

RESEARCH PROJECTS IN SCIENCE EDUCATION DEVELOPED IN ARGENTINA: A BRAZILIAN POINT OF VIEW

Ana Cristina Santos Duarte

State University of Southwest Bahia, Brasil
E-mail: tinaduarte2@gmail.com

Héctor Santiago Odetti

National University of the Littoral, Argentina
E-mail: hodetti@fbc.unl.edu.ar

Abstract

The constant and rapid changes that mark the contemporary world require adequate, and compatible with our own critiques against positivism, social practices from the universities. In this sense, the university has sought to establish partnerships and collective actions with the community and develop more direct research and intervention projects, especially with schools, to contribute to the improvement of the teaching-learning process. Thus, this research aims to evaluate educational research projects developed in Argentina, identifying which impacts they have on teachers' training and practice as well as the difficulties to implement the proposal.

Key words: *assessment, projects, research, science, teacher training.*

Introduction

Traditionally, the role of the university has always been associated with the production and dissemination of scientific and technological knowledge, aiming at social transformation. However, the constant and rapid historical, social, political and economic transformations of the last decades, have affected the identity of the universities, and required changes in order to adapt to a different reality. In this sense, and to establish a more direct relationship with the community, especially with the schools, universities, through partnerships and joint actions, are implementing projects for research and educational intervention in order to fulfil their role as agents of social transformation.

The option for the schools, as a space to articulate and narrow the relationship between the university and the community, could perhaps have been taken because they are a privileged space for debate, discussion, exchange of experiences, dialogue between various areas of knowledge, a multiple space of observation, analysis and reflection. Thus, the University possessing the knowledge of the schools' reality can integrate theory and practice and (re) organize its work plans in order to meet the demands of school and society.

Whereas the current world passes by large and complex transformations and scientific and technological development, science education assumes a prominent place in the educational system. As part of this education, the school must provide students with the training and skills for their day-to-

day problem solving, which requires changes in the school and in the teacher training, incorporating critical reflection on the role that Superior Education plays in relation to society.

Accordingly, since 2002, the *Universidad Nacional del Litoral* (UNL), located in Santa Fé, Argentina, has been conducting research projects that address the problem of continuous training for teachers of middle education. In general, the projects sought to create spaces for joint operation between researchers and teachers at UNL and Teacher Training Institutes (TTIs) in order to identify the major dimensions of analysis involved in designing, developing, implementing and evaluating teaching sequences of mathematics, chemistry and languages. The university has a group of education research professors, thus, the partnership with schools has appointed a reality hitherto unknown within the University.

Therefore, after 10 years, a review of the research projects in partnership with schools, developed by the UNL is necessary, based on the groups that compose them, under the vision of an agent external to the process, aiming to identify the impacts on the teachers' training, on their pedagogical practice, the difficulties they faced, and other aspects, which are of great importance in order to assess the project and justify further research about teacher education.

This project was developed during the postdoctoral period of the Brazilian researcher conducted in Argentina, at the *Universidad Nacional del Litoral* (UNL), of Santa Fé.

Theoretical Framework

Through science productions of knowledge are created in certain cultures. Historically, there is a gap in the understanding of science in different social groups. For a group, science is constituted by a set of complexity, theories and laws as the task of scientists and they seek to specialize and hold back scientific knowledge, the other group rejects science. For Ward and Roden (2010) this has had two undesirable consequences: first, the rejection of science and the activities related to it and secondly the abuses that have been created between these two groups of society. Unfortunately, the educational system has allowed many people to reject science because science one learns in school most often is presented in a decontextualized manner, as a systematic result of scientific work, this conception has led to undesirable outcomes and needs to be resignified.

The scientific and technological advances in quotidian reality requires changes in science education as schooling process, regarding what, how, and why to teach science? This is needed to break the fragmentation of the basic curriculum content and to progress in scientific and technological perspective, pointing to more active understanding and participation of the students so that they may realize the relationship and the importance of school knowledge with the one required in everyday life.

The scientific knowledge seen in a traditional and fragmented form has been questioned with the advent of science and technology, which is not always accepted with serenity by teachers who often consider that their disciplinary knowledge is being threatened. However, the discussion about Scientific and Technological Literacy (STL) is a response to the classic science teaching crisis developed in most schools, which has not promoted the meaningful learning of the students. According to Giordan (1989) "We cannot longer continue imposing curricula overloaded with content sometimes incoherent and often irrelevant regarding to current necessities" (p. 29).

