Some reasons that influence dropout in a Physics Teachers Training program

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Abstract. There currently exist several countries experiencing problems related to the lack of teachers, as indicates the Organization for Economic Cooperation and Development. Part of this problem is related to the quantity of students that dropout teacher training programmes, reducing the quantity of teaching workforce. We conducted a research to understand the main reasons to former students to dropout a physics teachers training programme. To obtain the data we applied an online questionnaire with 274 former students, 37 of them answered the questionnaire. Although this number represents 13.5% of the total, the main answers are recurrent, indicating that those could be similar to other former students. Through the analysis of the answers was possible to note that, although this physics’ teaching programme may be considered difficult among former students, such difficulties seem to be related to several factors, besides the complexity of the Physics as need to work during the morning or the demotivation that occurs within this programme. We argue that the dropouts seem to be more related to problems such as the pedagogical performance of the professors of Higher Education, than difficulties related the complexity of Physics.

1. Introduction

There are several countries experiencing problems related to the lack of teachers, as indicates the Organization for Economic Cooperation and Development (OCDE, 2005) [1]. Factors due to the increase in the wealth of the population, the emergence of new fields of work and the difficulty of the teacher’s work, as is possible to experience in schools, or as informed in the daily media, making the career less attractive for the younger generation. A consequence of the lack of teachers graduated in various subjects like physics, open the possibility that teachers graduated in other subjects teach it, as it is occurring in Brazil, and reported in a Brazilian newspaper of great national scope. According to this newspaper, the School Census in Brazil verified that: "Only 27% of the in service physics teachers are graduated in physics; there are more teachers graduated in mathematics teaching physics at high school level than physics majors teachers training program teaching in these disciplines: 29.8%." (SALDAÑA, 2017) [2]. Although this physics’ teaching program may be considered difficult among former students, such difficulties seem to be related to several factors, besides the complexity of the physics.

These factors are, for example, the need of the student to work during the program, or the demotivation that occurs within the program. These data point to the need to rethink this program in order to consider results of the researches about science teaching in the higher education and the problems related to the teaching practices of lecturers in this level of education. In general, they do not
take into account students’ previous knowledge and the fact that time to learn is different for each student. We mean that the dropouts seem to be more related to problems such as the pedagogical performance of the professor of Higher Education than the complexity of Physics. However, mathematics teachers teaching physics can’t solve the problem of lack of teachers, since teachers without specific training did not study specific themes on the subject they are teaching, influencing the depth of knowledge about the subject they teach, as well as how they teach those subjects to their students.

In addition to the low attractiveness of teacher training programs, we can highlight two factors that influence the lack of teachers: the number of people who do not complete these programs and the number of those who leave the profession in high schools.

The influence of the number of people who left the profession was studied by Kussuda et al. (2013, 2014) [3], [4] a research made among students who completed the physics teachers training program on a public university in the state of São Paulo, Brazil. Through this research, it was possible to conclude that many of the former students who completed this program chose to teach; however, approximately 1/3 of those who answered the questionnaire abandoned their careers in Middle or High School. The main reasons are the difficult working conditions and the economic issue of the profession; the wage was approximately 748 dollars monthly, for 40 hours of work a week, in the state of São Paulo in 2018). This study showed that only the increasing the number of teachers trained is not enough to solve the problem of lack of teachers, but rather, it is necessary to change the public education policies aiming to better the quality of work to the teachers in Middle or High Schools.

The possibility that lack of teachers be related to the number of people who dropout the teachers training program was studied by the same researchers through the survey carried out with former students that did not finish this program. In this paper, we present part of the outcomes of this this research, focusing on the main motives to former student’s dropout in a physics teacher training programmes on a public university in the state of São Paulo. Discussions about quantitative data from this research and about the expectations of the former students of the studied sample before starting the program were already presented by Kussuda et al. (2016) [5].

We believe that this research may help to think about how the teachers training programs are conducted, considering main difficulty of the students and the way that professors conduct their classes. Moreover, raising the quantity of graduated on teachers training programs we expect to better the quality of education in Brazilian Middle and High Schools.

2. Considerations about Higher Education in Brazil

To discuss dropout in teacher training programs, we should highlight some points about Brazilian Higher Education. In this country, the training of teacher occurs in specific programmes denominated "licenciatura"; in this way, the physics teachers training programs are denominated Licenciatura in Physics. There are public higher education institutions that are not paid; they are maintained through taxes paid by the population, which should reduce the influence of the financial issue to maintenance in the university. However, there is a selective process to be accepted in these institutions, consequently, not everyone can attend these universities. In addition, the greater part of the students cannot be contemplated with student assistance as housing facilities or university restaurant, because there are no vacancies for all or the opening time for the university restaurant dose not match with students necessity. Therefore, although it is not necessary to pay to study in these institutions, there are high costs for the maintenance of these students, such as renting, alimentation and transportation expenses.

Private higher education institutions are maintained through the payment of tuition fees. However, there is a possibility of partial or full government funding of the studies. Even if it is paid, in general, these institutions do not offer assistance as student housing for these students.

