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Relations Between Scholarship Types and Number of Publications from Scientific Initiation Fellow in Applied Social Sciences: A Study at the Federal University of Paraná

Relações entre Tipos de Bolsas e Número de Publicações de Bolsistas de Iniciação Científica em Ciências Sociais Aplicadas: Um Estudo na Universidade Federal do Paraná

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Abstract

Given the importance of the Scientific Initiation (SI) programs for the development of researchers, the objective of the present study is to identify the existence of an association between types of SI grants and the number of publications of fellows. The data were obtained from the Scientific Initiation System of the Federal University of Paraná and the Lattes platform, comprising scholarship holders from the courses of Administration, Accounting Sciences, Economic Sciences and Information Management, who were in SI between 2003 and 2016. This is a quantitative study with non-parametric bivariate methods. The results show that CNPQ fellows have accumulated higher amounts and have remained longer in SI. It is concluded that the number of publications is not given by the type or value of the scholarship grant – which points to aspects intrinsic to the student.

Keywords: Scientific Initiation; Scholarship; Number of Publications; Applied Social Sciences.

Resumo

Dada a importância dos programas de Iniciação Científica (IC) para o desenvolvimento de pesquisadores, o objetivo do presente estudo é identificar a existência de associação entre tipos de bolsas de IC e o número de publicações dos bolsistas. Os dados foram obtidos do Sistema de Iniciação Científica da Universidade Federal do Paraná e da plataforma Lattes, compreendendo bolsistas dos cursos de Administração, Ciências Contábeis, Ciências Econômicas e Gestão da Informação, que estiveram em IC entre 2003 e 2016. Trata-se de um estudo quantitativo com métodos bivariados não paramétricos. Os resultados obtidos mostram que bolsistas CNPq acumularam montantes mais elevados, tendo permanecido por mais tempo em IC. Conclui-se que o número de publicações não se dá pelo tipo ou valor da bolsa – o que aponta para aspectos intrínsecos ao aluno.

Palavras-chave: *Iniciação Científica; Bolsas; Número de Publicações; Ciências Sociais Aplicadas.*

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Introduction

Scientific research and development are considered essential for the production of capital and social welfare of countries. Many nations consider Science and Technology as indicators of power, being able to divide the world between countries that produce knowledge and those that only use it (Castanha & Grácio, 2012). It is a ″strategic element into the conception of scientific and technological policies that aim to direct the way science operates, as well as its results″ (Martins et al., 2015, p. 163).

According to Tenório and Beraldi (2010: 390), ″in Brazil, the idea that the country′s development is linked to scientific production is also accepted and expanded.″ The first contacts between student and scientific production can be given through Scientific Initiation (SI) programs. For Santos and Leal ″ (2014: 31), ″participation in projects of scientific initiation provides students with contact with scientific production and enables the development of scientific skills, abilities, and knowledge, engaging them in research activities.″

Studies involving SI are justified in more than one dimension. In socioeconomic terms, SI is an active component of this aspect (Fava-de-Moraes & Fava, 2000). For Pires (2009, p.510), the lack of follow-up policies for SI graduates translates into ″waste to the country″. In this way, the results of the SI are directly related to the institutions′ research policies (Ohayon et al., 2007).

On the other hand, ″despite the relevance and important contributions of SI activity in Higher-Education Institutions (HEIs), there are still few investigations carried out in this respect,″ thus requiring studies that show knowledge about skills, constraints and weaknesses in the training process of the IS grant holders (Massi & Queiroz, 2010). According to Castanha and Grácio (2012), with the expansion of scientific production, this has become an interesting object for several studies and researchers in the most diverse areas of knowledge.

More than this, for Erdmann et al. (2010, page 27), studies on SI contribute to ensuring that public resources are properly employed in the ″development of national science.″ In addition, despite the number of educational institutions that implement such programs (about 72%), it is not possible to say ″that the implementation was done

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with quality" (Tenório & Beraldi, 2010, pp. 390-391). Therefore, it is necessary to establish methodologies capable of providing "consistent subsidies for the evaluation of the results obtained" (Martins et al., 2015, p.163).

Given the importance of SI studies, the problem that leads to this research can be formalized: what patterns can be identified in SI activity in relation to the academic production of its participants and the types of scholarships received? In this context, the objective is to identify an association between types of SI scholarships and the productivity of the Fellows as measured by the number of publications.