However, for Fourez (1997) scientific literacy is necessary for the promotion of human dignity in developing societies.

A scientific and technological literacy (STL) is required for insertion in contemporary society. It is almost unanimously stated that, without acquiring some familiarity with science and technology, it is idle to pretend to have a place in today's world [...] (p. 18)

There is a widespread recognition that science and its disciplines are of fundamental importance for the social, scientific and economic development of the country. However, "train scientists" is not the only goal of science education in schools, "science and technology are essential to our quality of life, and are central to our history and culture" (Ward, quoted in Science and Technology Committee, 2002, p. 1).

According to Ward and Roden (2010) an educational system must address two closely related needs: those of the individual and those of society. Therefore, it is necessary that educational systems produce “researchers of tomorrow”, but they must also “form balanced adults, scientifically informed, who would be adaptable, possessing a variety of skills, and specific and generic capabilities which enable them to face the many and varied opportunities that arise at any stage of life” (p. 15).

In this sense, the important role of science education as a conducive discipline to provide discussions, exchange of ideas and experiences among students, providing opportunities for the development of cognitive, affective and social skills are highlighted. We also consider that the planned curriculum content to be taught in school enables teachers to develop science education solid and systematically relating them to social, scientific and technological problems.

Changes in science teaching in elementary education proposed by the National Curriculum Parameters (1997) reflect the recognition and the need for significant changes in teaching practice in order to ensure the scientific literacy of the students.

Trying to overcome the fragmented approach of Natural Sciences, various proposals have suggested working with themes that give context to content and allow an approach of scientific disciplines in an interrelated way, seeking the interdisciplinarity, possible within the area of Natural Sciences (Brazil, 1998, p.27)

According to Ward and Rodan (2010 cited in Harlen, 2000)

The Core Curriculum is getting incompatible with science in other areas of education and with science in real life. Science is one of the core subjects of the National Curriculum that contributes to the acquisition of basic skills, including thinking skills (p. 21).

The National Curriculum Parameters, documents published by the Ministry of Education and Sports (Brasil, 1998), in Brazil, propose a set of curriculum guidelines - parameters - grounded in different conceptions than those which populate the classroom of a large part of the country. These guidelines should be worked with by teachers of different areas, seeking to improve the quality of education in Brazil.

The National Curriculum Parameters (1998) set the contents of science teaching through thematic issues which “represent an articulated organization of different concepts, procedures, attitudes and values for each cycle of education (...)” (p. 36). In this document, the contents are organized and outlined to extend the possibilities of these connections with the student’s reality, establishing a relationship of the classroom practice with the social context through crosscutting themes and sequences and different teaching situations, including different places where learning science is possible (Brazil, 1998).

Such content can be organized in investigation themes and issues, prepared by the teachers in their teaching plan. With this, it is not proposed to force the apparent integration of content, but to work knowledge of various natures that manifests itself interrelated in a real way.

[...] The choice of the teachers in organizing their teaching plans, according to working topics and research problems facilitates the interdisciplinary treatment of Natural Sciences. It is a practice which in this area is already becoming common and recommended as it allows the organization of content in a flexible and compatible way with its selection criteria (Brazil, 1998, p. 36).

In an attempt to find the best way to teach and learn, as well as achieve the goals of science education, teachers select content, program activities, prepare teaching materials and resources, i.e. they need to make decisions about what to teach and how to teach it. These decisions and strategies can match the use of didactic sequences, which are a set of activities linked together, planned to teach content, step by step. Thus, the articulated ordination of the activities is the distinguishing element of the methodologies, which must be organized according to the objectives the teacher wants to achieve (Zabala, 1998).

The term *Didactic Sequence* appears in the official documents of the National Curriculum Parameters (1998) as “projects” and “sequenced activities”. The didactic sequences in science teach-

ing are aimed at teaching certain knowledge about social, transversal issues, new trends in science education and/or issues considered major/important in the area.

The most current pedagogical trends in science teaching point for valuing the experience of the students as a choice criterion for research topics and development activities. “[...] To find meaningful situations in the experience of students, thematize those experiences, integrating several axes and transversal themes is the sense of the National Curriculum Parameters of Natural Sciences. Therefore, it is necessary to identify these situations and formulate educational activities for project design or teaching unit” (Brazil, 1998, p. 117)

In this perspective and based on the innovations aimed for science teaching, teachers must be prepared to develop proposals that meet the learning needs and the increasingly complex social context in which the schools are inserted. Thus, strategies should be established in or outside the classroom so that the students might understand what, how and why they should learn.