3. The dropout in Higher Education
In order to study dropout in the physics teachers training program, we based on research about dropout in higher education conducted by Vincent Tinto (1994, 1997) [6], [7]. According to this author, the dropout on this educational level is related to the student’s difficulty in integrating academically and socially in the university.

The difficulty of academic integration is related to the lack of ability to reach certain parameters expected by the institution, for example, the student's performance in the assessments or the minimal presence in the classes. The difficulty of social integration is related to the ability of the student to interact with members of the institution such as classmates, professors, students of other programs and people working in the institution of higher education.

Although Tinto (1994) [6] carried out his study in the context of the United States, that has different characteristics from the Brazilian education system, a study conducted by Pereira Júnior (2012) [8] found that this research can be adapted to the Brazilian context.

Tinto (1994) [6] points out that both actions that occur inside and outside the institutions of higher education can influence the academic and social integration of the student, and those occurring outside the academic context influence more students who do not reside in the university. In the Brazilian context, most of the students do not reside in the university, as already informed, in this way, Brazilian students are more influenced by the actions that occur outside the university.

4. Methodology
In order to know the reasons presented by the former students to drop out the program, we sent an online questionnaire through their email obtained through the consultation of their name on various search systems such as consulting the professor who taught these students, the registration on a platform of Brazilian researchers, social networks and search engines. The names of the former students were obtained by consulting the university’s secretariat, responsible for organizing the data about the students entering the university.

Through this search method, it was possible to find the e-mail of 274 former students; however, only 37 answered the questionnaire. Although the number of respondents is low, the data obtained provided important information for us to rethink possible actions to reduce dropout in Higher Education.

Data obtained through the online questionnaire were analyzed according to the Content Analysis that has Bardin (2002) [9] as main author.

Excerpts provided by former student were translated into English by the authors of the article to facilitate the understanding. At the end of each answer an "S" (student) code followed by a number will be indicated to show which response corresponds to each respondent.

5. Data analysis
According to data obtained at the university's office of academic records, most part of the dropouts occurs at the first year, after the student entering the program, as well as occurs in other universities. These data matches with similar studies conducted in Brazil by Testezlaf (2010) [10] and Villwock, et al. (2015) [11] and points to the need for more attention to the students who are starting to study in the university in order to reduce the dropouts taxes. This finding also seems to be in agreement with the theory of Tinto (1994) [6], since the difficulty of social and academic integration is greater in the first years of study in Higher Education, due to the difficulty of transition between educational levels. According to our survey, approximately 29% of the dropout occurs in the first year and 18.18% in the second year of study at the university.

As Tinto (1994) [6] indicates, dropout in Higher Education may be related to the difficulty of academic integration; the research conducted by Gomes et al. (2010) [12] and Pereira et al. (2011) [13] also indicate that the difficulty of the program is related to the dropout in Higher Education. In this way, we analyzed the self-declared performance of the student according to the answer provided through the online questionnaire to the question: “How do you describe and evaluate your overall academic performance during your stay in the program?”
It was possible to verify that 15 of the 37 respondents consider that their performance was low; 9 regular, 9 high and 4 did not answer the question. These data seem to indicate that dropout can be related to the low performance of the students. However, when we analyze why the former students consider that their performance was low, we can note that, although the physics teacher training program analyzed may be considered difficult for them, other factors like demotivation, the professors teaching methodologies and the need to work during the program, seem also to influence students' performance. The following Table, below, shows the reasons declared for the students and the frequency for each reason.

| Reasons for low performance                                      | Amount |
|------------------------------------------------------------------|--------|
| Demotivation                                                    | 5      |
| Need to work                                                    | 2      |
| Professor's way of working                                      | 2      |
| Intended to transfer before starting the program                | 1      |
| Lack of knowledge that should have been obtained in High School | 1      |
| They did not answer                                             | 4      |

Analyzing the 5 motives declared for the former students be demotivated, we could notice that 3 of them relates the demotivation to the way that professors teach and evaluate, 1 to the possible future job, 1 consider himself demotivated, but curious.

Desiring to know the main motive to dropout the physics teachers training program, we asked the following question to the former students: “What reasons do you believe that may be related to your dropout from the physics teachers training course?” Some answers to this question were recurrent, so we decided to highlight one of them, as example for each kind of answer we could find.

Among the reasons presented by former students for dropout, were indicated the way that the professors at the university (university lecturer) teach physics and the teaching methodologies used by them, as well the evaluation system, not compatible with the classes taught. The professor responsible for disciplines related to the Didactics of Physics, the criticism falls on the adoption of only one form of teaching, while he/she discusses the necessity to approach the classes through different ways of teaching: “[...] While analyzing incorrectly the knowledge acquired with a stressful test system that does not necessarily contain the content taught by the professor [university lecturer] and keep requiring mastery of knowledge that are still being learned in other classes. (S1) I believe that dropout may be related to topics such as subjects that are not related to teachers training program, professors [university lecturers] who did not apply the teaching practices that they teach that we should know and evaluation with disjointed issues. (S2)

Another reason presented by the former students for dropout the program is the importance attributed to the research in opposition of the importance attributed to the class by the professors (lecturers), as we can see in the answer: “The little attention teachers have to the teaching imply that only as research are important”. (S3). This importance given by the professor to the research can be related to the difference
in the importance that the university gives to the class and to the research when the university professor is charged.