This objective is in line with the proposal of Ohayon et al. (2007, p. 130), according to the authors, "the evaluation of scientific initiation programs is necessary to ascertain the stage of the institution and that, through this process, it is possible to monitor the effectiveness of the implementation of these programs ". This is a preliminary, quantitative study, using bivariate non-parametric statistical analyzes, delimited to students in SI programs from 2003 to 2016, of the Administration, Accounting, Economics and Information Management courses from Applied Social Sciences sector of the University Federal University of Paraná, whose data were extracted from the Scientific Initiation System and the Lattes platform.

Scientific Research

Scientific Initiation (SI) is the process in which "the necessary knowledge is provided to initiate the youth in the rites, techniques, and traditions of science" (Massi & Queiroz, 2010, p.174). For Jorge, Telles, and Patrocínio (2010: 454), "scientific initiation is an important policy that reflects positively throughout the process of training the student population of our higher education institutions." In Brazil, SI programs were based on institutionalized experiences in the United States and France (Bazin, 1983) and were consolidated with the founding of the National Council for Scientific and Technological Development (CNPq) in 1951, which financed this activity (Santos & Leal, 2014). Based on normative resolution 17/2006 of the CNPq, the SI program has as leading objectives: to promote the engagement of human resources within activities of research and technological innovation; discover unused potential talents in the area of scientific research; encourage creative thinking for the discovery

of modern methods of technological research between scholarship and advisor; encourage the training of faculty; encourage institutions to formulate policies aimed at technological and innovative initiation (Normative Resolution 017/2006, 2006). Tenório and Beraldi (2010, p.390) also point to the training of researchers as the main objective of SI projects, since it is expected ″firstly that some of these students continue to produce knowledge and technology through their own research after the end of course″.

Regarding the reasons that lead a student to become interested in SI, Bridi (2010) suggests that, in most of the times, they are related to the search for technical education for the researcher. The case study conducted by Santos and Leal (2014) with students, counselors and directors of the Accounting course at public university of Uberlândia - MG, identifies that the ″pre-disposition to carry out research and the interest in continuing to improve and their knowledge, especially, evidence the interest in the accomplishment of postgraduate courses ″.

The research by Velloso e Velho (2001), conducted with 1,312 master′s and 891 doctoral students, from a public university in Minas Gerais, from all areas of knowledge, with the exception of Health, points out that SI programs offer favorable conditions for the insertion of the scholarship student in the postgraduate studies and found a strong correlation among the students of SI scholarships who entered the master′s degree faster - results that are related to the study of Lordelo and Argôlo (2015). In a sample with 895 graduate students from the Federal University of Bahia, this study showed that 27% were graduates of SI programs. In general, the contributions of SI to the researcher′s training are reflected in the student′s progress towards postgraduate studies and in the add of quality in postgraduate courses, being evident that the SI directs the academic life and brings the possibility that he/she experiences this option of professional performance before graduation (Massi & Queiroz, 2010).

According to Bridi (2010, p.350; 359), when the teaching and learning process is associated with SI activities within the curriculum structure, the scientific method is understood as a formation that goes beyond a set of techniques to organize, process or analyze data [including] contributing to the intellectual and moral formation of students. ″ In this sense, Santos and Leal (2014) go beyond:

> Graduate research, inserted in institutional programs of SI, has as main objective the training of researchers [since] it contributes to the production of knowledge, the stimulation to the learning and the construction of a more critical posture by the participants of these programs (Santos & Leal, 2014, p. 27).

Therefore, Castanha and Grácio (2012, p.83) define scientific production as an important indicator in the student's education, since "it has become an object of study and research in several areas of scientific knowledge." Furthermore, Botomé and Kubo (2002) (2003) found that a process in scientific education "is related to learning to produce knowledge."

For Heyden, Resck and Gradim (2003, "The research obligation encourages the student to use the scientific methodology as a tool to solve problems, allowing the development of creativity and the continuity of studies" (Spindola et al., 2011: 610-611). Scientific production to the undergraduate level "demands the efforts of the universities so that these studies represent not only an academic exercise but also an indicator of quality inns and possible contribution to the solution for social problems." In particular, Giacchero and Miasso (2006: 432) are incisive: "research can and should be stimulated from undergraduate, through scientific initiation," making explicit the links between the elements addressed in the present study.

It is, therefore, an activity of potential national strategic interest, since "the technological growth of the country is closely linked to the way and intensity with which young people are encouraged to research" (Tenório & Beraldi, 2010).

