EXPERIENCE WITH THE DISCUSSION OF GAMES IN A SUBJECT OF THE ONLINE MATHEMATICS DEGREE COURSE.

João Pessoa/PB – 2011,May

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Educational Area – University Education

Classification of Research Areas in EaD – Theories and Models

Planning Models Nature

Innovative Experience Class

Abstract

This work deals with the experience of teaching the subject Special Topics in Mathematics III (STM III), in the 6º term of the Online Mathematics Degree Course. It was elaborated for the discipline a set of activities involving the use of mathematical games as a methodological strategy. First we cite the theoretical content discussed highlighting the importance of games based on studies and researches of authors such as Emerique (1999), Kishimoto (1988), Rêgo & Rêgo (2009), besides the guidance of National Curricular Parameters for the Mathematics Fundamental Teaching (NCP). Then we cite the development of the discipline by the students and the analyses of the facilities and difficulties found along the course. With this purpose we try to contribute with the formation of teachers in the Online Mathematics Degree Course showing the feasibility of the discussion about the use of teaching games as a methodological strategy for the Mathematics teaching.

Key words: Mathematics Degree Course; Teachers formation; Online Education; Mathematical games.

Introduction

The necessity of widely socialize, with quality, the basic knowledge in Mathematics is one of the greatest challenges of our educational system due to problems which are frequently exposed, in particular, by the Brazilian Basic Education Evaluation System (BEES). The traditional teaching still predominant in our classrooms allows the success of only a minority of students excluding the rest of them if we consider as a reference

the conclusion of the Secondary Course or the entrance in the Graduate Course.

Due to our new requests of students' formation in the Basic Education it is necessary the introduction of teaching approaches in which they learn Mathematics so that they will use it properly in the several situations they will face, both the ones that have to do with the Mathematics itself and the others that have to do with other knowledge areas.

Among the several methodological ways studied on the mathematics teaching we could cite the use of games. Many didactic books dedicated to the Fundamental Teaching bring, today, suggestions of games to develop mathematical concepts in the classroom. However, there is still much polemic about their use as methodological strategy due to their linkage with playing and the teaching as a serious activity and some teachers don't feel confident enough to use them because they are afraid of losing the control of a group of pupils or the critics by some of the coworkers and/or parents.

Independent of the polemic about the use of games and about its importance in the classroom, we believe that this strategy must be part of the methodological repertoire of each mathematics teacher. This way it was incorporated to the UFPB Virtual Online Mathematics Degree Course, in the extent of the subject Special Topics in Mathematics III (STM III), the discussion about the use of teaching games as methodological strategy for the Mathematics teaching.

Along this study, the strategy of games requires the use of several didactic materials being many of them manipulative. In most of the degree courses this discussion is treated in the extent of Math Labs where the teacher and the students handle the games together. In a virtual subject it must be verified how to approach these games as manipulative materials. Many of these games have already been computerized. However, the professional reality of such students in schools will be with low budget manipulative materials. During the discussion of games strategy in an Online Mathematics Degree Course we face some questions: how to work the use of games as manipulative material in a virtual subject? What problems will come up due to the use of games and manipulative material in an online subject?

Theoretical Referential

Online Education

Today much is discussed about the introduction of new technologies in the teaching/learning process. Using these technological tools one of the areas with the biggest development is the Online Education. According to

Moran the 'Online education is the teaching/learning process, mediated by technologies, in which teachers and students are separated by space and/or by time'. When we mention online education we are referring to this process of interaction between student and teachers who are apart. So, Online Education is that which, even possessing some present moments, happens mainly with online moments.

The online courses have faced a great evolution, from the courses by mail, for example, the ones offered by the Instituto Universal to the use of radio and afterwards the TV. In the 1990's, with the internet massification, the number of online courses which use this environment increased. The courses in the internet environment are also called virtual courses. Firstly used in trainings and corporative courses they have also been used for the regular education, today there are several degree virtual courses, specialization and even master degree courses.

In the virtual education much emphasis is given to the necessity and improvement of the interaction between students and teachers who are apart both physically and by time. Actually this must be the concern of any educational process both in presence-based and online courses.

