CONSCIOUSNESS AND TEACHING OF FINANCIAL MATHEMATICS: AN EXPERIENCE BY USING OF DIGITAL INFORMATION AND COMMUNICATION TECHNOLOGIES


Faculdade de Pará de Minas - FAPAM (BRAZIL)

Abstract

It is reasonable to infer that the insertion of Digital Information and Communication Technologies (DICTs) can make the Financial Mathematics classes more interesting and enabling a more practical and contextualized approach of the contents. This paper aims at investigating the main contributions the technologies can play on the process of these content's teaching, since the teachers are bonded to boring classes instead of trying new experiences and discoverings. In order to reach such Purposes, an exploratory research featured by both qualitative and quantitative aspects was carried out in the period from February, 2016 up to May, 2017 with high school students from the city of Pará de Minas, state of Minas Gerais, Brazil. As a support to the main objective to comparative effects and become understandable how the reality of Financial Mathematics in Brazilian public schools is, quantitative questionnaires were also applied to the high school teachers to verify which methodologies are more used by them.

1 INTRODUCTION

The importance of the Digital Information and Communication Technologies (DICTs) is often discussed as a didactic resource in classroom, and, when analysing the ways to teach Mathematics, there is an attempt to find out the main contributions these technologies can play on the teaching process. In the case of Financial Mathematics, the technological resources are important on its application since they enable the students knowledge improvement on diversified subjects which involves this content everyday and in the environment where they are inserted, showing the reality more clearly. Concerning to this new educational context, where the DICTs are used as a teaching support, it is understood that “the fast way how the technological innovations has taken shape is, at present, a significant feature of our society” and the “dimensions of the technological innovation allow the exploitation and the advent of new alternative scenarios for the education and, specifically for the teaching and learning of Mathematics” [1].

Thus, this tools inserted at schools is a great support to students and teachers concerning to the new way of teaching and learning. Diversifying the classes of Financial Mathematics is one of the main ways for the teaching-learning process significantly, since the approach of new methodologies makes the content richer and becoming it more accessible.

Based on these perspective, the present study addresses the teaching of Financial Mathematics using electronic boards and their main contributions for the teaching of Mathematics and also the teacher’s training to deal with these tools, as well as its conceptions face to the technological innovations. Taking into consideration the current society where the students are inserted, it is essential to highlight the importance to be aware of overconsumption. On this issue, the Financial Education becomes the main ally at the school environment, highlighting the teacher’s role, who should approach transversal themes along the Financial Mathematics classes.

1.1 Digital Technologies for Financial Mathematics teaching

The Mathematics Education critically proposed enables the students to be able to establish critical judgments about decisive attitudes at the political and social field [2]. According to Ausubel, Novak and Hanesian’s theories, in order to have a significant learning it is needed to have some conditions as new materials powerfully significant to be related to the relevant ideas which the subject has already had. [3]
On these conditions set by the author, it is also pointed out that the student should express disposal significant for the learning. Thus it is necessary that the teacher uses teaching methods which can instigate the student to be more motivated and thoughtful, factors indispensable to learning.

Since both students and teachers are fully engaged to the technological world, the use of technology in the classroom can result in more attractive classes, and thus bringing the necessary conditions to a significant learning which at the end lies in attention and motivation.

These ideas are also supported by other authors, who state that: “The computer can enrich the learning environment in which the student interacts with other study instruments, participating actively of his/her knowledge construction, instead of receiving it as something possible to touch and store in memory” [4] and who believe that by the time the new technologies are being inserted in Mathematics teaching, the real students and teachers’ conception should be taken into consideration. [5].

It is clear that the educational context should be understood in an attempt to change the way of teaching by means of a diversified and innovative teaching which does cover not only theoretical based on didactic books classes but also practical activities.

1.2 Aspects about Financial Mathematics teaching at Brazilian basic education

The school is the main environment which allows to student develop abilities and conform to job market. It is important the student should be able to match Financial Mathematics contents learned within the school environment to everyday activities, which means how to apply the knowledge acquired at school to practice and social work, and it is necessary that the teacher properly chooses the didactic materials as well as the teaching methodologies to be worked with students.

The teaching material used by teachers have been modified over time aiming at properly meeting what is established by Brazil Ministry of Education (MEC). On the thematic bases enclosed on the Common Basic Curriculum (CBC), which covers the contents to be taught at the Brazilian regular teaching, several activities suggestions are shared to be applied in the classroom, and among them it can be highlighted those concerning to the Financial Mathematics where is addressed the favorable use of technologies and issues related to the students routine. On this document also proposes that the students draw up electronic boards. [6]

Still regarding to the teaching material for the Financial Mathematics, it can be highlighted that some books need a more social focus, since they still address the content cautiously, which means without creativity. According to the author it is clear that raises the necessity of a more favorable choice for the didactic book by the teachers [7].

