

## INITIAL TEACHER TRAINING: MEANINGS AND SINGULARITIES OF SCIENTIFIC INITIATION AS A SCIENCE POLICY<sup>1</sup>

### *FORMAÇÃO INICIAL DOCENTE: SENTIDOS E SINGULARIDADES DA INICIAÇÃO CIENTÍFICA COMO POLÍTICA DE CIÊNCIA*

### *FORMACIÓN INICIAL DE MAESTROS: SIGNIFICADOS Y SINGULARIDADES DE LA INICIACIÓN CIENTÍFICA COMO POLÍTICA CIENTÍFICA*

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**ABSTRACT:** This research aims to understand the meanings and singularities (re)constructed by scientific initiation (SI) scholarship holders/volunteers, with a view to identifying interrelations with initial teacher education. This is a theoretical-empirical study, of qualitative nature, which used a questionnaire as an instrument for the collection of data worked in the light of discursive textual analysis (DTA). The findings allow us to conclude that the experiences experienced in SI by the participants present an attitudinal tendency towards the academic career, also focused on professional values, respecting the curriculum and pedagogical practices; learning for authorship, interaction and critical relationship; production and dissemination of knowledge and social pertinence for the performance in the spaces of the profession. It was concluded that the initial formation of teachers refers to considering the difficulties existing in the research process of the students and in the work of the teacher-advisor on the construction of knowledge with the world, with himself and with the other.

**KEYWORDS:** Initial formation. Teacher. Scientific initiation.

**RESUMO:** *Esta pesquisa tem como objetivo compreender os sentidos e as singularidades (re)construídos pelos bolsistas/voluntários de iniciação científica (IC), com vistas à identificação das inter-relações com a formação inicial docente. Trata-se de um estudo teórico-empírico, de natureza qualitativa, que utilizou um questionário como instrumento para a coleta de dados trabalhados à luz da análise textual discursiva (ATD). As descobertas consentem concluir que as experiências vivenciadas na IC pelos participantes apresentam uma tendência atitudinal para a carreira acadêmica, também voltadas aos valores*

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*profissionais, respeitando-se o currículo e as práticas pedagógicas; aprendizagem para a autoria, interação e relação crítica; produção e difusão do conhecimento e pertinência social para a atuação nos espaços da profissão. Concluiu-se que a formação inicial de professores remete considerar as dificuldades existentes no processo de pesquisa dos acadêmicos e no trabalho do professor-orientador sobre a construção de saberes com o mundo, consigo e com o outro.*

**PALAVRAS-CHAVE:** *Formação inicial. Docente. Iniciação científica.*

**RESUMEN:** *Esta investigación tiene como objetivo comprender los sentidos y singularidades (re) construidas por los becarios / voluntarios de iniciación científica (CI), con el fin de identificar las interrelaciones con la formación inicial del profesorado. Se trata de un estudio teórico-empírico, de carácter cualitativo, que utilizó un cuestionario como instrumento para la recolección de datos trabajado a la luz del análisis textual discursivo (ATD). Los hallazgos permiten concluir que las experiencias vividas en CI por los participantes presentan una tendencia actitudinal hacia la carrera académica, también enfocada en valores profesionales, respetando el currículo y las prácticas pedagógicas; aprendizaje para la autoría, interacción y relación crítica; producción y difusión de conocimiento y relevancia social para actuar en los espacios de la profesión. Se concluyó que la formación inicial de los docentes se refiere a considerar las dificultades existentes en el proceso de investigación de los académicos y en el trabajo del docente-asesor sobre la construcción del conocimiento con el mundo, contigo y con los demás.*

**PALABRAS CLAVE:** *Formación inicial. Profesor. Iniciación Científica.*

## Introduction

Scientific initiation (SI) as an object of study arose from the objective of understanding the formative processes of public policies of science. The meaning of policy, here, has no relation to political parties and elections, the purpose is to distinguish the approaches of policies derived from political science, which keeps its attention to the action of the State.