Methodological Procedures

Using the classification proposed by Silva and Menezes (2005), the present research, regarding nature, is applied as applied, given the claim to generate knowledge for practical application in specific interests; as for the approach, it is a quantitative study, since it uses statistical techniques to classify and analyze information; in relation to the objectives, is classified as descriptive, given the intention of describing the characteristics of a population and establishing relations between variables; and, from the point of view of procedures and techniques, this is documentary research, since it was elaborated from sources that did not receive previous analytical treatment.

Data were obtained from the students belonging to Applied Social Sciences (SCSA) sector of the Federal University of Paraná (UFPR) who remained in SI for at least three months from 2003 to 2016. The SCSA was formalized in 1973, taking care of the courses of Administration, Accounting Sciences and Economic Sciences and Law (the latter became disengaged in 1980), and later in 2001, the Information Management course also took part, with a number of more than 3 thousand students (Federal University of Paraná, 2017).

The study used the variables presented in Table 1.

Table 1 - Study Variables.

Variables	What we want to measure	Nature
Course (control variable)	Check if the number of publications is associated with a certain course.	Nominal, with the options "Administration", "Accounting Sciences", "Economic Sciences" and "Information Management".
SI Time (control variable)	Control variable: check if the number of publications is associated with the number of months that the student has remained in SI.	Scale, representing the number of months that the student remained in SI.
Scholarship (explanatory variable)	Check if the number of publications is associated with a particular scholarship/development agency.	Nominal, with the options "CNPq", "Araucária Foundation", "UFPR" and "Volunteer".
Total Received (explanatory variable)	Verify that the number of publications is associated with the financial amount received while remaining in SI.	Scale, representing the financial amount received while remaining in SI.
Scholarship Value (explanatory variable)	Check if the number of publications is associated with the value of the scholarship.	Scale, representing the average value of the scholarship.
Scientific publications (variable response)	Scientific production during the period in SI.	Scale, representing the sum of the scholar's publications as author or co-author in scientific journals and conferences (in all strata).

Source: Elaborated by the authors.

The data were extracted from the UFPR Scientific Initiation System, developed in 2003 (this being the reason for the initial temporal cut), as well as the Lattes platform, since it is a "Brazilian standard of evaluation, representing a history of scientific, academic and professionals of registered researchers "(Brito, Quoniam & Mena-Chalco, 2016, p.79). In turn, turn, the data collected were submitted to the analysis protocol shown in Table 2.

Table 2 - Analysis Protocol

Step	Procedures			Objectives	Theoretical support
1	Course Scholarship SI Time Total Received Scholarship Value Scientific publications	*Descriptive Statistics:* *Averages and standard deviations* *Minimum and maximum* *Proportions*		Describe the data set.	Field (2009); Pestana and Gageiro (2005).
2	SI Time Total Received Scholarship Value Scientific publications	Course *Kolmogorov-Smirnov*	Scholarship *Kolmogorov-Smirnov*	Check for normality between groups of data.	Field (2009); Siegel and Castelan Jr (2006).
3	SI Time Total Received Scholarship Value Scientific publications	Published? Yes *U de Mann-Whitney*	No	Verify differences between groups and scalar variables.	Pestana and Gageiro (2005); Siegel and Castelan Jr (2006).
4	SI Time Total Received Scholarship Value Scientific publications	Published Course / Scholarship *H of Kruskal-Wallis* *Averages and standard deviations* *Minimum and maximum* *Proportions*	Did not publish Course / Scholarship *H of Kruskal-Wallis* *Averages and standard deviations* *Minimum and maximum* *Proportions*	Verify differences between groups and scalar variables.	Pestana and Gageiro (2005); Siegel and Castelan Jr (2006).
5	SI Time Total Received Scholarship Value	Published Number of publications *Spearman's Rho*		Check association between variables.	Field (2009).

Source: Elaborated by the authors.

Table 2 should be interpreted as follows: in the steps that contain variables only in the rows, statistical measures will be used directly in those variables; in the steps that present variables in rows and columns, statistical tests and measures will be used at each cross of rows and columns. In these cases, a 95% confidence interval and an expected

level of significance of 0.05 were considered in the appropriate tests. The analyzes were performed with Microsoft Excel 2007® software and IBM SPSS 24® software.

