



***Multimedia “Hombres de Ciencia”: propuesta para fortalecer
la orientación profesional-vocacional en la carrera
Matemática
Multimedia "Men of Science": a proposal to strengthen
professional-vocational orientation in the Mathematics
program***

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Resumen

La Matemática desempeña un papel importante en la formación integral de los estudiantes. Sin embargo, las investigaciones internacionales, nacionales y territoriales realizadas constatan que cada vez son menos los estudiantes que optan por el estudio de la pedagogía de esta ciencia. Por lo que se hace necesaria la divulgación del quehacer de los paradigmas de esta ciencia. Este trabajo presenta una multimedia que da a conocer la vida y obra de algunos de los más excelsos matemáticos y físicos de la antigüedad para favorecer la orientación profesional- vocacional en lo relativo al estudio de sus disciplinas para los futuros pedagogos.

Palabras clave: Multimedia; Orientación profesional- vocacional;

Abstract

Mathematics plays an important role in the comprehensive education of students. However, international, national and territorial research shows that fewer and fewer students choose to study the pedagogy of this science. Therefore, it is necessary to disseminate the work of the paradigms of this science. This work presents a multimedia that makes known the life and work of some of the most exalted mathematicians and physicists of antiquity in order to favor the professional-vocational orientation regarding the study of their disciplines for future pedagogues.

Keywords: Multimedia; Professional-vocational orientation;

Introduction

At present, the country is engaged in the Battle of Ideas, where ideopolitical, professional and cultural preparation becomes the only way to preserve the achievements of the Revolution and the social project. It corresponds to the school the conduction of the formative process of the personality of children, adolescents and young people. No one is unaware that an important step in the life project of these adolescents and young people is the selection of a profession. Hence, the highest leadership of the Revolution, under the guidance of Commander in Chief Fidel Castro Ruz and with the support of the Organizations and Institutions, offer solutions that guarantee the future of these adolescents and young people.

This is a question that worries researchers at world, national and territorial level, in particular one of the most important pegogos of our time L. S. Vigotski, this is demonstrated when he expressed; quoted by L. I. Bozhovich: "The choice of profession is not simply the choice of one or another activity, but, that of a certain path of life (...)". (L. S. Vigotski, 1976, p. 247).

As a result of all of the above, programs and projects have been created to guarantee professional and general cultural training, with a notable concern for the professional preparation of adolescents and young people, materialized in the creation of new schools, where the professions most necessary for the social and economic development of their locality and the country are prioritized.

Several investigations have been carried out on the subject of pedagogical professional orientation or pedagogical vocational training; however, the results are not sufficiently satisfactory, thus thus, every year the number of students who opt for pedagogical careers is reduced and more critical for the career of Mathematics.

The subject of Mathematics plays a very important role in the integral formation of the student in the primary, secondary and pre-university levels of education, since it offers means applicable to the solution of the most diverse problems of society and of any situation related to human activity.

The Mathematics Master Program in force as of the 1997-1998 academic year states:

The importance of the teaching of Mathematics for the multilateral formation of students is universally known. The basic contents of this subject are indispensable to achieve a meaningful, solid and applicable learning in daily life as well as in professional performance.

In the 1999-2000 Precisions for the direction of the educational teaching process of the Basic Secondary School in force, it is stated among the general formative objectives:

To decide on their continuity of studies, with orientation towards a profession necessary for their community, with willingness to enter the IPA, IPVCP and EMCC as a result of their unconditional attitude towards the Revolution, their political, ideological and labor formation.

Due to the above, it is necessary to increase the number of professionals in the pedagogical performance of this subject, so this research work proposes a multimedia that has among its objectives to make known the life and work of some of the most exalted mathematicians and physicists (related to mathematics) of antiquity, to favor the taste in future pedagogues of the study of their disciplines.