Souza (2006) deals with public policy on the holistic perspective that situates the territory of various disciplines, theories and analytical models. Thus, public policy formally belongs to the branch of political science, but it is not limited to it, since it is an analytical object of several fields of knowledge, public policy (in general) and social policy (in particular)

[...] are multidisciplinary fields, and their focus is on explanations about the nature of public policy and its processes. For this reason, a general theory of public policy implies the search to synthesize theories constructed in the field of sociology, political science and economics. Public policies have an impact on the economy and societies, which is why any theory of public

policy must also explain the interrelationships between the State, politics, economics and society (SOUZA, 2006, p. 25, our translation).

These aspects allow the conception of SI as a public action policy that stimulates the production of knowledge in education in Brazil, in relation to graduation, specifically, in terms of research. The SI was created in 1951, together with the National Council for Scientific and Technological Development (CNPq), an organ directly linked to the Ministry of Science, Technology and Innovation (MCTI). The creation of the CNPq occurred at the same time as the beginning of the financing of the SI activity, through the release of annual scholarships to promote research in undergraduate courses. However, this body is not the only for this purpose, there are also the Research Support Foundations (FAP, Portuguese initials).

CNPq's functional structure comprises an Executive Board responsible for the management of the institution and a Deliberative Council, which acts on institutional policy. CNPq's Internal Regulations - Title I, Chapter I, Art. 2 - determines this organ's mission to “[...] promote and foster the country's scientific and technological development and contribute to the formulation of national science and technology policies” (BRASIL, 2010, p. 1, our translation). Thus, the history of CNPq is directly related to the development and institutionalization of science and technology in Brazil.

Nowadays, this body has the mission of supporting research through public calls and also the formation human resources through the granting of scholarships, which are destined to institutions, postgraduate programs (or individual researchers) to promote formation and improvement in the country's researchers. The grants for these scholarships serve postgraduate programs, public notices or agreements with own resources from CNPq or other public and private institutions. Quotas can be granted to researchers, graduate courses and institutions for teaching, research and technological development.

CNPq data for the period 2013-2018 show that 611,984 thousand SI and technological initiation (TI) scholarships have already been awarded, distributed as follows: Institutional Program for Scientific Initiation Scholarships (PIBIC) 466,554 (76.23%); Scientific Initiation Program of the Brazilian Mathematics Olympiad of Public Schools (PIC-OBMEP) 31,702 (5.18%); Institutional Program for Scientific Initiation Scholarships for Secondary Education (PIBIC-EM) 27,717 (4.52%); Institutional Program for Initiation Scholarships in Technological Development and Innovation (PIBITI) 75,919 (12.4%); Institutional Scientific Initiation Program (PIBIC-Af) 7,480 (1.22%); Junior Scientific Initiation Program (ICJ) 2,622 (0.42%) (PAINEL DE INVESTIMENTOS CNPq, 2019).

SI scholarships cater to any area of knowledge for undergraduate students who participate in a research project with a advisor-professor. This configuration associated with the teaching profession allows us to adopt the concept of a reflective professional and reflection-in-action as a strategy that underlies the epistemology of practice, with repercussions, both from the point of view of didactic research and teacher formation.

The Federal University of Sergipe (UFS) offers undergraduate teaching and bachelor's degrees on five campuses, located in the municipalities of Aracaju (Saúde), São Cristóvão, Itabaiana, Laranjeiras and Lagarto. There are 106 on-site courses offered, 72 of which are bachelor's degrees and 34 undergraduate teaching courses, which cover the areas of Biological and Health Sciences, Exact and Earth Sciences, Applied Human and Social Sciences, Linguistics, Letters and Arts<sup>5</sup>.

It is believed that the teacher is a social scientist whose formation focused on research ensures the construction of knowledge and knowledge that goes beyond the limits of discipline. Such a discussion goes through the personal and cultural formation and the perspectives of the initial teacher education that leads us to the categories of analysis of this investigation. The objective, then, is to understand the meanings and singularities (re)constructed by SI scholarship students/volunteers, with a view to identifying the interrelationships with the initial teacher formation.

### **Research methodological trail**

The theoretical-methodological path of this study, regarding the nature of the data, was based on a qualitative approach due to the need to understand the subjectivity, the senses and the meanings of SI, as a science policy, in undergraduate courses, specifically, in the courses of Initial formation.