Analysis and Discussion of Results

Initially, the data set should be described. Data were collected from students who participated in Scientific Initiation (SI) programs for at least three months - totaling 412 cases. However, one of the cases is excluded, as it was an outlier, since the number of published articles remained above the superior limit for the sum of the upper quartile with triple interquartile range - the number of articles published was 1,85 times higher than the student with the second greatest number of publications, in the same way, it remained in SI for a time 1.32 times greater than the student with the second largest time, having received an amount 1.28 times greater than the second placed. Thus, in the remaining 411 cases, 56.9% of the students are in the Administration course; 5.4% of Accounting Sciences; 20.7% of Economics; and 17% of Information Management. Regarding the type of scholarship received, 33.98% were from CNPq; 8.01% of the Araucária Foundation; 19.66% of UFPR; and 38.35% were volunteer fellows.

The students in SI remained in this status for 12.83 months (on average), with a standard deviation of 5.84. The minimum reception time was four months and the maximum 41 months. Of the 411 students, 55 had their name associated at least to one publication - the general total of publications was 180, generating an average of 3.27 publications per student (standard deviation of 3.85, minimum of 1 and maximum of 20). Among the 253 students who received scholarships, the amount received reached R$ 1,142,293.48, which provides an average value of R $ 4,514.99, with a standard deviation of R$ 2,487.59 (minimum of R$ 600,00 and maximum of R$ 15,920.00). The mean value of the scholarship reached R$ 328.59, with a standard deviation of R$ 93.00 (minimum of R$ 99.99 and maximum of R$ 400.00).

In order to identify patterns among IC Fellows who published and did not publish, the database was divided into these cases. The Kolmogorov-Smirnov test showed simply five crosses between the categorical variables (stroke and type of pouch) and the scalar variables (time in SI; the total received an average value of the pouch), of

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a total of 28 possible crosses, in which the data did not drastically diverge from a normal distribution. Thus, in order to standardize the analyzes, just non-parametric tests were used.

The students who did not publish stayed in SI, on average, 12.54 months, with a standard deviation of 5.52, with cases in which it reached 40 months; while those owning at least one single publication remained for a mean of 14.73 months, with a deviation of 7.43, reaching 41 months (the minimum time for both was four months). The difference between these groups is not statistically significant (U = 8589.00, p-value <0.072). Excluding the volunteer fellows among those who did not publish, the average value of the scholarship was R $ 333.36, with a standard deviation of R$ 93.52 (minimum of R$ 99.99 and maximum of R $ 400).

Among those who published, the average value reached R$ 295.65 (standard deviation of R$ 83.45, minimum of R $ 99.99 and maximum of R$ 400.00). This is a statistically significant difference (U = 2372.50, p-value <0.001), which shows that the students who did not publish gained an average of 11.31% higher than those who had their name associated with at least one publication.

The mean amount received was R $ 4,433.69, with a standard deviation of R$ 2,254.14 (R $ 600.00 minimum and R $ 12,800.00 maximum). The students who published accumulated a medium amount of R $ 5,076, 43 (standard deviation of R $ 3,724.39, minimum of R $ 799.92 and maximum of R $ 15,920.00). The difference between these groups of students is not statistically significant (U = 3507.50, p-value <0.941).

Following the analysis protocol established, after the division of the database among the students who published and did not publish, we searched for patterns related to the course and type of scholarship. Thus, in the case of non-published SI students, when they relate course and time to SI the statistical measures shown in Table 3 are recorded.

Table 3 - Course in relation to time in SI (not published)

Course	Average	Standard deviation	Minimum	Maximum
Administration	12,34	5,17	4	32
Accounting	11,89	4,99	4	24
Economy	12,34	5,29	4	40
Information	13,65	6,92	4	36

Source: Elaborated by the authors.

However, there are no statistically significant differences in the SI meantime-related to the courses (H (3) = 1.346, p-value <0.718). As for the average amount received, only students who did not publish and actually received scholarships were analyzed. The results are shown in Table 4.

Table 4 - Course in relation to amount received (not published)

Course	Average	Standard deviation	Minimum	Maximum
Administration	4.471,27	2.356,42	600,00	12.800,00
Accounting	4.992,00	1.692,52	3.600,00	9.600,00
Economy	4.418,62	1.833,74	1.200,00	11.640,00
Information	4.250,32	2.533,98	600,00	11.640,00

Source: Elaborated by the authors.

Likewise, there were no statistically significant differences between groups (H (3) = 3.148, p-value <0.369). In relation to the average value of the scholarship, maintaining the database without the volunteer students, there were obtained the results presented in Table 5.

Table 5 - Course in relation to the average value of the scholarship (did not publish)

Course	Average	Standard deviation	Minimum	Maximum
Administration	335,42	95,86	99,99	400,00
Accounting	366,00	66,69	200,00	400,00
Economy	359,12	69,31	133,33	400,00
Information	295,21	103,76	99,99	400,00

Source: Elaborated by the authors.

