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BIOFRONTEIRAS-UFF: EXPLORING AN EDUCATIONAL PROGRAM THAT SPREADS THE SCIENCE FRONTIERS THEMES

***Helena C Castro, Neuza R W Lima, Rodrigo Santos, Grasielle Freitas, Gabrielle Braga, Augusto Mendes, Heloia Caramuru, Gabriela Silva, Patricia P Teixeira, Marina A Feistel, Cinthya G Santos**

UFF - Tutorial Education Program Institutional Fluminense Federal University, Brazil.

Article Info	ABSTRACT
<i>Received 25/08/2013</i> <i>Revised 15/09/2013</i> <i>Accepted 18/10/2013</i> Key words: Sciences, education, research, teaching and learning.	The school is the primary scenario for identifying student's talents, thus we should study continuously how to deal and improve them. On that purpose, currently in Brazil there is a program called ProPET Biofronteiras that aims to present themes of frontiers (e.g. Biotechnology, Neuroscience, and Nanotechnology) to teach Biological Sciences and stimulate not only the student's talents but also professors and teachers. In this paper we analyzed the profile of the students that participates actively of this program and called petianos (n=8) and the profile of known Brazilian researchers (older, n=98 and young, n=99) that are invited to transfer didactically their knowledge in the frontiers areas to students, professors and teachers communities by these students. According to our data, the petianos consider that a professional entitled with doctorate in a university can work in research, education and extension but without being obliged to do so simultaneously.

INTRODUCTION

According to the literature, the process of teaching and learning still has the information as its main priority. For some of these authors, the student must have the first contact with the information; followed by the opportunity of working, classifying, analyzing and renewing it; going into a third stage involving the full processing of it, which will allow the student to understand it, using the intelligence, consciousness and wisdom. The way that these steps are performed cannot disregard the latest information on teaching and learning process and their different aspects, requiring a personal organization of it.

LITERATURE REVIEW

The courses for training teachers must include aspects related to the applied and current context of

specific themes, especially in case of the technology and health areas (e.g. Applied Microbiology and Biotechnology). These aspects cannot be restricted by the implementation of technical procedures, since they are not the result of only a scientific procedure, but also of a political and a deliberative process [1]. It is necessary to consider not only that the current classroom still deal with the students in a uniform way, but also how this model limits these students development. They are currently defined/classified only by an average income, which avoids and restricts their development on specific talent areas.

Since the school is the primary scenario for identifying student's differences, we should study continuously how to deal with these differences and how to improve these students' talents. One approach for stimulate the students talents could include the use of themes of sciences frontiers as a starting tool. On that purpose, currently in Brazil there is a program called PET (Program of Tutored Education) that stimulates students to present an active profile, working with research, teaching and extension areas simultaneously. This program seeks to provide to the students that are participants, conditions for

Corresponding Author

Helena C Castro

Email:- hcastrorangel@yahoo.com.br



conducting extracurricular activities that may complement their academic formation, under the guidance of a tutor [2]. It also aims to fully meet their undergraduate needs and/or expand and deepen their objectives to integrate their curriculum. In this regard, the program expects to provide an improvement in the academic quality of the undergraduate students supported by PET.

The extracurricular activities executed on the program are aimed at ensuring the students opportunities to have experiences that are not present in their conventional curriculum, favoring their academic formation for both market integration and professional development. Thus, PET is an investment in academic undergraduate courses that have strong epistemological, pedagogical, ethical and social commitments with the human being as a member of society. Thus, in a long term, it expects that the higher training level of professionals in the various areas of knowledge, endowed with high scientific, technical, ethical and social standards in various areas of knowledge, may transform the national reality, especially as teachers and postgraduates researchers in professional areas [3,4].

The program Biofrontiers from Federal Fluminense University is a ProPET program created in 2013 that aims to present themes of sciences frontiers (e.g. Biotechnology, Neuroscience, and Nanotechnology) and uses them to teach Biological Sciences and stimulate not only the undergraduated students but also professors and teachers [5,6]. Therefore, the participants of this ProPET activities are stimulated to think about sciences and consider the university as a place of consulting and of information access. Its purpose is to contribute to strength the professor degree course focusing on teaching, researching and divulgating aspects, also considering new practices and topics about their professional life.

The Propet-BioFronteiras-UFF aims to involve students of the Biological Sciences teacher degree course in different perspectives of their professional practices, also training them as motivation agents for new student's generations. Through different activities, these students participate in the program and are called *petianos*. They receive a fellowship to work in the perspective of transferring the scientific knowledge from university to schools, giving them a chance of studying and understanding these themes and the process of transferring this knowledge to the scholar community in a logical, didactical and comprehensive way [7,8].

In this paper we aim to analyze the initial profile of the *petianos* of the Propet BioFronteiras-UFF and the profile of their main bank of lecturers, which includes almost 200 researchers from the 2013 fellowship programs known as Scientist of Our State and Young Scientist of Our state from the Research Support Foundation of the

State of Rio de Janeiro (FAPERJ) that obligates them to give lectures for public schools by signing a fellowship contract [9].