It is in this sense, that the UNL has developed research projects in partnership with high schools. Therefore, the main objective of this work is to identify and assess the impacts of these projects on the teachers’ training, in their pedagogical practice.

Methodology of Research

This is an evaluative qualitative research, i.e. a research that “involves obtaining descriptive data obtained from the direct contact between the researcher and the situation studied, emphasizes the process over the product and cares to portray the participants’ perspective” (Ludke & André, 1986, p. 13). The instruments used for data collection were document analysis and semi-structured interview. The semi-structured interview asked questions regarding the teachers’ participation in improvement and research projects; What kind of projects did they participate in; the significance of these projects for teaching practice; the impacts and importance of these projects for their teaching practice; what had changed in their teaching practice after participating in the projects and the difficulties to continue applying the proposed projects in the classroom. Three large projects, which had external funding, implemented by the UNL in secondary schools in Santa Fé, Argentina, were analysed. Five teachers who participated in the projects of educational research were interviewed.

This survey was developed in two stages: first, we performed an analysis of the project, its objectives, participants, developed activities and results. In the second phase, we conducted interviews with teachers who participated of the projects. The interview consisted of two parts: the first one on the participants’ identification and the second one on specific issues, such as: participation in improvement projects; meaning, impact, importance and changes in teaching practice; continuity and difficulties in implementing the actions of the projects and suggestions. Due to the time of the project execution, it was not possible to locate all participants.

Results of Research

The Projects: Contextualization

Three projects were analyzed for being considered of greater magnitude, extent and duration.

1. Projects of Scientific and Technological Research - PICT-O - 2005 Education: a shared space between educational research and teaching practice. Construction of teaching sequences in mathematics, chemistry and language to promote the reconciliation of levels (2008-2010);
2. Announcement of funding for university cooperation and scientific research programs (A/7510/2007) - A shared space between educational research and teaching practices to construct teaching sequences in experimental and mathematical sciences;
3. Course of action for research and development: “Programa de I+D Orientado a Problemas Sociales y Productivos” (R & D Program Facing Social and productive Problems) (Convocation call 2010) - Resignifying of Science, Mathematics, Physics and Chemistry teaching: Impact on the Middle School. With purpose the encourage the creation and analysis of common spaces between educational research and teaching practices and promote concrete actions in the classroom that allow changes in teaching strategies in the areas

of Mathematics, Chemistry and Physics positioning them as a way of understanding the world around us.

In general, the analyzed projects were developed by the UNL/FBCB in partnership with middle schools and with the participation of Educational Institutions, principals and teachers of secondary schools, interested in the problems of science teaching, particularly mathematics, chemistry, Physics and Arts and the relationship between them.

It is observed that the educational research projects are characterized mainly by the implementation of pedagogical practices in order to enhance curriculum integration and dialogue between different kinds of knowledge. In this sense, the projects were developed at least twice: the first moment to organize the activities developed in conjunction with the teachers (planning: selection of content and learning strategies and assessment), from topics/content that articulated with the day-to-day life of the students. Another moment was developed in the classroom, directly with the students, aiming to expand and deepen the knowledge.

Hernandez and Ventura (1998), emphasize that the research projects are a form of articulation of school knowledge, a way of organizing the activities of teaching and learning, which help creating strategies for organization of school knowledge in a more flexible and open way and may occur in different ways: by discipline, activities, interests, topics or work projects.

For the projects implemented by the UNL, among other developed activities we highlight the construction of implemented teaching sequences in Chemistry, Mathematics and Language, aiming at the articulation of levels and the improvement of teaching practices, so they can give feedback to new training projects and update teaching and pedagogical innovation according to the regional needs.

Schneuwly and Dolz (2004) argue that an approach guided by the use of didactic sequences contributes effectively to the students' process of teaching and learning, as this perspective suggests the progressive development of various activities that collaborate to identify what is already known by the students, and what still needs to be internalized by them.

Discussion

Three key points can be highlighted, from the research's analysis:

First, the originality of the projects that promote the development of knowledge and favor the articulation between middle school and higher education through the development, implementation and evaluation of didactic sequences aiming to improve educational quality should be highlighted.