In this case, statistically significant differences were recorded (H (3) = 11.874, p-value <0.008). Scholarship holders of the Accounting Sciences course remained with a mean scholarship 19.34% higher than the students of the course of Information Management. When synthesizing the results regarding the courses in relation to the

students who did not publish, it is possible to affirm that both the amount received and the time in SI remained balanced in the courses.

On the other hand, the highest medium value of the scholarship found throughout Accounting Sciences, registered a greatness that distinguishes it in relation to the average value of the scholarships granted to the students of the course of Information Management. In relation to the type of scholarship received by the students who did not publish, the time in SI presented the results shown in Table 6.

Table 6 - Type of scholarship in relation to time in SI (did not publish)

Scholarship	Average	Standard deviation	Minimum	Maximum
CNPq	13,84	6,43	4	36
Araucária Foundation	13,00	6,92	4	28
UFPR	13,30	6,08	4	40
Volunteer	10,87	3,11	4	24

Source: Elaborated by the authors.

Statistically relevant differences were observed (H (3) = 10.619, p-value <0.014) when the mean values were compared: CNPq fellows remained 21, 45% longer than volunteer grantees.

For the amount received, excluding volunteer students, there were also statistically important differences (H (3) = 20.613, p-value <0.000), in which CNPq fellows accumulated an average amount of 16.72% higher than UFPR fellows, as shown in Table 7.

Table 7 - Type of scholarship in relation to amount received (not published)

Scholarship	Average	Standard deviation	Minimum	Maximum
CNPq	4.756,13	2.331,44	1.199,88	12.800,00
Araucária Foundation	4.284,50	2.083,96	1.566,00	9.600,00
UFPR	3.960,90	2.122,44	600,00	9.600,00

Source: Elaborated by the authors.

Table 8 shows the average value of the scholarships, without counting the volunteer's students.

Table 8 - Type of scholarship in relation to the average value of the scholarship (not published)

Scholarship	Average	Standard deviation	Minimum	Maximum
CNPq	350,29	76,48	99,99	400,00
Araucária Foundation	351,38	87,59	133,33	400,00
UFPR	298,61	111,14	99,99	400,00

Source: Elaborated by the authors.

There were statistically significant differences (H (2) = 9.74, p-value <0.008), such that the Araucária Foundation grants were 15.01% higher than the UFPR ones. As a general rule, in the case of scholarships, it can be deduced that, among the non-published students, the CNPq fellows spent a long time in SI and, although they did not receive the most rewarding fellowships, they accumulated the highest amount in grants.

The next step, in this research, is to analyze only the students who presented at least one publication.When associated with the courses, the SI time of these students is presented in Table 9.

Table 9 - Course in relation to time in SI (published)

Course	Average	Standard deviation	Minimum	Maximum
Administration	16,39	8,55	12	41
Accounting	11,00	1,73	9	12
Economy	11,09	3,86	4	19
Information	16,30	7,18	8	27

Source: Elaborated by the authors.

It is noticed that the students for the courses of Administration are the ones that remained for a long time in SI, coming at a time 32.88% greater than those of Accounting Sciences. This is a statistically significant difference (H (3) = 9.188, p-value <0.027).

The descriptive statistics on the amount received in each course, withdrawing the volunteer fellows, are shown in Table 10.

Tabela 10 - Course in relation to the amount received (published)

Course	Average	Standard deviation	Minimum	Maximum
Administration	8.557,77	4,875,05	3.300,00	15.920,00
Accounting	3.690,00	127,27	3.600,00	3.780,00
Economy	3.264,11	1.610,44	966,00	6.000,00
Information	4.191,10	2.619,09	799,92	8.000,00

Source: Elaborated by the authors.

There were statistically significant differences (H (3) = 7.834, p-value <0.050) in such a way that the scholarship recipients received an average of 61.85% higher than those in Economic Sciences.While still excluding volunteer grantees, the descriptive statistics involving the average value of scholarships can be seen in Table 11.

Table 11 - Course in relation to the average value of the scholarship (published)

Course	Average	Standard deviation	Minimum	Maximum
Administration	343,35	83,68	143,48	400,00
Accounting	357,50	60,10	315,00	400,00
Economy	288,77	68,77	150,00	400,00
Information	232,59	75,69	99,99	333,33

Source: Elaborated by the authors.