METHODOLOGY

Target Public

In this research we evaluated: a) 8 *petianos* (2 males and 6 females) that are undergraduate students in Biological Sciences teacher degree course and participate in the ProPET BioFronteiras from Fluminense Federal University since its beginning in 2013, and b) researchers included in the Scientist of our state (n = 98) and Young Scientist of Our State (n = 99) fellowship programs of FAPERJ in 2013. The main difference between them are the time of getting the doctorate degree (older >10 years, young <10 years)

Assessment Instruments

The evaluation of the *petianos* was performed using a questionnaire with 4 open questions regarding their personal concepts on important topics such as Research, Teaching, Extension, and Themes of Science Frontiers whereas the evaluation of the researchers of both FAPERJ programs in 2013 was shown in percentage and performed by analyzing the distribution of these researchers in the technological and Humanities areas, the gender and place of work.

RESULTS

In this study we used a questionnaire containing 4 questions to evaluate the initial profile of the *petianos* that work in the program Propet Biofronteiras-UFF (Table 1). Interestingly, all *petianos* related the research with creating/finding new knowledge and only one related it specifically with the university environment, which pointed to a wider vision to the other five students (Table 1).

One of the tasks of the *petianos* from Propet Biofronteiras involves recruiting researchers for speaking in a simple but structured way about themes of frontiers for an audience of undergraduates, professors and teachers.

To find potential volunteers, the *petianos* conducted a research involving FAPERJ that is a foundation that presents a mandatory offering of lectures to public schools as a rule in some of its contracts that are signed by the researchers when getting financial support and/or fellowships. The idea is to improve the dissemination of scientific information from the research facilities (e.g. universities) to the society. In this work we analyzed the profile of these FAPERJ researchers including their distribution in the two main areas of research (Technology and Humanities), their workplace, and gender (Figure 1).



Table 1. Concepts about research, teaching, extension and themes of science frontiers of the students that participates of Pro-Pet Biofronteiras-UFF (petianos)

Question	Answer
1) What is research?	<ul style="list-style-type: none"> - It is studies to gain new knowledge. - It is a process of knowledge construction that is focused solely on the interest of the university. - Research is the way of obtaining knowledge or contesting any existing hypothesis. - It is the segment where new concepts and applicability of the content are researched in the field or in the laboratory. - Research is the process of finding and producing new knowledge. - It is a process used to generate new knowledge. - The understanding of a topic and its preparation.- It produces a new knowledge given area.
2) What is teaching?	<ul style="list-style-type: none"> - It is the act of spread knowledge. - It is a practice that involves research in the area of education, according to the demands of the university. - Teaching is to transmit the knowledge. - It is learning, the assimilation of new content in a discipline. - Teaching is the way of spreading knowledge, the construction and deconstruction process of well known and can be formally (formal educational institutions) or informally offered (non-formal education institutions - museums, etc., day-to-day). - The teaching is how to spread throughout the knowledge produced. It can occur in a formal or informal sphere. - It is knowledge exchange. - The way it is transmitted and learned knowledge.
3) What is extension?	<ul style="list-style-type: none"> - It is an interdisciplinary way to relate research and teaching. - It is a practice that integrates teaching, research and society, seeking the commitment of the university with the demands of the society. - Courses offered by the University that aims to add knowledge or update the professional, not necessarily using a graduate version. - Extension involves activities that may use the research or teaching as an influence or base, having a social character, or activities that, in general, have a dialogue / return to society. - Extension is the initiative to make the knowledge produced in the university through research and education useful to society, thus an interaction between the two parts, reducing the huge gap that exists between the academic environment and the rest of society. - The extension is to transcend the university to let the community know what is produced as a research and teaching. - Extension is an extension of the search. - It is the articulation of education and research.
4) What are themes of sciences frontiers?	<ul style="list-style-type: none"> - It is everything that is new and related to an existing or a new subject. However, all frontiers themes should be analyzed to see how interesting they are for society. - They are innovative themes but not necessarily new, and they can be studied to be applied to the society. - They are the topics of greatest visibility in scientific area that has repercussions in the academic and social environments. - They are topics that, in general, are difficult to be addressed in the classroom. Controversial and current topics. - Themes difficult to approach or understanding, whether they are related to moral values, or without clear information, rarely addressed in the literature, which generate ideological conflicts, themes recently discussed / discovered and poorly understood or not. - They are topics which are difficult to understand or due to treating moral values are difficult to be addressed. - Topics are difficult or complicated transmission primarily for faculty. - Lines are contemporary knowledge already explored



similar distribution is also observed when analyzing the research areas of the young scientists that are equally distributed between the genders while for older scientists, the area of technology have been more addressed in 2013. These data are also in accord to the literature that discuss that now women are being more recognized and supported in these “male-areas” change the paradigm about technology and gender.

Most of these researchers both scientists and young scientists are located in institutions for education (e.g. UFRJ and UFF) or research (e.g. Fiocruz, Embrapa) but not enterprises, which is explained by the tradition of these institutions. However the older scientists are present in a higher number of research institutions than the young

ones.

CONCLUSION

Considering the existence of the FAPERJ contract, this result confirms that there are qualified scientists for giving lecturer and participating in the ProPET program, providing good and qualified information for the target public from schools and undergraduate courses.

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