With the virtual education the concept of communication in the classroom with the establishment of varied and creative tools which make this connection student/teacher and student/student in an appropriate way has changed. The objective of these tools is not only to compensate the lack of presence-based contact. It could go beyond bringing extra benefits which wouldn't exist due to limitations that could be imposed by the presence-based contact. For instance, doubts raised by a student in the classroom which were answered by the teacher, could not be fully understood by the other students who were simply hearing the discussion. When this doubt is raised and the answer is written in a virtual forum, all the students can verify it more deeply and even interact with the discussion.

Games and manipulative materials

Although much have been discussed about the use of games in the teaching process, due to a major comprehension that we have today about the theoretical justification for that, such practice has been defended along the centuries since the ancient times by several studious and researchers, Platos, for example, highlighted in his studies the importance of learning while playing.

In the text, the toy in education, historical considerations, Kishimoto states that with the advent of Christianism the games were separated from the teaching/learning process and only recovered their place during the Renaissance being exploited in the XVII century and becoming popular in the next century.

> The beginning of the XIX century faces the end of the French Revolution and the appearing of pedagogical innovations. The schools try hard to put into practice ROUSSEAU, PESTALOZZI and FROEBEL'S principles. ROUSSEAU for example already points two facets in toys: the object and the action of playing. The first doesn't deserve attention, since he considers the senses a knowledge source not always faithful. It is the subject's action, the relation established by intelligence, that he considers to be relevant to the children development. PESTALOZZI follows the master and try to study the child mental action, researching the necessary intuitions to the establishment of relations. But it is with FROEBEL that the game, understood as object and the act of playing becomes part of the pre-school education (KISHIMOTO, 1995, p. 42)

Although the constant and growing references about the use of games in the teaching process, this is a practice a little spread and accepted in our classrooms yet. The teacher who wants to implement the use of games in the classroom with the purpose of making the Mathematics learning process more pleasurable and efficient must be confident regarding to the methodology to be introduced, the theoretical fundaments, the reach and limitations. The teachers must analyze their students and the school specific situation, discuss with their coworkers, they must promote initially extra-curriculum events such as expositions and workshops which show the school community the potentiality of didactic-methodological modifications which could be adopted in classrooms.

In a general way the activities with games and concrete materials are dedicated not only to the development of specific contents in Mathematics but also to abilities which will enrich the student's general formation, enabling them to improve their language and promote the communication of mathematical ideas; develop or understand strategies of problems resolution; stimulate the production of new games or modifications of rules in games already known; promote the exchange of ideas and the student's formation to act in collaborative activities.

But, as every pedagogical resource, the use of concrete material in classroom demands certain basic cares by the teacher. It is due do the teachers to conduct the learning process choosing the activities from their students' knowledge and the previously defined didactic objectives.

Methodological procedures

The experience was adopted in the 2010.1 term in the extent of the UFPB Virtual Online Mathematics Degree Course in the subject Special Topics in Mathematics III (STM III). This subject is taught in the 6th term of the course.

The material used by the students is a book specially produced for the UFPB Virtual Mathematics Degree Course in which one of the chapters refers to the subject STM III. In this chapter there are basically two Units which are about the use of games. One of the units proposes a more theoretical discussion regarding to the concepts of using games as a methodological strategy. The following unit is approaches the theme in a more practical way establishing the relation with the use of games in classrooms with the presentation of examples of games that can be adopted in a didactic way in the Basic School.

The activities applied in this term with discussion about the theme games happened in about eight weeks corresponding to Units 3 and 4 of the subject STM III. These activities had as objective of contextualizing the use of games. The 1st week had the objective of contextualizing the students about the use of games as didactic material. In the two following weeks the activities were showed to the students so that they could realize the importance of using the games and didactic material in the formation of Basic School pupils. In the 4th week the students tried to familiarize with didactic games which could be used in classrooms based on games proposed in the activities of the Moodle Platform. In the 5th week the students were deeper in the use of some games and did a research about games in some didactic books used in the Basic Education. In the 6th week the activities led the students to elaborate or adapt a game to be used in a Basic School classroom reflecting about the didactic sequence to use this game as a learning methodological strategy. The 7th and 8th weeks were dedicated to a presence-based evaluation and to the discussions due to the feedback of the evaluation for the students.

Activities results and analyzes.

At the beginning of the activities we tried to identify which experience the students had with the use of games in their basic formation (Elementary and Secondary Schools). It was asked then, that each student talked about that experience. Among the 39 students who answered the activity, 27 (69%) had never had contact with games in the Basic School, 10 (26%) had had some experience in the Elementary School, and 2 (5%) had had some experience in the Secondary School.