The didactic sequences promote the involvement of students in order for them to establish relationships between the content taught in the classroom and their daily lives. Active participation of students during activities is essential and the teacher should stimulate and encourage such participation.

From a constructivist perspective, it is not expected that, through the implementation of didactic sequences or other methodologies, students discover new knowledge. The main function is, with the help of the teacher and from the assumptions and prior knowledge, to broaden the students' knowledge about natural phenomena and make it relate to their way of seeing the world.

Cognitive activities and the development of the student's potential for life in society are strengthened when we understand the didactic sequences as dynamic and interactive strategies that emphasize negotiation of meanings of knowledge, favoring the construction of knowledge from real or created contexts.

Another point, maybe the most important one, both from the scientific and the academic point of view is the amount of publications resulting of the projects, mainly printed material, i.e. two books "*Química, Lengua y Matemática: Secuencias de Enseñanza para La Articulación de Niveles*". 2010. Ediciones UNL, Santa Fé, Argentina. ISBN: 978-987-657-470-9. Compiladores: Odetti, H.; Pacífico A. (PICTO) and "*Actividades para la enseñanza en el aula de ciencias: fundamentos y planificación*". 2007. Ediciones UNL, Santa Fé, Argentina. ISBN: 978-987-508-888-7. Editor: José Manuel Domínguez-Castiñeiras (AECID), directed to teachers, in which several didactic sequences are described as dealing with various contents in order to contribute to the improvement of the teaching-learning process. Considering what teachers say about the lack of training and lack

of teaching/learning materials to support the moment of planning their lessons, this production is expected for and desired by teachers, who take it as a reference to make their lessons more interesting, motivating and arousing the students' interest.

One last point, no less important than the previous ones is the possibility to promote concrete actions and articulation in levels, through the construction of spaces for meetings and exchanges of experiences between researchers and teachers from different educational levels to identify and select factors that facilitate or prevent that the results in educational research may be transferred to their teaching practices.

Therefore, the analyzed research projects that are being developed by the UNL, provide conditions in the classroom so that students can "do", that is, solve problems and reflect on the produced knowledge thereby establishing significance and meaning for their everyday life.

Thus, one way to promote a better and clearer understanding of content by students in science classes is through their signification and the significance of knowledge. According to Nazari et al (2002), the use of more refined and diversified strategies contributes to renewing education and a more effective participation of the students, leading them to questioning and improving their knowledge.

Importance and Impacts of the Projects on Teaching Practice

The interviewed teachers have between 14 to 29 years of experience in teaching and participated and/or continue participating research/improvement projects offered by the UNL. They stated that the projects offered by the UNL were very significant for teacher training, so they continue implementing some actions taken by these projects.

The interviews revealed peculiar aspects of the teachers' trajectory. In the research projects the constructions/learning are differentiated and indicate the importance to their practice. As demonstrated by the statements:

"I had the opportunity to participate only in one project and I think that it was a very good experience that allowed me to join the institutions of non-university superior level and plan together; get to a respite, implement the proposal, etc."

I consider that the three mentioned projects have significant results for my continuing education intertwining academic knowledge with practice, academic knowledge with teacher practice."

"In PICTO project, the elected theme was Chemical Reactions and Stoichiometry, a research project that allowed us to improve the teaching of chemistry. Also to interact with teachers from different secondary schools".

"I am a teacher of mathematics and as such I participated in the development of a teaching sequence for the area centred on solving math problems with the theme: polynomial function of the second degree, to implement in middle school courses".

"Since I do not work in secondary level, I accompanied a colleague to the course, where I implemented the proposal observing and recording the lessons of the classroom".

Regarding the impacts of the projects and their importance to teaching practice, the reports demonstrate teachers' satisfaction to participate in the projects and state that these contributed to their professional development. Especially considering the projects that worked with development, implementation and evaluation of didactic sequences, for this type of education is very interesting, it promotes reflection, practice and educational research. As noted in the reports:

"Working through sequences allows us to carry out an educational research and improve teaching practice".

"Participation in the project impacted on my teaching practice while strengthening strategies of a teaching sequence's elaboration and the preparation and writing of the conclusions."

"The impact was positive. We started from the base to generate concrete research proposals that allowed reflection on teaching practices as well as modification of those who needed to be

readjusted generating categorical instruments for such a goal. This process is interesting as a continuous working mode for all educators."