The work started with concepts and syntheses. Along the way, the aim was to (re)construct and understand the study categories through reflection and analysis of the meanings and singularities constructed in the context of SI, as well as their relationship with the teaching degree. The subjects of this investigation were scholarship fellows/volunteers linked to the guiding professors of Scientific Initiation Programs (PIC), of the Pedagogy course, Department of Education/Professor Alberto Carvalho Campus/UFS, in the period 2017-2018. Together with the lattes of these professionals, we sought to locate the fellows/volunteers participating in SI projects in the indicated period. Eleven students were

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<sup>5</sup> Available: <http://prograd.ufs.br/pagina/cursos-gradua-ofertados-7756.html>. Access: 19 Sep. 2020.

identified, eight of whom answered the online questionnaire, comprising the researched population (five fellows and three volunteers). This instrument had 16 open and closed questions, distributed in three stages: identification data, SI and teacher formation.

With regard to the age group, the subjects of this research were of different ages, namely: a scholarship holder and a volunteer between 16 and 20 years old; two fellows, two volunteers and a volunteer between 21 and 25 years old; a female scholarship holder between 31 and 35 years old. Of the total number of participants, two are in the fourth period of Physics (1) and Pedagogy (1); four are in the sixth period of Pedagogy (2), Physics (1) and Information Systems (1); in the seventh period of Letters (1) and in the eighth period of Pedagogy (1). As for the place of residence, three live in Itabaiana, two in Frei Paulo and one in each of the following cities: Aracaju, Campo do Brito and Nossa Senhora Aparecida.

At the conclusion of the first stage of the questionnaire, participation in research groups and research experience are recorded as incentives for scientific production. Of the eight subjects, only one volunteer indicated that he did not belong to a research group and two stated that they had already participated in another SI experience. In this sense, “[there is] a convergence in the academic environment about the research groups being the locus of diffusion and production of science, also being characterized as an oriented activity, within the parameters of higher education that develops research” (NASCIMENTO, 2016, p. 199, our translation), in higher education institutions (HEIs), and the base of the Research Group Directory (DGP),

[...] provides information on researchers, students and technicians, as well as the lines of research in progress, the specialties of knowledge, the sectors of application involved, scientific and technological production. And according to the biannual census of that directory, in 2014, the research groups with the highest incidence are in the Humanities area, reaching a percentage of 21% (7,408) of a total of 35,424 consolidated groups (NASCIMENTO, 2016, p. 199, our translation).

The Human, Applied Social and Linguistics, Letters and Arts areas together account for 42% (14,703) of the total research groups in Brazil; Biological and Health Sciences have 26% (9,259); Engineering and Computing, Exact and Land and Agrarian make up a total of 32% (11,462). The data reveal that the Humanities area has more groups and receives less aid for research from funding agencies.

After these steps of characterizing the profile of the investigated, progress was made towards the appropriation of the results through the discursive textual analysis (DTA) that describes this type of study

[...] as a self-organized process of construction of understanding in which new understandings emerge from a recursive sequence of three components: deconstruction of texts in the corpus, unitarization; establishment of relationships between unitary elements, categorization; the capture of the new emerging in which the new understanding is communicated and validated (MORAES, 2003, p. 192, our translation).

DTA addresses a cycle of operations that aims to unitarize/deconstruct material from the corpus to move towards the categorization of units of analysis. In this phase, we chose to characterize the subjects with letters and numbers, for example: age of the respondent, H for men and M for women; name PIBIC or PICVOL (20HPICVOL). Then, understandings and learning emerged consisting of self-organization. The third stage of the cycle brought together the explanation of the lights on the phenomenon under study in the form of metatext, potentiating the emergence of new knowledge.

Regarding ethical principles, the guidelines published by CNPq published to promote ethics in scientific research are mentioned as a basis. The document describes guidelines that emphasize, among other aspects, the need to credit the sources of the work, using citations; reproducing the exact meaning of the ideas or facts presented by the original author; presenting the results of a single complex study as a cohesive whole, however, it is not considered ethical for these to be broken down into individual manuscripts.

