 131.

After developing the research project, the scientist moves on to the next step: submission to the Research Ethics Committee (REC). Plataforma Brasil is the National Health Council's tool responsible for verifying project progress when using human subjects or animals for research and mediating the Scientist-REC process. The REC, in turn, has the role of guiding, instructing, validating research, and deliberating ethical issues, as well as intervening in research processes that negatively impact the lives of participants. The process requires attention to avoid negative feedback and delays, leveraging students' skills in reading notices and meeting deadlines[11].

The experience gained by scientific novices allows them to perform more successfully during their undergraduate studies, achieving better academic performance and being less likely to drop out, facilitated by financial support, in some cases, and by greater networking with other specialists in the studied category. Furthermore, this work provides greater autonomy during service delivery, developing critical thinking, maturity, and responsibility[12].

The use of an initiation program allows for the improvement of academic performance by establishing criteria that make it necessary for successful continuation in the course, engaging this student to always seek academic mastery and excellence before other students, using tools acquired with the IC, the undergraduate moves ahead in the race in Postgraduate selection processes aiming at admission to educational institutions that offer Master's and Doctorate programs[13].

Given the need for the production and consumption of scientific knowledge, envisioning a broader framework of measures that enable therapies and practices with more effective and specific results, scientific initiation programs allow students to immerse themselves early in the practical world. The use of databases to construct evidence-based knowledge is a reality experienced by students undertaking scientific initiation programs. By utilizing recent research, students gain access to the reality of a studied society and can draw analogies with their own experiences[14].

Knowledge production enables the engagement of other professionals in the same or other specialties. Through the dissemination of results, practical projects can be impacted by utilizing up-to-date evidence, as the literature is constantly evolving. Sharing knowledge aims to impact society with tangible and solid knowledge, bringing with it the name of the researcher behind the project, and

ultimately, with other stakeholders using it for their projects and work, whether in the scientific field or elsewhere[15].

Discussion

The participation of undergraduate students in scientific research in the Brazilian context is practically a century old, given that it emerged in conjunction with the creation of Higher Education Institutions, which dates to the 1930s. That said, Brazil established the inclusion of undergraduate students in the scientific environment, in line with what was practiced in the United States and France[11].

Based on this conjecture, the National Council for Scientific and Technological Development (CNPq) was created in 1951, recognizing the importance of scientific research and the need to institutionalize science promotion efforts in Brazil. From that point on, undergraduate and graduate students were provided with greater opportunities to conduct research and scientific investigations, given that the process of carrying out such work is quite costly and tends to require financial resources that most students cannot afford[13].

Thus, among the research categories, Scientific Initiation stands out as extremely relevant, as it goes beyond the mere insertion of undergraduate students into the research environment, providing students with experiences that extend beyond even the university walls. Furthermore, Scientific Initiation is seen as a tool to stimulate the potential of students, who, with intellectual and financial support, can delve deeper into areas they perceive affinity with. Furthermore, students participating in Scientific Initiation tend to achieve better grades throughout their undergraduate studies, a fact evidenced by various scientific studies conducted in Brazil[13]. Thus, SI provides students with a greater level of interaction between theory and practice, increasing overall performance in new learning tests, demonstrating greater performance in the academic environment[16].

Thus, undergraduate scientific initiation is knowledge-based, as greater depth enhances critical and reflective thinking. A study published by the Brazilian Journal of Medical Education, which included 143 students with an average age of 23-54, analyzed the prevalence of scientific programs and noted a low number of students in scientific initiation programs. However, when questioned about initiation within programs, they agreed with curricular needs and concluded that these activities contribute to the development of their final project[17].

Furthermore, it is also clear that the SI brings students closer to the postgraduate environment, acting as a stimulus and making the possibility of entering a master's program after graduation more tangible. Furthermore, students involved in the SI have a greater critical and investigative sense, which positively contributes not only to those students who will pursue academic careers and enter a master's program upon graduation, but also to those who will pursue a career focused on non-scientific endeavors. Professionals who have had the opportunity to enter SI during their undergraduate studies possess unique knowledge and experiences[11].

Therefore, beyond developing theoretical and practical skills, scientific research is seen as a tool that awakens undergraduate students' awareness of the relevance of science to the country's development. Furthermore, through scientific research and direct contact with scientific practice, students can move beyond viewing research and science as abstract concepts and understand the necessary steps for scientific development, the importance of following a specific method for each type of work, and the need to equip themselves with a satisfactory theoretical framework that can effectively support scientific production[11].

In line with these aspects, the literature also shows that academics who had access to SI developed into professionals with greater ease in teamwork and public speaking, important characteristics for any field of professional activity, whether directly related to scientific research or not. Thus, SI is seen as an important tool for preparing students for future challenges related to their field, even if, after graduation, they do not work directly in research[18].

However, despite the broad benefits of scientific initiation (SI), such as developing critical thinking and preparing students for graduate studies, significant gaps remain that compromise students' full engagement in scientific production. A study conducted with graduate nursing program graduates between 2010 and 2018 revealed that only half of the participants continued to engage in scientific production after completing their courses, and the majority did not publish any papers. These data suggest that, although SI offers robust tools to the academic community, there is a disconnect between the learning acquired and its practical application, which can be attributed to a lack of encouragement and ongoing commitment during training[19].

This disconnect is exacerbated by institutional challenges, such as the unequal distribution of research resources, which particularly affects less-privileged regions of Brazil. A study of CNPq faculty members in the field of public health showed that scientific production is significantly more concentrated in certain regions, highlighting a worrying regionalization. This limits the potential of scientific research to provide equitable development among students from different parts of the country and highlights a critical barrier to equal access to science. In the global context, this inequality is also reflected, undermining the relevance and impact of scientific production on local issues that could be better addressed with greater participation from all regions[20].

Conclusion

Therefore, it can be stated that scientific initiation during undergraduate studies has a significant impact on a student's academic career. By providing immersion in the world of research, scientific initiation develops essential skills such as critical thinking, autonomy, and responsibility. Therefore, this acquired experience prepares students to face academic and professional challenges, significantly increasing their chances of success in future opportunities. It

is worth emphasizing the importance of disseminating relevant knowledge to society that scientific production can provide. Furthermore, undergraduate research is a fundamental tool for professional development, enabling students to develop critical, methodological, and investigative skills. The impact of research during undergraduate studies enhances the development of skills essential for qualified professional performance, such as critical thinking, investigative skills, and familiarity with research. Thus, research represents a valuable opportunity for developing better-prepared, innovative professionals who are better equipped to face the challenges of the job market and academic research.

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