As it was expected, most of the students hadn't had contact with Mathematics games in the Elementary School. This reflex that there is a long way to be followed when the subject is to widen the use of this methodology and supports the approach of games in the Degree Course so that this gap won't be reproduced when these students become professionals.

This datum also indicates a complicated factor in the approach of games in the subject taught online since the students didn't have previous

experiences it may there be a bigger difficulty in manipulating these games. Such difficulty would also exist in a presence-based subject taught, though, in this case, we believe that the teacher could identify and mediate in a faster way.

In the 4th week one of the activities proposed was: the students should play the game 4 in the line that was available in the subject reference book. The steps were explained in the Moodle Platform. It was realized in this activity that students' most difficulties in playing correctly were due to the students hadn't understood the rules through reading the activity. At that moment there was mediation through doubts 'Virtual Forum' so that the difficulties in understanding the game rules could be solved and they could play the game the right way. There was also difficulty in making the game through the textual information only. At that moment we realized that a bigger audiovisual interaction could maximize the students' understanding. It was also realized that part of the difficulty came from the lack of contact from the students with manipulative materials leading to simple difficulties such as drawing using a ruler.

In the 5th week some activities were realized so that the students could research on didactic books, games used as didactic material and could also analyze the potentialities and limitations of such games in the use classroom. The first difficulty they found, especially in the countryside was the low source of books available for the research. This is a structural difficulty due to the pulverization of poles in many diversified places. On the mediation we tried to present several electronic addresses on the internet so that the students had access and the biggest number of games possible used in a didactic way.

In the 6th week, with the students' activity to elaborate or adapt games for a didactic sequence, we verified that most difficulties in the presentation of the results of this work were in the written part of the task only. Some of them had difficulty in explaining textually the instructions of making and the rules elaborated by them on the virtual platform. Some games should be designed what led to limitations due to the lack of familiarity with tools which allowed that drawing.

Final considerations

Working with the theme of games and manipulative materials for the teaching of Mathematics is a challenge, especially in the online education modality.

The first great difficulty faced both in the presence-based and the online education is that we have to break some students' paradigms. Most of these students didn't have any contact with games and manipulative materials as strategy for the teaching of mathematics in the basic

education, so the students find difficulties in making the games, comprehending the instructions and handling the materials. Another paradigm to be broken is the idea that a game is only for a moment of pleasure, for leisure, and they don't realize them as a curriculum integrant part, they don't get to establish a connection between the games and the improvement of mathematical concepts.

The strategy adopted was to put the students in contact with several games and manipulative materials always relating them with the classroom and with abilities and competences which could be developed through their use. However, in the online modality this strategy presents certain difficulty since the students should make the games they will use and the references are only written instructions. Many of the difficulties realized by the students came from the lack of practice of using manipulative materials.

With the purpose of minimizing these difficulties some presence-based workshops were carried out in which the students had the opportunity of using the games and other manipulative materials with the mediation of a teacher. These presence-based workshops allow the exploitation of games in a deeper way and with more diversity of examples. With this presence-based contact it is possible to realize including that many students answer the activities on the online platform without making and handling the games what brings a great damage to the subject objective. So, we can realize a better performance of the students in the activities carried out on the online platform after taking part in the presence-based workshops.

Another strategy that is being prepared is the use of videos with the making and using of some games. We expect that this audio-visual resource will be able to reach a great number of students since many of them cannot take part in presence-based workshops on the set up days, moreover, with this resource they can revise the instructions as many times as desired.

An alternative that is also being prepared is the structuring of math labs on the several teaching poles. This will allow the students to have access both to games already prepared and also to necessary material for them to make games.

Another point to be highlighted is the use of virtual games for the teaching of mathematics. Many of these games are suggested in the subject. However, it is important to highlight that on many places there is difficulty in the internet speed which limits the use of such resources. This limitation will also be in real in most of the classrooms where the students will be in their professional lives. This is a resource that must also be known by the students since there is a tendency in the advancement of digital inclusion in basic teaching schools.

With the improvement of Online Degree Courses it will be more and more important the discussion about the migration of subjects usually taught in specific labs for a virtual platform. So, with this work we tried to contribute with the discussion about the use of mathematics games and manipulative materials on a virtual platform, pointing their feasibility and indicating ways for their improvement.

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