In this perspective, this research investigated the interrelationships of SI scholarship students/volunteers in initial formation courses based on institutionalized ethical standards, with a view to promoting responsible authorship within the principle of suitability through the application of the Informed Consent Form (ICF). Therefore, ethics supposes mastery of the principles that regulate what is acceptable in obtaining, using and spreading knowledge from a field of knowledge, and in this study, it was not limited to doing and communicating, but to the usefulness of the theories and concepts studied.

### **Meanings and singularities of scientific initiation in the formation**

This stage represents the development of the analysis categories found in the DTA, namely: academic profession/career; scientific writing/critical opinion and academic activities/research/knowledge; dedication/commitment. It is worth mentioning that these categories emerged from the unitarization and categorization of the corpus, constituted by the research findings.

SI is a device that enables the (re)construction of knowledge through research in HEIs. Certainly, the concept of this policy in Brazilian universities was formed as an activity that



initiates the student in the field of science and allows them to live experiences linked to research projects, elaborated and developed by an advisor-professor. So,

[...] the SI contributes to the systematic and guided formation of the student's awareness about the importance and accessibility to the investigation process, as well as the communication and use of its results. Through this device, university students are inserted in regular research activities, through planning and monitoring, aiming to build knowledge from the perspective of experienced researchers (MASSI; QUEIROZ, 2010 *apud* NASCIMENTO, 2016, p. 77, our translation).

When the fellows were asked about how the interest in SI arose, the responses were diverse regarding the development of skills focused on writing, the academic career, the production of the Course Conclusion Work (TCC, Portuguese initials), the construction of knowledge, according to reports:

*Seeking to question and analyze a theme. (20HPICVOL).*

*People encouraged me to improve the writing and development of the future TCC. (21MPIBIC).*

*After a certain discipline, the curiosity to understand how the education process in Brazil arose and also, after contact with one of the first schools in the State, I tried to understand through research, a certain theme. (22MPIBIC).*

*In order to improve my writing and because I am interested in pursuing an academic career. (22MaPICVOL).*

*I intend to pursue an academic career and mature as a researcher. (23HPIBIC).*

*I wish to pursue an academic career. (33MPIBIC).*

SI as a formative space emerges as a possibility to learn contents and (re)signify knowledge. Thus, it is stated that graduating from SI is to transcend teaching based on memorization or reproduction. It is about having a “[...] possibility of creating spaces for participation, reflection and formation so that people learn and adapt to be able to live with change and uncertainty” (IMBERNÓN, 2011, p. 15, our translation).

For Charlot (2014, p. 50, our translation), “[only] can learn who develops an intellectual activity for this and, therefore, nobody can learn instead of the other. [...] however similar human beings may be, they are also unique and, therefore, different”. This means that learning is related to the sense and meaning of the object studied.

The meanings and singularities appear when the fellows/volunteers indicated the SI activities they liked most. The results may be related to the actions taken in their respective courses, for example: the scholarship fellow/volunteer who study Pedagogy choose to register, analyze, debate and question the topic under study; Physics students prefer to

present; of Geography, highlight the questioning and those of Information Systems signal the act of investigating itself, according to the narratives:

*I discover new things, I grow academically. (19MPIBIC).*

*I learned more about doing academic work. (21MPIBIC).*

*I managed to develop a greater understanding of research and interest in continuing the academic formation process (master's, doctorate). (22MPIBIC).*

*I have the opportunity to learn scientific writing and to study with a greater focus on the topic that I am interested in researching. (22MaPICVOL).*

*I can form more critical opinions and draw better conclusions from what I'm working on. (22MbPICVOL).*

*I can expand my readings, textual production, discuss various research that are being developed. (23HPIBIC).*

It is noticed that those included in the SI, who managed to experience this scientific experience, ratify the contributions to the improvement of their formation in the course, to the personal development through the elements and the social function of science, the reframing of knowledge and appropriation of scientific language, with a view to enhancing teaching praxis.