Regarding to this issue, it is also pointed out the importance to use the didactic materials, justified by a qualitative research to investigate which materials can contribute to a better approach of the Financial Mathematics at schools. [8]

The didactic books have been the most used tool to teach in the classroom due to several factors, such as: lack of time, choice and new teaching methodologies. However, in some cases, the chosen book does not address a diversified content focusing only on formulas, mainly regarding to the Financial Mathematics [9].

Besides the teaching material, the teachers should also “enable the critic dialogue so that the teaching of the content applied to Financial Mathematics helps also on the building of thinking, active and critical citizenship, face to the social problems and the place they inhabit face to this society.” [10]

Addressing the teaching of the Financial Mathematics content and bearing in mind that most of the times this task it is not carried out in the students’ familiar environment, it is necessary that the school Mathematics can contribute to the Financial Mathematics thematic “founded in a contextualized approach based on problem solving from the student’s reality” [11].

At the familiar environment, it is important to highlight that the student is often influenced by the environment where he/she lives, however, not always this student will receive enough guidelines which can contribute to a awareness about his/her consumption and investment’s decisions consciously. Thus, “it is necessary lead the citizen understand that his/her conscious actions and attitudes concerning to money reflect the construction of a better society, what is also an educational need” [12].
1.3 Continuing Education: Search for new courses on technology field by Mathematics teachers

In Brazil, at the courses for teachers education there is not any Financial Mathematics discipline, and the contents regarding to this field are in the background. [2] [13]. Thus, as a result there is a great number of teachers unprepared to teach the Financial Mathematics at high school level, making the theme few explored in the classroom. The search for specialization courses becomes essential for the teacher work: “one of the first possibilities of changing at this professional education and in its subsequent performance in the classroom lies on the perception that we live in a globalized world” [14].

On this context, the globalization at the digital era enables an active teaching in which the student learning can take place by means of discovering having as its taks to interpret and understand the information to whom is applied. In this active teaching method, several situations should be proposed to the student being expected that he/she thinks and understands the information promoting ideas which will result in actions applied in some situations [2], thus, it is essential the teachers’ training to teach Financial Mathematics using the new methods.

This necessity to work in a diversified way has contributes to the student’s interest and one way to reach this is by means of DICTs. In order to classes scheduling using these tools, it is needed that the teacher is able to develop significant activities for the student, provide him different possibilities on the use of computer and other media, contributing to the knowledge construction [15].

In many cases, the computers are not used at school by the fact the teacher it is not able to use it for teaching. Taking into consideration this fact, it stated that the process of continuing education is needed so that the computers are inserted in the pedagogic practices of many teachers, since most schools have computer classroom and their teachers are supposed to used them [16].

The use of educational softwares to teach can provide a better learning, since the logical thinking, the interaction and the participation are present in this framework. Such aspects are considered remarkable for the knowledge construction and they emphasize that the Financial Mathematics can become an interesting content with innovative possibilities in the way it is taught [17].

In this context, the softwares of electronic boards “can be a technological resource in the educational scenerium which involves the teaching and learning process creatively that comes to make the understanding of some Mathematics contents easier and also become the contextualization more accessible” [18].

The challenge is motivate the teachers in using the technological resources available, and integrate them to the existing methodologies to Financial Mathematics teaching.

2 METHODOLOGY

Both qualitative and quantitative methods were contemplated on this paper and the research was exploratory in nature. The exploratory researches are based on studies which aim at providing greater familiarity with the problem, in order to make it more explicit or build hypothesis. This sort of research aims at the ideas improvement or the discovering of intuitions. [19]. The research techniques used to produce this work envolve a bibliographic survey, questionnaires applied to subjects who had practical experiences with the researched problem and analysis of exemplos which encourage the understanding.

This work development was divided into four steps: first of all, a bibliografic survey, was carried out about the Financial Mathematics teaching and teachers education. Following that, a quantitative research was carried out with the high school Mathematics teachers from a Brazilian city of the state of Minas Gerais. At the two last steps, a theoretical class using the traditional resources and a practical class in which technological tools were use such as: computers, multimedia projector and electronic board softwares, were taught at the school chosen to be the project’s contributor.

During the classes, it was possible observe, Interact and verify the learning and receptivity of the content by students, as well as the differences analyzed at teaching with the aid of DICTs. The results of these processes are shown hereinafter.
3 RESULTS

In this chapter, the data obtained during the research will be introduced. First of all, the data about how the teachers act concerning to the Financial Mathematics content; after that, the data about how the students react to the use of the DICTs at the content application.

3.1 Analysis of the use of DICTs at schools and by teachers during the Financial Mathematics content application

At first, the high school Mathematics teachers’ profile from the Brazilian city of Pará de Minas, state of Minas Gerais was analyzed. This investigation aimed at discovering how the teachers acted during the high school Financial Mathematics classes. Out of a total of 36 professionals, 18 responded the questionnaire, which has already shown a low collaboration with the researchers.