The values show differences between courses (H (3) = 10.631, p-value <0.014); and the students on the course of Accounting Sciences received a scholarship, on average, 34.93% higher than the students on the course of Information Management.

Regarding the number of publications (and incorporating the volunteer students), Table 12 presents the descriptive statistics in relation to the courses.

Table 12 - Course in relation to the number of publications (published)

Course	Average	Standard deviation	Minimum	Maximum	Scholars	Scientific publications
Administration	3,36	4,32	1	20	28	94
Accounting	3,33	2,08	1	5	3	10
Economy	2,71	3,71	1	15	14	38
Information	3,80	3,39	1	12	10	38

Source: Elaborated by the authors.

The Kruskal-Wallis H test does not show significant differences (H (3) = 1.964, p-value <0.580) between the average production of the courses analyzed, but it is possible to highlight the ratio of approximately 4.5 publications per student on the

course in Accounting Sciences.Regarding the type of scholarship, Table 13 shows the results in relation at the time in SI.

Table 13 - Type of scholarship in relation to time in SI (published)

Scholarship	Average	Standard deviation	Minimum	Maximum
CNPq	19,30	10,19	8	41
Araucária Foundation	13,25	7,22	4	19
UFPR	10,38	1,99	7	12
Volunteer	12,52	2,50	12	24

Source: Elaborated by the authors.

Significant differences were recorded (H (3) = 10.992, p-value <0.012) when it was found that, among the students who published, the CNPq fellows remained 1.85 times longer in SI than the UFPR grantees.

The descriptive statistics of the average amount received in relation to the types of scholarships withdrawn from the volunteer fellows can be seen in Table 14.

Table 14 - Type of scholarship in relation to amount received (published)

Scholarship	Average	Standard deviation	Minimum	Maximum
CNPq	6299,50	3994,11	2.400,00	15.920,00
Araucária Foundation	4.541,50	2.895,52	966,00	7.600,00
UFPR	2.286,24	1.095,64	799,92	3.780,00

Source: Elaborated by the authors.

The differences between groups are evident (H (2) = 46.281, p-value <0.000). The amount received by CNPq scholarship holders was 2.75 times higher than that received by UFPR scholars.

While the volunteer fellows are still apart, the average value of the scholarship, in relation to its type, is presented, as a whole, in Table 15.

Table 15 - Type of scholarship in relation to its average value (published)

Scholarship	Average	Standard deviation	Minimum	Maximum
CNPq	324,14	67,91	143,48	400,00
Araucária Foundation	295,23	80,70	191,59	400,00
UFPR	211,68	75,99	99,99	315,00

Source: Elaborated by the authors.

The differences remain (H (2) = 8.401, p-value <0.000) between the CNPq and UFPR grants, the first being 1.53 times greater than the second.

The relationship between scholarship types and the number of publications, including volunteer fellows, is presented in Table 16.

Table 16 - Type of scholarship in relation to the number of publications (published)

Scholarship	Average	Standard deviation	Minimum	Maximum	Scholars	Scientific publications
CNPq	2,60	2,85	1	12	20	52
Araucária Foundation	5,50	6,45	1	15	4	22
UFPR	2,50	1,60	1	5	8	20
Volunteer	3,74	4,60	1	20	23	86

Source: Elaborated by the authors.

The results indicate that there were no statistically significant differences in the groups (H (3) = 2.075, p-value <0.557). This result points to the presence of type II error, probably caused by the discrepant numbers of cases in CNPq scholarships (thirteen fellows who each published a single article) and the Araucária Foundation (with four fellows). In any case, the difference between the average number of scholarly publications of the Araucária Foundation is 2.2 times greater than the UFPR grantees. In addition, in this category of scholarship, there is a ratio of 5.5 publications per scholar.

The correlation between the number of publications and the months in SI was not significant (ρ = -0.022, p-value <0.872), as well as the correlation between the amount received (ρ = -0.152, p-value <.269) and the mean grant value (ρ = -0.231, p-value <0.090). That is, it can not categorically be stated that more time in SI or the higher amount received, or even a higher-value grant may be related to the number of publications.

In general, Table 17 synthesizes the results found.