Research was also carried out on the activities that the fellow/volunteer least liked in SI projects. The result signaled the creation of tables (quantitative part), the tight time for activities, the support of third parties, the moment of socialization, deadlines and charges, relating the authors studied to the research, a lot of reading, difficulty in locating material. Within these difficulties, it is worth highlighting that a quality SI includes scientific writing, learning and knowledge activities, with a view to developing different skills that involve time, commitment and discipline. These questions were raised by the respondents, namely:

*Where there are error fixes, [...] you learn correctly. (19MPIBIC).*

*[Makes me] reflect on the topic. (20HPICVOL).*

*Boosts the student for new searches. (22MPIBIC).*

*Learn to write better and publish an article. (22MaPICVOL).*

*Raises discussions, debates, that is, exchanges information and experiences. (22MbPICVOL).*

*Stimulates student academic production and progress. (23HPIBIC).*

*Empowers and encourages students to research. (33MPIBIC).*

*It makes me reflect on the theme (20HPICVOL)*

*Stimulates student academic production and progress (23HPIBIC)*

This perspective is related to the idea that all higher education presupposes an experience of SI for the development of the scientific spirit, with research at the university being an inseparable pillar of teaching and extension in the field of initial formation for the teaching profession, with a view to produce science, including the pedagogical one. For



Martins, Antunes and Monteiro (2019), formation must meet the demands of contemporary times, going beyond the walls of universities to meet the daily life lived and practiced in formal learning spaces, with social commitment and commitment.

Thus, the experience of being a PIBIC/UFS the scholarship fellow/volunteer contributes to the future profession, when directed towards professionalization. On the other hand, the probability of following the academic career by most participants stands out, requiring learning aimed at scientific writing, critical sense and professional formation. Thus, the SI

*[...] it awoke things that I didn't know existed, for example, research itself, reading, writing. It opened [my] vision and [...] I believe to grow [academically] and professionally with current and future experience. (19MPIBIC).*

*[can] improve my development with academic activities and explore more content. (21MPIBIC).*

*[provides] an opening and a step in the world of scientific and academic knowledge, later, professional. (22MPIBIC).*

*[stimulated] the interest in doing master's and possibly doctorate and I'm sure that the experience at PIBIC will help me a lot. If I had known how much PIBIC expands knowledge, I would have already ingressed [...]. (22MaPICVOL)*

*[...] helps me to contextualize my future profession, makes me see what it involves, what is best and worst in its practice. (22MbPICVOL).*

*[learn] about different contexts, subjects that I can meet on my journey as an academic/teacher. (23HPIBIC).*

It is noted the recognition of the value of SI to favor the development of differentiated skills that emerge in the everyday of higher education of academics, as well as stimulates critical capacity in the face of social, cultural and economic problems, with the elaboration of arguments, via writing and speaking. From this perspective, SI in initial formation is essential for the professional trajectory, configuring itself as a reflective space on the construction and strengthening of the appropriation of learning from different scientific contents and the experience of collaborative experiences for the profession. This condition consider the existing difficulties in the research process, as well as in the work of the advisor-professor on the construction of knowledge with the world, with oneself and with the other. According to Bersch and Schlemmer (2018), formation can also contribute to the development of skills with creative and inventive potential, aiming at building reticular practices that promote change in the cultures of the university.

Finally, it is noteworthy that the initial teacher formation goes through questions and vulnerabilities that separate it from the production of scientific knowledge, with relevance to

the expansion of the SI offer for transformations in the institutional field and in professional development linked to training in research that is built in everyday life.

### **Some considerations**

The configuration of the SI presents itself as a public policy that promotes accessibility to advances in research networks, making it possible to implement mechanisms capable of stimulating the mobilization of the scientific-technological community. In addition, the SI contributes to the reduction of socioeconomic differences between regions and countries in order to favor research in times of internationalization in higher education.

The findings, in this study, allow us to conclude that the experiences of the fellows/volunteers in the CI present an attitudinal trend towards the academic career, also focused on professional values, respecting the curriculum and pedagogical research practices; learning for authorship, interaction and critical relationship; production and dissemination of knowledge with quality and social relevance for professional performance.

On the other hand, the insufficient number of grants characterizes SI as a selective and exclusive policy, creating prerogatives for some and exclusion for others. Therefore, the pragmatic character of this device in universities, public and private, as an inducer of postgraduate studies, cannot lose sight of its specificity in undergraduate studies, which, in fact, shapes and certifies the social scientist, understood all science as human, therefore, social.

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