The results have shown that most of teachers is female and more than half is over 40 years old and work as Mathematics teachers since 10 years. About 75% of them are graduated at Mathematics, 29% are specialists, and 35% has concluded their master’s degree.

Regarding to the use of technologies, most of them has stated that they had classes in their graduation where technology was addressed and, after graduated they looking for courses about the subject.

Concerning to the infrastructure and availability of the computer’s laboratories at schools, 53% has stated that they were available for the classes in the schools where they work. However, 18% has stated that this resource does not exist or it is not available, and the other 12% does not know whether there is the resource in their schools.

It was noticed that the use of DICTs by teachers happens more at the classes’ preparation than at their application to the students. About 65% uses the tool at the application of Financial Mathematics contents, whereas 94% uses it to prepare themselves.

Among them who use the DICTs for teaching, about 70% has stated that they calculator in their classes of Financial Mathematics and 52% has stated that they use computers and internet and only 18% has stated the use of smartphones.

3.2 Results of the theoretical and practical classes at Financial Mathematics Teaching

Analyzing the questionnaires responded by the students concerning to the theoretical and practical classes, it was noticed a great satisfaction with the application of the technological resources at the Financial Mathematics teaching. It highlights that a fair part of these students involved at the research has considered the computer as a didactic tool favorable at Mathematics teaching-learning.

The information below were built by means of analysis of the information referred to the questionnaire applied at the end of both classes taught: the first theoretical (traditional) and the second one practical (at the computer’s laboratory, using Datashow, computers and electronic boards), in both classes at the same day.

In general, it was noticed the increase of the students’ satisfaction rate at the practical class concerning to the theoretical class. Issues like proportion among concepts, practical exemples and exercises, resources used, depth and development of the themes concerning to the aims, quality of didactic resources, provided immersion, level of motivation created, content introduced concerning to the available time, had an increase about 6%.

The speed of the discipline content exposure and amount of new information had an increase of 15% each one, concerning the practical class to the theoretical one. About the resources used (DICTs), the increase was 13%. According to one of the researchers “The students got exciting with what the electronic boards can propose to our life and how is much more interesting work with them instead of making the calculations in a sheet of paper and taking notes item by item running the risk to make a mistakes at the calculations”.

Taking into consideration the data obtained, it still necessary to consider the taught content applicability. At the theoretical class, the new knowledge and/or abilities produced have shown an index of 81%, instead of at the practical class, the index was 93%. This index reveals that the content
approach and the new teaching methodologies promote the students development and the perception contextualized of the content.

In issues intended to learning, the student monitoring concerning to the classes and the monitoring concerning to the content introduced, there was a decrease of 9% from the practical class to the theoretical one, whereas in the issues about new knowledge and/or abilities generating there was an increase of 12%.

This decrease justify itself by the fact that great part of the students do not have knowledge concerning to the electronic board, making it necessary some intervention by the researchers in order to teach basic concepts on their use. This intervention has caused on students the feeling that new knowledge and abilities were acquired.

The students have classified the theoretical classes as important to store the content: “This class reminded me and made me learn even more about this subject. We had an excellent explanation by the teachers and everyone helping us we had a great output for the exercises resolution when the doubts appeared” and they also classified as positive the practical classes, reporting that the use of DICTs are new resources for the learning.

4 CONCLUSIONS

The school plays the role of providing the society’s needs, however the growing use of technologies in the everyday activities requires the increasingly presence of computers at the school learning. Outside school teachers and students always use their electronic devices, however, these devices are forbidden in the classroom, act which needs to be thought.

The Financial Mathematics teaching, by means of the technological resources as the electronic boards, allow us to work different Mathematics content with the curricula aspects, promoting new knowledge to the students which subsequently can be used in Accounting, Economic, Administration field or on their own financial life.

From the analyses it was possible to determine that it is necessary that the students have some basic knowledge about electronic boards before the practical class concerning to the content studied in the classroom is applied. It is important to mention here the teacher’s preparation about basic knowledge related to this tool to work with the students as well as instruct them during the activities developed in the computer laboratory.

Even the importance to use new technologies is recognized, few are the teachers who search for applying such necessity, either because they have never learnt about it at their school curriculum or because they do not use resources which exemplify and contextualized the students’ reality, promoting a lack when carrying out the Financial Mathematics to the students, affecting the education of critical and active individuals on the personal, politics and economic decisions.

By means of the results obtained, it is clear that the use of the DICTs becomes favorable at the school environment. Teaching some content in a diversified and innovative way can enrich the themes studies in the classroom. It is necessary highlight that, even the technological resources contribute positively at the Financial Mathematics teaching, it is still necessary to address the contents by means of a theoretical and negotiated class, and thus, provide a support for a significant class which explores the use of available resources.

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REFERENCES