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Table 17 - Synthesis of results

Variable	Published		Not published	
	Course	Type of scholarship	Course	Type of scholarship
Time	Scholars of the Administration course remained for a longer time.	CNPq scholarship holders stayed for a longer time.	No differences were recorded.	CNPq scholarship holders stayed for a longer time.
Total Received	Scholars of the Administration course received a larger amount.	CNPq scholarship holders have accumulated a larger amount.	No differences were recorded.	CNPq scholarship holders have accumulated a larger amount.
Scholarship value	Scholarship of the Accounting Sciences course received scholarships.	CNPq scholarship recipients received larger grants.	Scholarship of the Accounting Sciences course received larger grants.	Araucária Foundation scholarship recipients received larger grants.
Scientific publications	No differences were recorded.	Fellows of the Araucária Foundation published more than the other fellows.		

Source: Elaborated by the authors.

From Table 17, therefore, it can be deduced that CNPq fellows have accumulated higher amounts, and have also been the ones who remained longer SIs - consequently, the average value of their scholarship was higher. Among those who published, the Administration scholarship holders were the ones who stayed the longest, accumulating, of course, a greater amount. Also, among those that published or not, the highest average stock exchanges were destined to the Accounting Sciences students. In general, with regard to the types of scholarships, among the scholars that published, the distribution, in the course of Administration, can be seen in Table 18.

Table 18 - Publications by scholarships in the Administration course

Scholarships	Scholars	Scientific publications
CNPq	7	13
Araucária Foundation	1	2
UFPR	1	2
Volunteer	19	77

Source: Elaborated by the authors.

Due to the small number of cases in some categories of scholarships, the Kruskal-Wallis H test was not used for comparison of means. Even so, in the course of Administration, it is noticed that the ratio of publication to fellowships among volunteers is at least 2.18 times higher than the second largest CNPq fellowship.In the course of Accounting Sciences, the distribution of publications by type of scholarships is presented in Table 19.

Table 19 - Publications by scholarships in the Accounting Sciences course

Scholarships	Scholars	Scientific publications
CNPq	1	1
UFPR	1	4
Volunteer	1	5

Source: Elaborated by the authors.

In Accounting Sciences, the CNPq scholarship holders stand out due to the low proportion of publications by fellows in relation to the other types of scholarships.In the course of Economic Sciences, the highlight is among the three scholars from the Araucária Foundation who published 40% more than what was published by the seven CNPq scholarship holders, as shown in Table 20.

Table 20 - Publications by scholarships in the Economic Sciences course

Scholarships	Scholars	Scientific publications
CNPq	7	12
Araucária Foundation	3	20
UFPR	2	3
Volunteer	2	3

Source: Elaborated by the authors.

The publications found in the Information Management course in relation to the types of scholarships are shown in Table 21.

Table 21 - Publications by scholarships in the Information Management course

Scholarships	Scholars	Scientific publications
CNPq	5	26
UFPR	4	11
Volunteer	1	1

Source: Elaborated by the authors.

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The highlight is the CNPq fellows who published 2.36 times more than those who came second (UFPR scholarship holders).

The proportions found in the courses as a whole do not present patterns that can be identified. Either way, it is important to note the results found in similar surveys.

• In a study of 212 students and 188 professors from Unicamp, Bridi (2010) points out that the opportunity for financial aid, obtained in the form of scholarships, is a stimulating factor for joining SI projects. In the present research, although the aspect of motivation to participate in SI has not been addressed, the value of the scholarship is associated with the stockholder's productivity simply when associated with specific courses. Otherwise, when grouped just by having (or not) published and excluding volunteers, the mean value of the scholarship was higher among students who did not publish.

• In a survey of 486 students enrolled in academic master's degrees in Accounting Sciences from Brazilian public higher-education institutions from 2010 to 2012, Miranda et al. (2014) note the low expressiveness of these students' participation in SI projects, as well as in scientific publications. Given the differences between the samples, the results of the present study point to a scenario that is in line with the mentioned study, since only 13.82% of the participants in SI projects have their name associated with at least one of them, a publication.

• Another previous research result that deserves attention is presented in the study of cases involving students, counselors of SI, director, and course coordinator, carried out by Santos and Leal (2014). In this study, both for students and teachers, one of the motivating factors for admission to SI is the opportunity to develop research for publications. Regarding the results found in the present research, although hypothetically, publications have been a motivation for SI, they were not found in sufficient numbers, in order to prove this situation.

Some of the results point to the existence of situations that deserve due to attention, especially when it is noticed that the highest average values of scholarships were found in the group of students who did not publish - regardless of the time in SI

and the types of scholarships. This fact indicates that the financial aspect does not seem to be the element that directly encourages the fellow to publish.

