The influence of teacher (Des) qualification in teaching chemistry in Brazil

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ABSTRACT

The lack of teacher qualification in Brazil has been pointed out as one of the great current problems, especially in the case of teachers of the exact science, such as chemistry. The present study used exploratory and descriptive-analytical procedures. The technique of data collection was an extensive direct observation. A semi-structured questionnaire was used as a data collection instrument; it was applied to elementary school science teachers and high school chemistry teachers. It was therefore a case study with a qualitative-quantitative approach and field research carried out in the area of sciences (chemistry) in municipal, state and private schools, elementary and middle schools of Picuí state of Paraíba, Brazil. Through the results obtained, it is possible to observe the existing great need of qualified professionals who can offer a good formation, that is, a continuous formation for our students, those that can be part of the evolution so that one can have a better quality of education.

Keywords: Teachers, qualification, chemistry teaching.

INTRODUCTION

Concerns about training of teacher and poor chemistry throughout elementary and high school are not recent. In general, science teachers are deficient in chemistry, as such it is necessary to intensify the debate and reflection about this problem so that chemistry, which is present in everyday life can be contemplated in the basic training of students bringing greater contribution to the improvement in quality of life. The work of Chassot (2008) says that chemical knowledge must permeate the entire area of elementary school science and not confined to an isolated semester at the end of elementary school, wherein general anticipate high school content. From there, the need for qualified professionals who can offer a good training that is, a continuous training for our students and those who can be part of the evolution to have a better quality of teaching is a necessity.

The different analysis on the teaching of Sciences (Chemistry) requires to a greater extent a teaching where science is a support to be educated. This means that it is not enough to transmit scientific knowledge, but it is important that this scientific knowledge becomes instruments for improving education generally (Santos et al., 2016). The study analysis were translated into different attempts and in trying to discuss with chemistry teachers, three questions that are put in forums and meetings as primordial are: Why teach?, What to teach? and How to teach?

These three questions were used in a broader way when addressing primary school teachers, not only for them, but also for the secondary school and even the university where results that have significant data are not found. The training of teachers is based on the hypothesis that a greater mastery of the academic and professional knowledge of educators has a positive influence on the students’ school success. The teaching profession is above all, a decision-making one in complex systems where there are many variables of which the teacher is a part. Thus, the teacher must have tools that allow the management of
complex and rapid decision-making. These tools should be sought in observation, analysis, management, regulation and evaluation of educational situations.

Scientific education in science (chemistry) plays an important and essential role in an individual’s life, namely to present, organize, analyze, experiment and discuss the different knowledge that is treated in this area of knowledge since it is in a student that the importance of chemistry can be defined (Santos et al., 2016). The importance of science (chemistry) generates a search for the orientation of general and scientific knowledge, thus, establishing differences between the various levels as the knowledge of common sense and scientific universe. Science is characterized as an organized and systematic form of knowledge by following specific techniques, means and procedures.

In this perspective, this research arose from the need to investigate some situations in the field of pedagogy and didactics and more precisely in the teaching of sciences (chemistry) in an attempt to find solutions to the issues analyzed.

A broad discussion was selected with five characteristics for the teaching of chemistry at the intermediate level: aseptic, abstract, dogmatic, anti-historical and evaluated in a ferret way (Lima et al., 2016). These five characteristics which showed aspects of dogmatism and anti-historical teaching have been hallmarks that seem to make Chemistry not contribute to education, or even take responsibility to help maintain domination. In particular, these two characteristics mark teachers at different levels of formal schooling and the presence of dogmatic teaching tends to become more accentuated (and this even seems paradoxical) when it rises to higher levels. There is another serious complication in the teaching of Chemistry: Chemistry has been taught in high school to prepare students for the entrance examination or even worse, science in elementary school is to prepare students for high school. One of the great losses of teaching is to link it in a systematic way to the next higher grade. There is a need to convince ourselves that each degree completes itself. Elementary education is not preparation for high school, as this is not college preparation.

It is necessary to emphasize how much the continuous formation of teachers in our environment has represented to us a guarantee of the continuity of the process with the future departure of the precursors. The permanent adherence of new participants among those who are in the front lines of the three levels of schooling gives the pioneers a special tranquility to see that the seeds that have been planted are bearing fruits. Chemistry teachers have to contribute to a broad and simple view of individuals in relation to Chemistry, making it necessary to show that they are simple transformations that happen in our daily life that make up and are part of this study and our goal can be reached only through a chemistry education that is focused on the daily life of the student. Since the teacher is the mediator of the teaching-learning process in the classroom, the individual must know the contents to be taught, know and question reality, acquire theoretical knowledge about learning and establish relations of specific contents with reality socio-culturally (Marcondes et al., 2009).

