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**GEOGEBRA AND ITS IMPORTANCE IN THE ACADEMIC
EDUCATION OF THE MATHEMATIC TEACHERS – AN
EXPERIENCE REPORT**

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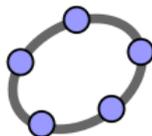
ABSTRACT

In view of the relevance of technology on the basic school, as a way to reduce the difficulties that permeate the school environment regarding the math teaching and learning, we reported, the experience of the utilization of the GeoGebra software, as a didactic resource, in the formation of the math students from the Federal University of Pernambuco (CAA) in the elapse of the discipline Geometric Design. GeoGebra was as a facilitator and motivator element in the geometric constructions of the cited discipline, taking us to realize that is insertion in the initial formation has an important role, to be a tool that promotes the teaching, increases the learning, in the process of knowing to the construction of knowledge.

Keywords: GeoGebra. Formation of the math teacher. Geogebra.

INTRODUCTION

Due to the challenges of the contemporary society which we are situated, it became evident the need which the teaching and the learning should have an intense relationship with different technologies targeted to the development support in activities that promote the knowledge. In this sense the teachers act as motivating agents of learning, identifying and using the available resources to rethink and improve the process of Mathematic teaching



which is present in the basic education. In this perspective the GeoGebra software is necessary as a tool that enables a significant learning, in the process of knowing to the construction of the knowledge.

In this current work, we had the goal to exhibit the need of the presence of educational software in the formation of math teachers with an element that enable the teacher who is taking the course to obtain skills, knowledge, dialoguing about the technologies of the daily in a classroom, producing, testing and evaluating possible results of teaching activities during their formation with the intention to promote a dynamic learning, critic and meaningful.

Aware that it is in the graduation that this professional in education is formed as a teacher, appropriating of the math knowledge proposed by the résumé of the higher education so that from these information the professional can product his/her own knowledge during his/her academic formation and current profession.

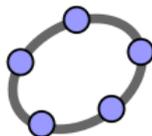
By this software we can visualize geometrically, and determine algebraically the formulas and definition, sharing the same ideal Gomes e Carvalho (2006) showed the need of the school for educators who allow their students to imagine and concretize their knowledge in math.

Nowadays; the school needs interchangeable professionals who match imagination and action; they must be apt to search for new information, know how to work with new resources and interpret all the information through the Medias, while that; the teacher must work in the classroom together with his/her students to interpret data, relate and contextualize them, assuming a role of someone who makes things easier. (GOMES; CARVALHO, 2006, p.2).

In view of the technology relevance in the basic education, aiming to eliminate the difficulties that permeate the school environment about teaching and learning math, due to the great utilization of abstractions and formal aspects which are immersed in a significantly part of the Math experienced in the basic and high schools.

Collaborating with this Idea, Miskulin, Amorim e Silva (2005), clear the importance of knowledge of new technologies to someone's formation.

Education might provide a full and complete formation of the person, forming critical individuals, conscious and free, allowing them the contact with new technologies so they cannot lose the dimension of the



technological development which goes around the country. (MISKULIN; AMORIM; SILVA, 2005, p.74).

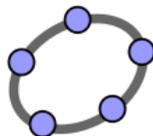
We believe that to acquire abilities and develop competences it is necessary to understand that the technology and the computer must be used in an appropriate way, defining and dominating the objects of the activities that are proposed, understanding the advantages in the use of the GeoGebra software covering in a systematic way an evaluation of its applicability; which enables the student to show what he/she really obtained success in the proposed activities and constructed a reflection to beyond of the worked content.

METHODOLOGICAL PROCEDURE

The obligatory curriculum component, Geometric Design, we work during the school semester with the following contents: geometric morphology and scales, straight lines, construction of perpendicular and parallel straight lines, segments and divisions of segments, traced angles and transportation of angles, operations with angles, construction of triangles, medians, bisector and height, constructions of tetragons, constructive segments, proportions and similarities, circumferences: basic constructions, angles inscribed in the circle and polygons, construction of equivalent figure and conics.

This programmatic content was divided into two specific moments. The first which we recognized the definitions and the concepts, besides we performed the geometric constructions with drawing tools (protractor, squares, ruler and compass) in an individually way. Already, in the second moment, we divided into groups and we prepared seminar which there were a selected theme among the ones already worked and each group prepared and presented a “class-seminar”, which had the goal to stimulate a class with a given exposed content and had the experience by GeoGebra.