Another factor that must be taken into account is that the scholarship holders, whether or not they have published, who have remained in SI for a long time, receive the most valuable scholarships. Although it is premature to state categorically that in these cases, scholarships assume a more socioeconomic rather than a scientific motivation role. This possibility cannot be ruled out.

This situation raises, of course, a question: what is the real role of the remuneration to the IC grant holder? According to Lordelo and Argôlo (2015), in 1951, the National Council for Scientific and Technological Development (CNPq) granted scholarships to researchers who passed them on to their criteria to the chosen scholarship holders - which was modified in 1988 with the creation of the Institutional Program of Scientific Initiation Scholarships (Pibic).

According to Annex III of normative resolution 17/2006 of CNPq, the general objectives of the Pibic are the contribution in the formation of human resources for research and any professional activities and reduction at the time of permanence of the students on the graduate (Normative Resolution 017 / 2006, 2006).

These objectives, therefore, do not specifically address the performance of scholarship holders associated with grant awards. However, it is interesting to note that the financial question was a factor related to the undergraduate's productivity found during the research of Hunter, Laursen, and Seymor (2007), conducted with 133 art students and 55 mentors from four universities in the United States.

If it is impossible to establish a consensus on the role of the remuneration to the fellow, what does it make this actor publish? According to Ford and Newmark (2011), the greater the number of publications the greater the number of disciplines and opportunities that reinforce the communication concepts that can allow students to practice and perfect the necessary skills.

Already, Adedokun et al. (2013) show that the desire to follow in graduate programs is one of the factors that explain the number of publications, therefore, consistent with the goals of Pibic. Interestingly, a survey conducted with 536 members of health care faculties in the United States indicates that one of the factors associated

to the number of undergraduate student publications is precisely the receipt by the counselors of financial subsidies (Morales, Grineski & Collins, 2017).

On the other hand, the financing, not of students and counselors, but of research, has shown a significant relationship in the number of publications in which undergraduate students are involved (Jeong & Choi, 2015); This fact is also found through a survey of 194 colleges and universities in Science, Technology, Engineering and Mathematics in the United States (Eagan et al., 2011).

Final Considerations

At the end of the present study, it is important to rescue the problem that guided it ("what patterns can be identified in the SI activity in relation to the academic production of its participants, and the types of scholarships received?") And to compare it with the results achieved. In this sense, some standards were discovered: the number of scholarly publications of the Araucária Foundation was 1.47 times greater than the group of volunteer scholars - which presented the second highest average in the number of publications.

It should be noted, however, that this is not a consistent result, given the disparate number of students in the groups. However, it is interesting to note that both the scholarship recipients of the Araucária Foundation and the volunteers were not the most paid. Interestingly, the scholarship recipients who received scholarships with lower average values published more. In addition, as to time in SI, the total received and course. The results showed that fellows tend to stay longer in SI, to the extent that financial gains are greater, regardless of whether they have published or not.

Although the objective has been reached, the study is not without limitations, which of course suggest future approaches. In this sense, we suggest qualitative research capable of clarifying the motivation of SI scholars to develop scientific publications. This approach is justified by Bravo, Chaud and Abreu (2013, p. 57) who argue that motivation, in the academic context, "can only be studied through self-report or behavior observation." One of the factors pointed out by Gibson and Bruno (2012) for the productivity in terms of publications among undergraduate students is the claim to be accepted into postgraduate programs. Therefore, we suggest doing

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researches that capture this element in order to evaluate its relationship with the number of publications.

Attention must also be paid to the development of mechanisms capable of periodically assessing the stockholder's performance - especially when he is paid. Among these mechanisms, it is not possible to discard the role of the guiding teacher in the effective conduction of the process, "since intrinsic motivation does not result from training, and can be influenced by the teacher's actions" (Viana & Viana, 2017) - which is as well observed by Bravo, Chaud and Abreu (2013). Another limiting factor was the fact that the number of publications was obtained during the period in SI; that is, there is a possibility that works submitted in more recent years have not yet been published. Furthermore, it cannot be guaranteed that the Lattes curricula, from which part of the data has been obtained, has been kept up to date by all scholars.

In any case, the results indicate the urgent need for establishments of simple and effective control mechanisms, often measuring the stockholder's productivity in the allocated project. For Seymor et al. (2004), there are few programs to evaluate the financing of research involving undergraduate students, which only confirms the imperative of this instrument. Moreover, linking the renewal of scholarships to one's own performance, measured in an unbiased and neutral way, would not be unrealistic, even if such a stance is subject to criticism as much as support (Nielsen, 2016; Alvarez, 2012).

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