In the present day, there is discussion of the transformations that school education needs to go through and this is directly affecting initial and continuing teacher training courses whose traditionally established and disseminated knowledge and practices give unequivocal signs of socio-cultural exhaustion. Sousa et al. (2015) among the challenges, emphasizes on overcoming the common pedagogical sense, the socialization of scientific knowledge within the reach of all that is, sciences for all; the insertion of science and technology in school as culture; the incorporation of contemporary knowledge in science and technology throughout the school system including teachers training, overcoming the shortcomings of the textbook and the approximation between research and teaching.

Silva et al. (2016) in their study considered that as far as the sciences are concerned, considering the knowledge that the child possesses, his experience is the starting point in the way of the expansion of knowledge at broader and deeper levels. To do so, the teacher have to steer the guideline of his work inspired by the coexistence of the child and adjust his conduct to each situation with an awareness of the appropriate procedure that will give meaning to the educational process and always taking into account the objectives of teaching science.

In recent years, a number of conceptions have emerged about continuing teacher education (Leal and Mortimer, 2008; Yoon et al., 2014; Hume and Berry, 2013; Van et al., 2001). The term training or continuing education brings a critique of previously used terms such as: training, capacity building and recycling which did not prioritize the construction of teachers’ intellectual autonomy. Continuing education is made necessary by the very nature of human knowledge and doing as constantly transforming practices.

Reality changes and the knowledge built on it needs to be revised and expanded every time. In this way, a continuing education program is necessary to update knowledge and to mainly analyze the changes that occur in our practice, as well as, to assign expected directions to these changes. Continuing education of teachers can be characterized as a program of different actions which involves courses, congresses, seminars, collective pedagogical, departmental meetings, technical orientations and group or individual studies. It can be understood as a dynamic process through which a professional over time adapts his training to the demands of his professional activity.
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Figure 1: Flowchart of the methodology adopted in the research.

The full licentiate in chemistry is the privileged locus for the formation of chemical educators since they are based on studies carried out during four years of dedication to the search for knowledge, theoretical, practical and methodological contents so that when leaving the university they are licensed to help children, young people and adults in the germination of the knowledge built and organized in a systematic way for a better use of them in their life as a critical and participatory citizen. It has been known for a long time that a degree in chemistry was presented as an alternative to students who could not do advanced disciplines of physics, chemistry, organic and inorganic chemistry for which the degree, because it was didactic was taken as consolation.

Based on this perception, this study seeks to investigate the greatest difficulty encountered by teachers in teaching science (chemistry), knowing that most of them do not possess training in the field which often makes it impossible to explain, show and organize a series of worked content. Most of them that always find themselves in difficult situations are actually illiterate or semi-illiterate in chemical science.

In this regard, this research aims to study the importance of teacher (dis)qualification in chemistry and its implications in the teaching-learning process.

RESULTS AND DISCUSSION

From the analysis of the data according to the questionnaire carried out in five elementary schools, it was observed that 42.8% of the teachers interviewed did not have the necessary qualification for the execution of the function, while 57.2% are divided among those who graduated in the area, an equivalent of about 14.3% and those who are pursuing a degree in chemistry, that is, those with incomplete course was an equivalent of 42.9%.

Regarding the 42.8% of the teachers who did not have qualification, there were some justifications which in general corresponded to the lack of time and comfort that the institution gave and there was still an interesting response of the teacher that drew our attention wheh he says that: he was only teaching to complete his time of service and would soon retire and not stay in school without doing anything to the direction asked to take over analytical procedures. The technique of data collection was an extensive direct observation. A semi-structured questionnaire was used as a data collection instrument and applied to elementary school science teachers and high school chemistry teachers. It was therefore, a case study with a qualitative-quantitative approach and field research was carried out in the area of sciences (chemistry) in municipal, state and private schools, elementary and middle schools of Picuí state of Paraíba, Brazil. Figure 1 shows the methodology adopted.

METHODOLOGY

The present study used exploratory and descriptive-analytical procedures. The technique of data collection was an extensive direct observation. A semi-structured questionnaire was used as a data collection instrument and applied to elementary school science teachers and high school chemistry teachers. It was therefore, a case study with a qualitative-quantitative approach and field research was carried out in the area of sciences (chemistry) in municipal, state and private schools, elementary and middle schools of Picuí state of Paraíba, Brazil. Figure 1 shows the methodology adopted.
the class, at least for that time. There is a preoccupation with the situation of teaching in the world, where those who do not have qualification in the area are to replace the graduates and this is a saddening reality. In relation to the 14.3% who have already graduated, there is a postgraduate. For the 42.9% with incomplete course, there are some that are in the 2nd, 3rd and 4th year just waiting for the conclusion of the academic-oriented work.