According to Garcia (1999), professional development must go beyond the conception of mastering techniques and knowledge required for the activity of teaching. Perhaps the most important change is rooted in the replacement of the idea of teaching as applied science by teaching as a practice and a deliberate activity, with a clear ethical and political component.

Conforming to Selles and Ferreira (2005), the teachers demand spaces for discussion of their practice, even if they do not often how to characterize it. Professional development lies in complexity; it goes beyond the field of acquisitions and pedagogical renewal.

As for the changes in the teaching-learning process, the teachers report that major changes have occurred in the use of new methodologies and approaches of the content.

The importance of using methodologies/strategies/teaching resources is unquestionable and should occupy a central place in the teaching-learning process. Motivational strategies can be considered those fleeing traditional procedures (lecture, reading and discussion of texts, questionnaires, etc.) and classroom routine, highlighting among them didactic sequences, aiming to motivate and arouse students' interest in scientific knowledge.

"(...) I believe that the experience goes through teaching practice at any level of education. The thematic sequence, polynomial functions of the second degree, is not content that I develop in my chair, but I develop other content such as linear functions, I can say that I have changed the way I approach them with the development of the teaching sequence."

"Participation in the project allowed me to reaffirm that this type of work should be permanent in the task of every educator."

In this sense, the use of didactic sequences, the involvement and active participation of students during activities are essential and the teacher should establish relationships between the content taught in the classroom and their everyday life, which enriches teaching practice and learning.

According to Castiñeiras (2007) the planning and development of didactic sequences consist of five stages: 1. Determination of the content; 2. Determination of the learning problem; 3. Selection of objectives and strategies; 4. Sequence of the activities; and 5. Assessment instruments.

Moreover, when proposing the implementation of a sequence, the purposes must always be presented in a clear manner in order to create conditions for greater interaction between teachers and students, collaborating to overcome difficulties that may arise during the activities.

One should also focus on the work in pairs or small groups, so that together, students can collaborate for mutual construction of knowledge, preparing instruments to record and synthesize, so as to, posteriorly, assess the changes produced in learning.

The results show that despite the importance and size of the projects, teachers are still struggling to implement the proposals in the day-to-day of the school:

"The difficulties are that there are no institutional spaces to develop in a systematic way such projects."

"My experience of implementing the activities of the proposed project was as observant teacher, through participant observation, in the third year of a technical high school of the city, and I found as difficulty the deficiency that students experience working with this methodology of sequences and troubleshooting wherein each one or each group can advance at their own pace. Regarding the teachers, it appears as a problem to accompany all groups at once."

According to Marcelo (2009), in order that the teacher should continue to give appropriate answers to the students' right to learn, we must make a greater effort to continue learning, which requires an increased effort of the teachers in confidence, commitment and motivation.

The challenges and demands on the teacher's performance, in this case, are large, and it is necessary to discuss with the students the sequence and the definition of the problem and how to relate content to their day-to-day life.

It is consequently of paramount importance that the teacher should encourage the emergence of situations where the students get investigated or challenged to participate in the teaching-learning process, and therefore it is necessary to use the various teaching resources, tools and strategies for their learning (Brazil, 1999).

Finally, respondents suggested new development projects in collaboration with the UNL, such as the following:

“New trainings in joint projects Middle School/University in the area of chemistry and physics.”

“Updates and capacitation for the implementation of the new Information and Communication Technologies (ICT)”.

“That they continue opening the doors to teachers of middle schools and Teacher Training Institutes, since they generate very rich experiences for everyone.”

“To continue developing in a joint manner (and in a sustained and systematic way) this type of projects.” (...)

The development of improvement/research projects is of paramount importance for the improvement of vocational training and consequently the quality of the teaching-learning process. Such projects are based on the daily work of the educators, favoring the perception of the everyday life of this practice, diversifying the readings and the perspectives, promoting processes of awareness and educational change. However, it is noteworthy that the training group, through projects, is not the only way to awake awareness in the educator, but is a means for this to occur in a systematic way.

Conclusions

In front of the results obtained by the analysis of the research projects and the interviews with their participants, we can say that the UNL, along with the group of teachers-researchers, is fulfilling its social role, regarding educational, scientific and technological development. Nevertheless, universities, not only in Argentina, but especially in Latin American countries are being affected by the economic, social and political development, which has required universities to change and created the need to fit in a new context imposed by this reality.