A serious problem pointed out by some former students to dropout is the encouragement of some university lecturers to the physics teachers training program to dropout. We can see it in the answer: “When we enter to the College, there are many doubts and I remember the Physics teacher saying: ‘If you want money, this is not the program’ So I got out!” (S3).

We can notice in the former student’s answers that the professor does not adapt his classes to the different publics: “The level of demand of the program is heavy for those who work, and in my case, it was not for leisure ... it was almost the same content as a bachelor’s degree.” (S4). Through this answer, we can also verify that the former student considers that the students who will teach physics in High School must know less than those who will do research, reinforcing the idea that the teacher does not need to know the subject in depth, since he will teach to high school students, who knows less than the teacher.

One of the criticism presented by the former students is the excessive abstraction and the focus on the calculations, which prevents the student from understanding physics better, as we can see in the answer: “The absolute abstraction in the program of Physics prevents the student from seeing the applications of the immense and heavy content of mathematics discouraging him to study.” (S5).

Another criticism presented by the former students is the lack of attention to the difficulties presented by the students, which seems to discourage them, as we can see in the following answer: "The teachers think that the students arrive prepared for the subject, and some, for example of my program, do not know to do any quadratic equation. It was these difficulties and others that made me give up.” (S6).

Former students also disapprove the lack of empathy with how the curriculum matrix is organized, which prevents the student from completing the program, as indicated in the response: “For me, it was missing 3 or 4 modules, the dates always coincided in the semesters. I could not get class with other programs because I worked during morning and evening schedules. The lack of interest was also great, and the professors did not help.” (S7).

There are other critics to the university; however, the changes pointed out by the former students as necessary, depend on changes in public policies and not only on the action of the university professors or the coordination of the program. These subjects appear in the answers:

“... Place to study, in the afternoon... the library was usually full and the grove in front [of the Library] always had someone smoking marijuana. (S7).
“... Disorganization of the university; Successive strikes; Lack of government support in teacher training”. (S8).
“... Lack of student housing facilities. Passing the entrance exam is not the only difficulty for poor students. (S9).

Although most of the reasons given by former student to dropout are related to professors and to the university, reasons related to actions outside the university are also indicated, as the need to work during the program: "Lack of time to study. It is very difficult for those who work to study the amount of duties and be able to continue the program in a healthy way." (S10).

It was also presented as a reason for dropout, contact with teachers who currently teach in High School, especially during the supervised internship, when the student has contact with the High School again, but now as future teacher: "(...) during the program in my internships in schools and talking with the teachers of public schools I realized that for me it was not worthwhile to continue and I decided to opt for another program.” (S11)

The lack of attractiveness of the profession, a factor already highlighted by the OECD (2005) [1] was also indicated as one of the reasons for dropout, as we can see in the answer: “Lack of job opportunity for the physicist. About being a teacher, there is a very great neglect with the category; the salary is low and the working conditions are terrible.” (S11). However, the solution to this problem depends on public policies and changes in society and not just the university.
Personal factors, such as family problems and immaturity of the former student were also mentioned as we can see in these discourses:

“My immaturity: I started college without knowing what it could really provide me and throughout the program I could not evolving my vision as a university student, gotten involved with the program as if it were an extension of high school.” (S12).

“I had family problems that ended up preventing the stay in [name of the city], that was the main reason for the dropout.” (S13).

The answer also other reasons, such as the possibilities of concluding the program through online study and of transferring to another program as reasons for dropout:

“I attended two and a half years and the offer to finish the program online was very attractive and pleasant.” (S14)

“I had no expectations about the program; I had interest, however, to try to transfer to another program later.” (S15)

6. Conclusions

Through the analyzes it is possible to note that a large part of the answers presented by former students is related to the difficulty of academic integration of the student, often due to the way of teaching of the university professor that ends up discouraging the student. Moreover, it is possible to notice that there is difficulty of social integration of the student with the professor, since the this professional does not seem to be thoughtful to the difficulties of the students or it can even ignore them. In this way, much of the dropout could be avoided by paying more attention to the students, especially freshmen students and bringing discussions about science teaching research outcomes in the higher education context, such as the need to consider the student's previous knowledge and the perception that time to learn is different for each student.

Although most of the reasons presented are related to university concerns, like the methodologies of teaching of the professors (lecturers) at the university, we must demand better working conditions and more dignified salaries to the elementary and secondary school teachers. Only training more and better teachers does not guarantee a greater number of professionals teaching at high school level; the profession has to be attractive so that the graduates do not look for other jobs, as verified in the research conducted by Kussuda (2012) [14] and Kussuda et al. (2013) [3].

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