Incidentally, it should be noted that the dissemination of the work of the paradigms of this science in antiquity is very necessary, since according to our National Apostle, José Martí "... the past is the root of the present" (Martí, t-2, p. 283). The future Cuban pedagogues must drink in the source of knowledge of history to bring to the present what is most valuable and thus enrich their daily work and achieve a quality education where knowledge and processes must be created in an effective way, so that they contribute to the improvement of society, through the love for the study of Mathematical science, thus fulfilling the social task that teachers of these subjects have, especially Mathematics as one of the prioritized subjects.

Development

In the 21st century Cuban education continues to be committed to the social project of sustainable and integral human development and continues to enrich it in order to guarantee its enrichment.

In this sense Valdés, in his article "A new look at the didactics of science and education Science, Technology and Society", by its acronym STS, points out; "that the changes we are witnessing must be classified, beyond scientific-technological, as cultural, since they transcend to the most

diverse spheres of the material and spiritual life of society" (Valdés, 2012, p. 27). (Valdés, 2012, p. 27.)

See also; the growing involvement of science and technology in the global situation of the world (natural and social) and in the life of the common citizen and (...) the development of a new environment in (and with which) people interact (multimedia products, interactive platforms, Internet), which leads to the need to prepare for that environment (...) (Valdés, 2012, p. 27.)

For their part, the deficiencies found in the review of documents, inspections and the experience of teachers in the Mathematics department revealed an important need to better guide vocational training in students in the initial years of the Bachelor's degree programs in Education: Mathematics, since as main insufficiency; in interviews and surveys carried out to students of first and second years and to professors and directors of the career, it was detected the little motivation offered to the students either for the entrance or the reaffirmation in the study of this career, being in general terms, a priority of the National System of Education in Cuba.

In this sense and on purpose, it is raised in the XIII National Seminar for Educators of the 2013-2014 courses on the 150th Guideline of the economic and social policy of the Communist Party of Cuba and the Revolution:

Ensure that enrollments in the different specialties and careers are in line with the demands of the development of the economy and society. To guarantee that Vocational Training and Professional Guidance developed from Primary Education, together with production and service organizations and with the participation of the family, enhance the recognition of the work of middle-level technicians and skilled workers (Torres, 2014, p.2).

Within the framework of the implementation of this guideline, the work of vocational training and pedagogical professional guidance is developed as an essential element in ensuring the enrollment of teachers and teacher training centers.

Other researchers have ventured in this direction, among whom we mention: J.L. Del Pino, (1997). V. González Maura, (1994, 1998, 2001). Z. Matos, (1998, 2003). P. M. Casas (2002). E. Ulloa, (2002), Guibert, M. (2008). Trimiño, B, (2008). Cabrera. A, (2011) and Daudinot, J

(2013), among others, introducing theories and methodologies for the developments of this activity, but still the results are not as expected.

The first definition was offered by J. Fitch in 1935, (quoted by V. González Maura, stating that: "Vocational Guidance is the process of individual assistance for the selection of an occupation, preparation for it, initiation and development in it". (1999, p. 1.)

According to Torres.

Vocational training and professional orientation constitute two components of the same process, whose essential function is to contribute to the insertion of the subject in working life. They are integrated to the process of formation of the student's personality and are developed fundamentally in the school trajectory. (2014, p.3).

These concepts have been defined in different ways and have sometimes been used interchangeably.

Vocational training is a system of educational influences that stimulates the subject's interest to certain spheres of economic or social life or specific careers or trades. This interest is neither innate nor inherited but results from the subject's significant experiences through education and daily life. (Torres, 2014, p.3).

Torres goes on to state that professional orientation may include the process of vocational training, but it also aims at preparing the subject to select the career, face the process of professionalization and identify with it and acquire information about careers and professional profiles, and reflect on the whole problem of the profession.

Other authors have defined one or the other; for example, R. Ferrer (1977) and Y. Hedesá (1998) differentiate vocational orientation (orienting towards professions) and vocational training (forming the vocation). V. González, (1994) analyzes professional orientation and later (1999), vocational orientation. P. M. Casas, (2002) results vocational orientation. N. De Armas (1980); P. L. Castro, (1989) Del Pino, (1998). M. Gómez, (1993, 1995). A. Figueredo, Z. Matos (1998), L. Bacalli, (2001), among many others, result the term vocational orientation. Z. Matos, (2001, 2002, 2003) and E. Ulloa, (2002) use a single term to identify Vocational-Professional Guidance.