In general, the positive impacts and the contribution of the UNL through investigative projects in education were analysed. The results indicate the production of knowledge and improved practice of science education and consequently its learning. The projects enabled the creation of a printed and digital material, as well as a vast scientific production, publications of books, articles in refereed journals and presentation at conferences. However, it is necessary to advance beyond emergency, methodological and content actions, proposing projects that go beyond the scientific and technological training, but also aimed at citizenship education, attentive to diversity, respect and individual needs.

Thus, reflecting and evaluating the performance of the university for at least the last 10 years, demonstrates the commitment with social and educational issues and the need to continue designing investigative actions in favor of improving education in Argentina. This should happen through partnerships at all levels and areas of knowledge, such as the partnership with the State university of Southwest Bahia (UESB), in Brazil, through the International Cooperation Programme - CAPES (Brazil) and SPU (Argentina), aimed at resignifying science and mathematics education in the involved countries, by believing in the influence and interference of science and technology in social and educational problems.

It is noteworthy that the results presented here, as the title indicates, are the viewpoint of a Brazilian, it is a possible interpretation, based on the analysis of the projects and interviews with teachers who participated in the projects, who, however, could not all be located, because of the passage of time and events. So it is the result of my stance and my analysis. It is a possible way of reading the situation experienced by teachers and researchers from the UNL.

Acknowledgements

The authors thank CAPES and SPU for their support and funding the project 038/2011.

References

- Brasil (1997). Secretaria da Educação Fundamental. *Parâmetros Curriculares Nacionais: Ciências Naturais*. Brasília: MEC/SEF.
- Brasil (1998). Secretaria da Educação Fundamental. *Parâmetros Curriculares Nacionais: Introdução*. Brasília: MEC/SEF
- Brasil (1999). Secretaria de Educação Média e Tecnológica. *Parâmetros Curriculares Nacionais: Ensino Médio*. Brasília: MEC/SEF.
- Castiñeiras, José M. D. (Editor). (2007). *Actividades para la enseñanza en el aula de ciencias: fundamentos y planificación*. Santa Fe, Argentina: Ediciones UNL.
- Fourez, G. (1997). *Alfabetización científica y tecnológica: acerca de las finalidades de la enseñanza de las ciencias*. Buenos Aeres: Ediciones Colihue
- García, C. M. (1999). *Formação de Professores*. Porto-Portugal: Editora Porto.
- Hernández, F., & Ventura, M. (1998). *A Organização do Currículo por Projetos de Trabalho: o Conhecimento é um Caleidoscópio*. Porto Alegre, RS: Artmed.
- Lüdke, M., & André, M. (1996). *Pesquisa em educação: abordagens qualitativas*. São Paulo: EPU.
- Marcelo, C. (2009). Desenvolvimento Profissional Docente: passado e futuro. *Revista de ciências da educação*, n. 8. Disponível em: <http://sisifo.fpce.ul.pt/?r=21&p=7>. Acesso em: 15 de Junho de 2013.
- Nazari, E. M., Dias, P. F., Muller, Y. M. R., Fantin, S. B., Eger, F. (2002). Embriologia humana: do ensino formal à extensão universitária. *Coletâneas do 8º encontro perspectivas do ensino de biologia*. São Paulo: Feusp/Edusp.
- Schneuwly, B., & Dolz, J. (2004). *Gêneros orais e escritos na escola*. Campinas: Mercado de Letras.
- Selles, S. E., & Ferreira, M. S. (2005). Disciplina escolar Biologia: entre a retórica unificadora e as questões sociais. In: *Ensino de Biologia: conhecimentos e valores em disputa*. Rio de Janeiro: EDUFF, 50-62.
- Ward, H. (Org.) (2010). *O ensino de ciências*. Porto Alegre: Artmed
- Zabala, A. (1998). *A prática Educativa: como ensinar*. Porto Alegre: Artmed.

*Advised by Laima Railienė,
University of Siauiai, Lithuania*

Received: February 20, 2014

Accepted: October 21, 2014

Ana Cristina Santos Duarte

PhD., Professor, State University of Southwest Bahia, Av. José Moreira Sobrinho S/N. Jequiezinho, Jequié, Brasil.
E-mail: tinaduarte2@gmail.com

Héctor Santiago Odetti

PhD., Professor, National University of the Littoral, Bv Pellegrini 2750, 3000 Santa Fe, Argentina.
E-mail: hodetti@fbc.unl.edu.ar