In the systematization and elaboration of this seminar we had the orientation of the discipline teacher and we supported each other in the education theoretical. This way we discussed the relations among Education, Math Teaching, Meaningful Learning, the presence of computers in the school environment and mainly; which applications in learning and how to evaluate the development of the elaborated activities by the students.



The current work made itself by the dialogue we performed com GeoGebra in its version GeoGebra-Windows-Installer-4-2-51-0, to be dynamic software of geometry, it is easy to purchase and free which enables in special the future math teacher to innovate the teaching, motivate the learning, enabling the construction of the knowledge in a simple and dynamic way.

REPORT OF THE PRACTICES WITH GEOGEBRA BY LICENTIATES IN MATH

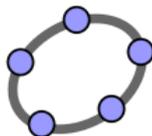
We are licentiates of the Mathematic-Graduation Course from the Federal University of Pernambuco of the Academic Campus of the Dry Region. Now we are in the 4th year in a class with 17 university students, we are having the experience of a discussion about the Euclidean Geometry and in the already mentioned curricular component.

About the documents that orientate the Basic Education in Brazil, the National Curricular Parameters (NCP), in special the directed to the curricular component Mathematics, they contemplate the importance of technology with resources to leaning:

About the educational software is essential that the teacher may learn to choose it in function of the goals which intend to achieve and their own conception of knowledge and learning, distinguishing the ones that lend themselves to a more directed work to test knowledge from the ones that want to make the students interact with the program in a way to construct the knowledge. The computer might be used as a support element to the teaching (database; visual elements), but also as a source of learning and as a tool to the abilities development. The work with the computer might teach the students to learn with their own mistakes and learn with their colleagues, changing their productions and comparing them. (BRASIL, 1998, p. 35).

This way, we considered the experience unique in our formation as future math teachers, because it has provided us knowledge about the referred software.

In particular the “class-seminar” of my group had as a theme, inscribed angles in the circumference and in polygons. We started our presentation with a quickly GeoGebra story and the recognition of the use of its tools and our classmates with their computers on observing and verifying what we were speaking about the software. In this perspective, Petla e Rolkowski (2008) say about the importance of the computer domain and the several softwares in the formation of the teacher and in the curricular activities.



The teacher needs to receive formation to assume the facilitator role of this construction of knowledge and stop being the “deliverer” of the information to the learner. That means to be graduated as in the computational aspect, the domain of the computer and the different software, as in the integration aspect of the computer and in the curricular activities. (PETLA; ROLKOWSKI, 2008, p. 17).

During the referred constructions we provoked their descriptions of what was a central and inscribed angle, what was the relation that there was between both of them and why this relation did not work in regular polygons, verifying that when we change the position of the points which are the vertices of the angles, the relation among them does not change. To be a dynamic geometry software; it allows us to verify the already mentioned relations. This way we performed a didactic sequence:

1^a) Exhibit previous concepts:

Ângulos inscritos na circunferência

- **Ângulo central:** É o ângulo que tem o vértice no centro da circunferência.
- **Ângulo inscrito:** É o ângulo que tem o vértice na circunferência e os lados são secantes a ela.

• **A medida do ângulo inscrito:** um ângulo inscrito é a metade do ângulo central correspondente.

$$\alpha = \beta / 2$$

ou seja

$$2.\alpha = \beta$$

Ângulos inscritos nos polígonos

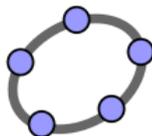
- A soma dos ângulos internos de um polígono