In this sense, it is necessary to be consistent with the position assumed, so before addressing the key aspects of the proposal it is necessary to raise two very important definitions for this work:

Vocational Professional Orientation (OPV):

It is a multifactorial process directed to the education of vocation, of professional interests, to establish a helping relationship through which the learner is offered ways, methods, procedures, and techniques for the search and finding of an adequate place within the system of professions and learns to choose one in a self-determined and conscious way. (Matos, 1998, p.17).

And as Multimedia:

A multimedia product is a work that integrates various media intended to influence the sense organs, its information content may consist of data, text, images, sounds, music, voice, animation and videos. Thus, in the case of computing, they are made through an interactive process of communication between the user and the computer (Navarro, 2008, p.23).

Having clarified these two concepts, we proceed to present the multimedia proposal that is socialized with the students of all the teachings with satisfactory results.

Structure of the Multimedia "Men of Science". named by its first author the student Marcos Antonio Sánchez Moreira "Science men's".

The main page offers support to all the other pages, it provides the interaction with the multimedia content.

- In the upper left part, taking as a reference that one is in front of the PC, there is the title of the multimedia in legible letters.
- In the upper right part there is the close button (X), whose function is to exit the application, next to it there is a speaker that allows us to play or stop the background music.
- In the left panel there are the buttons, which have the links to the different contents. At the end of this panel there is a back button that takes you back to the previous page.

The left panel is composed of:

- Introduction: in a brief synthesis the objective pursued with the multimedia is presented, it shows the photo of one of the most famous mathematicians who existed.
- Personalities: this allows us to access the informative part of the multimedia. In this page we can access to the information of five personalities of the mathematical-physical sciences of BC. They are Eratosthenes, Archimedes, Euclid, Pythagoras and Thales.
- Image Gallery: this page shows in detail each of the images used in the multimedia.
- Bibliographies: all the bibliographic material that was used to nourish the multimedia is found here.
- Help: a brief description of how to navigate through the multimedia is offered.
- Credits: we can visualize the credits of the material.

The initiative of a multimedia that disseminates relevant aspects about mathematical and physical scientists related to Mathematics, from the beginning of our century and previous centuries, the discoverers of science and the founders of naturalistic theories, was implemented through the Open Doors section that was carried out as part of the activities of the Manuel Ascunce Domenech Chair for Mathematics and Physics careers of the Faculty of Sciences of the former University of Pedagogical Sciences of Guantánamo.

It is valid to emphasize that multimedia enhances interdisciplinary relations, as it relates Mathematics with Computer Science (computer product), English Language, Mother Tongue, these last two through the communication established between teacher and student and the technical Languages of these subjects and allows inter-material relations, all the areas of Mathematics are represented in multimedia, in the Introduction of these subjects or their Thematic Units. It is also applicable in the subject Histories of Mathematics.

Some views of the multimedia are presented below:

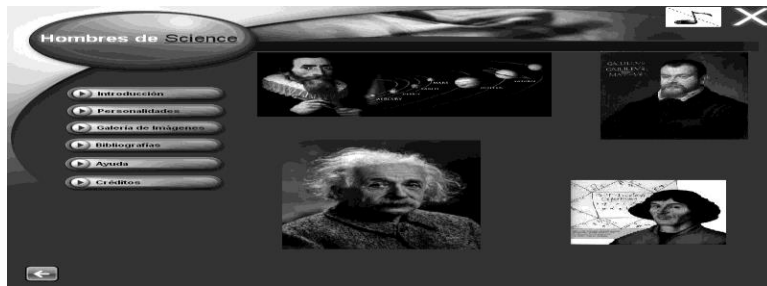


Figure 1: Main page

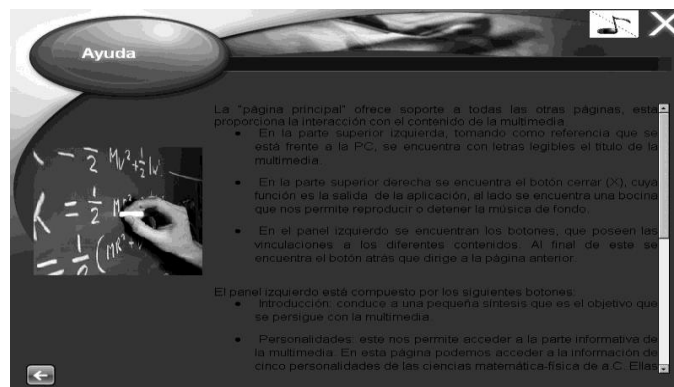


Figure 2: Help section

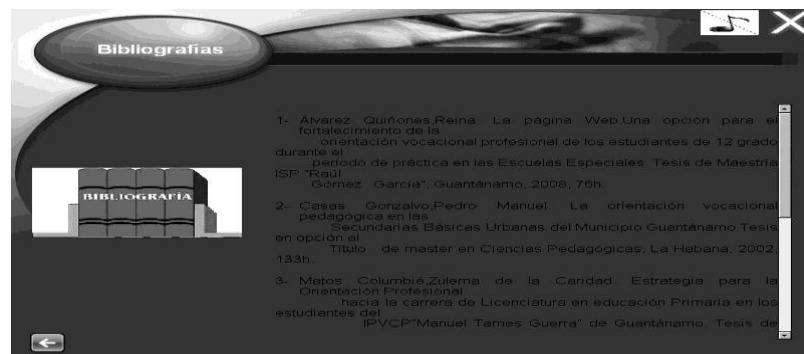


Figure 3: Bibliography Section

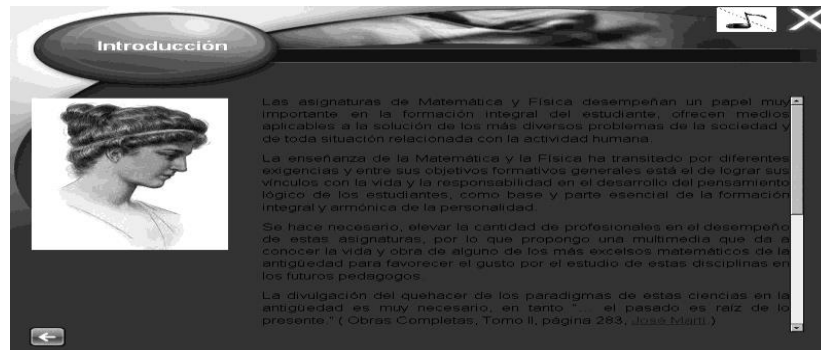


Figure 4: Introduction



Figure 5: Relevant personalities



Figure 6: Relevant personalities: Pythagoras



Figure 7: Relevant personalities: Thales of



Miletus

Figure 8: Relevant personalities: Archimedes



Figure 9: Relevant personalities: Euclid of Alexandria

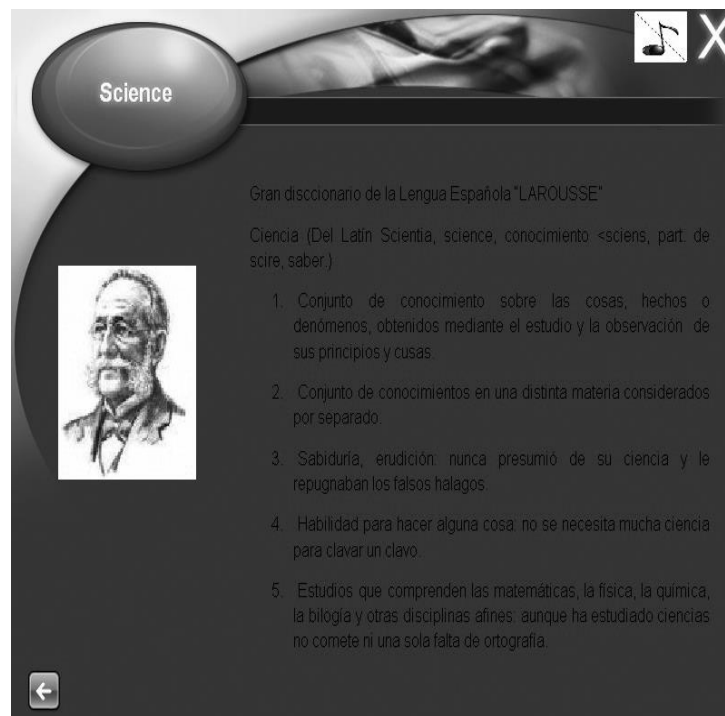


Figure 10: Meaning of Science

Installation

Hombres de Ciencia" Multimedia has a highly secure and flexible installation system. Safe because it guarantees that the machine on which the program will run has all the software components necessary for the proper execution of the multimedia elements used by the program. Its friendly character is defined by the ease with which the installer program is operated, in which the most logical proposals are those that the installer establishes implicitly, that is, always accept everything that is proposed to you and you will obtain a satisfactory installation. Finally, the flexibility is given since it allows to install the softwares in the hard disk that you choose, this product is installed in a local machine and allows to execute the program from the CD. If you want to achieve the execution from the hard disk removing the CD, you will have to follow the following steps: proposes

- Create a folder on the hard disk with any name that does not contain accents.
- Copy the contents of the CD-ROM to that folder.
- Create a desktop shortcut to the program

One of the advantages of this computer product is that students are motivated to study the subjects History of Mathematics or History of Physics, but it can be used in the introduction of other subjects, as it talks about the origins, personalities and histories of Mathematics or Physics. It favors the use of Information and Communication Technologies, so necessary in these times, in the so-called "era of technology", and in this way its use can be generalized.

In terms of economics, it is cost-effective because it can be carried on USB sticks and therefore does not require expenses to use it as is the case of the bibliography that students acquire in stores or in the library.