According to the analysis of the data from the questionnaire applied in secondary schools, the following data was obtained: 20.0% of the teachers interviewed do not have training in the area, since this data was directed to the schools of the state network where there was justification to the need of teachers and because the state does not make teachers available to the school, there is also a relocation of professionals from other areas matching the one who is willing to double the workload.

There were 80.0% of teachers in high school who are already well on the way, that is, they are in the 3rd and 4th year degree in chemistry. When asked if they used the experiment there was a general answer of no; it was said that the schools did not have a laboratory and that severally they could not do the experimentation that the textbook brought.

Regarding the seventh question, 83.5% said that the form of evaluation is by a test, work and continuous evaluation and the result of this form of evaluation is made in state and municipal schools. As for private schools, the form of evaluation made is with a subjective test and continuous evaluation, though a simulated one is still done with objective questions only, reaching only to 16.5% of the schools that have a relative difference in evaluation method. Majority of the teachers investigated said that there is a predominance of theoretical questions, that is, 75.0% of the evaluations are about theory, while the remaining 25.0% used closely related theoretical and practical issues.

Generally, there is a traditional assessment that is probably due to the influence of the teacher's qualification. In recent literature, there is a growing consensus that educational reform efforts are doomed to fail if the emphasis is on developing specific teaching skills, unless the teachers' cognitions including their beliefs, intentions and attitudes are taken into account (Haney et al., 1996). Figure 2 shows that many teachers are dealing with the difficulty of teaching science, where 25.0% find it difficult to have didactic material, 33.0% have difficulties because they do not have the training, 25.0% have difficulty in science itself (Chemistry), 8.5% have difficulty because they did not practice it and 8.5% admitted that they had no difficulty teaching.

Regarding students' difficulties in relation to science and chemistry, 16.8% feel they do not know basic concepts of biology, 8.4% feel the students do not understand the scientific language, 32.4% feel it to be something imaginary that do not leave the reality of the students and

**Figure 2:** Difficulty in teaching science and chemistry classes.
42.4% claim it is lack of attention, interest and perspective to learn. Moreover, 57.2% of the students find it difficult to understand the formulas and their respective applications, 14.3% feel difficulty due to lack of interest of the students and 28.5% still feel difficulty in relation to the language used.

Finding the best ways to introduce chemistry to high school students in scientific areas, particularly to chemistry students is a pressing, but hardly a simple task. Grega (2014) discussed the relevance of taking into account the history of the discipline and the ongoing controversy over its interpretations and foundations in the search for new ways of improving the teaching of sciences. From these discussions, some possibilities were suggested: the inclusion of philosophical interpretations and their defense, the emphasis on strictly quotidian features of the systems, an emphasis on formalism without worrying about the ontological status of mathematics, the incorporation of chemistry applications into real problems and the need to introduce complementarity when using images which can be taken into account in the devising of more effective ways of teaching introductory sciences for chemistry students.

In the questionnaire applied in the research, the teachers were asked how they intended to update: 59.0% seek this update in the participation of congresses, workshops, meetings, researching and reading on the subject. It was also verified that 25.0% intends to upgrade by making selection and consequently the upper course, 8.0% intends to take the master’s degree course and 8.0% seeks to update by doing the doctorate in this area. This demonstrates that despite the difficulties faced, there is an interest in qualification, either for the purpose of salary improvement or didactic improvement (Figure 3).

Analyzing the results of the research, it was noticed that the greatest difficulties encountered by teachers for elementary education are the lack of training in the area, that is, an illiteracy that generates a certain abstraction of the contents to be taught. Already in high school a concern detected through the questionnaire was to relate or associate the theoretical with the practical through applications of formulas and calculations. Knowing that a great part of those who complain about the difficulty in relating the content to the student’s experience was admitted by teachers who do not have training in the area and this confirms the importance of this study for the formation of the participatory citizen that are active in chemical knowledge.

**Conclusions**

Based on these considerations, this research was carried out due to the need to investigate in a general way the difficulties encountered by science and chemistry teachers at the time of class in trying to bring subjects related to their life and also because they are so abstractly shown. They make the disciplines and are remembered by the students as boring, unnecessary and even of no use for their life. We know and realize that in today’s world the
role of the teacher is to promote student learning, recognizing the importance of involving them, mobilizing their thought processes, exploring all dimensions and learning opportunities, making and retracing paths, creating and renewing procedures and always targeting their actual students which forms groups with their own characteristics.

Through the results obtained, it is possible to observe the great need that exists of qualified professionals who can offer a good formation, that is to say, a continuous formation for our students and those that can be part of the evolution so that one has a better quality education.

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REFERENCES


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