$$S1 = (n - 2) \cdot 180^\circ$$

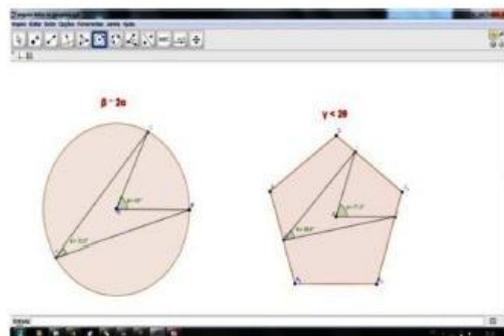
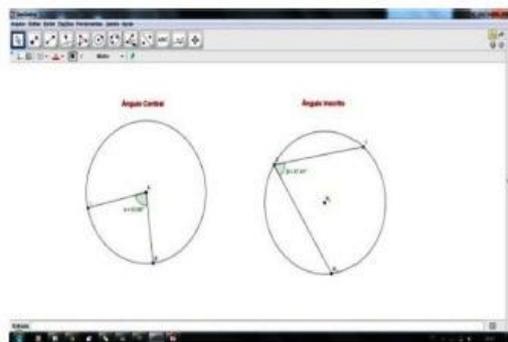
O Geogebra é um software de matemática, dinâmico, foi criado pelo professor Dr. Markus Hohenwarter da Fkfd, Atlantic University, em 2001, que reúne recursos de geometria, álgebra e cálculo. É gratuito, escrito na linguagem JAVA e disponível em rede para download na seguinte endereço: <http://www.geogebra.org/cms.br>.

É compatível com diferentes sistemas operacionais. O trabalho neste software é simples e fácil, e por isso pode ser usado tanto na educação básica como no ensino superior. Tais características, fizeram do Geogebra um software premiado internacionalmente. Como por exemplo o Prêmio Internacional de Software Livre na categoria de Educação.

Because of the provocations about what can be conjectured in front of the developed activities.



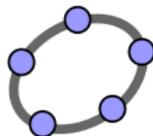
2^a) We worked with constructions with GeoGebra:



To comprehend all the dynamic that permeates the GeoGebra tools in activities that approach a given Math of the Basic Education content in a way that the traced goals can be reached, that the content be well developed, that the learning be the protagonist of the proposed teaching by the easiness that GeoGebra presents.

This way, we thought over the importance of this experienced moment this experience in our initial formation, allowing us to talk about its wide utility in the Basic Education, as the use of computers in the classroom, the importance of software as GeoGebra and the technologies as a whole immersed into the school environment; allowing a teaching to develop of the human being, while an active and changing individual of his/her own reality; improving the teaching; enriching the learning.

In this sense; the math teacher needs to experience in his/her initial formation the math of the basic school by means of the educational software, it is in this moment that the teacher is really important in the orientation about the theorists of the math education and in the already mentioned official documents, about the different aspects of the teaching and learning process; focusing to orientate and improve the educational practice of the university student in math, allowing them to discuss, elaborate, evaluate, make mistakes and elaborate again from the directions of the teacher during his/her initial formation.



FINAL CONSIDERATIONS

Therefore, we defend that GeoGebra allows a meaningful learning, it facilitates a lot of contents of the Basic and Higher Education of Mathematics, in special the Euclidian GeoGebra, Algebra and Calculus. We affirm that in the initial formation of the math teacher it is necessary that this one acquires abilities with the available technology to consider the educational software; as GeoGebra, a didactic and relevant resource in the classroom, to improve the teaching and allow the learning of the content in a playfully, creative and motivating way.

REFERENCES

BRASIL. Secretaria de Educação Fundamental. **Parâmetros Curriculares Nacionais (PCNs): matemática**. Brasília: Secretaria de Educação Fundamental, 1998.142p.

GOMES, Geraldo de Castro, CARVALHO, Marlene Araújo de. **Formação de Professores e novas tecnologias**. Disponível em: <http://ww.ufpi.edu.br/subsiteFiles/ppged/arquivos/.../GT17_2006_05.PDF>. Acesso em: 10 set. 2013.

HOHENWARTER, Markus; HOHENWARTER, Judith. **Ajuda GeoGebra manual oficial da versão 3.2**. [S.l.: s.n.], 2009.

MISKULIN, Rosana Giaretta Sguerra; AMORIM, Joni de Almeida; SILVA, Mariana da Rocha Corrêa. In: _____. **As possibilidades pedagógicas do ambiente computacional**. [S.l.: s.n.], [2000?].

PETLA, Relelino José; ROLKOWSKI, Emerson. **Geogebra – Possibilidades para o ensino de matemática**. Natal: UFRN, 2008.

TELEDUC na exploração, na disseminação e na representação de conceitos matemáticos. In: BARBOSA, Rommel Melgaço (Org.). **Ambiente virtuais de aprendizagem**. Porto Alegre: Artmed, 2005.184p.