As for the scientific branch, it covers stories of mathematical and physical sciences related to mathematics, besides being a result of a research work carried out from a scientific problem that is presented at a global, national and local level; that of training education professionals in the specialty of Mathematics.

Regarding the technological branch, the product is useful and profitable as it operates with the computer resources provided by the university.

The novel aspect of the research and consequent proposal consists in making available to the students of the career in question and to the high school and pre-university students who visit us at the Open Doors, a computer product that allows them to study personalities of Physics and Mathematics in a pleasant and modern way. It replaces books such as Baldor, which do not exist in the center or in the country, and the History of Mathematics book. It can be carried in memories. It is used in Mathematics and Physics courses: Audiovisuals, Working with Software and Mathematical Assistants in their own courses.

The multimedia contributes to the improvement of society, through the love for the study of Mathematics and Physical Sciences, and also fulfills the social responsibility of teachers, especially in Mathematics as one of the priority subjects.

List of users of the multimedia "Men of Science".

A total of 114 students at the undergraduate level:

For a total of 8 groups in the daytime of the Faculties of Higher Secondary Education of the Pedagogical University and the Faculty of Education of the Guantanamo University.

In the postgraduate through the courses of Improvement in Geometry and Descriptive Statistics for teachers who teach Mathematics for Professional Technical Education with a total of 35 trainees (1 group).

In the Open Doors held at the University during the courses: 2012-2013; 2013-2014; 2014-2015; 2015-2016; 2016-2016; 2016-2017, 2017-2018 and 2018-2019. For a total of 500 students of all the teachings of the Guantanamo province. In a total of 16 groups of the General High Education of Guantánamo province.

Target Education Subsystem: General

Level: Primary, High School and Preparatory.

Ages: From 5 to 19 years of age.

At the University it is one of the Audiovisual media implemented for the Mathematics and Physics career through several programs of the base curriculum and its own.

Minimum and desirable requirements

166 Mhz Pentium microprocessor.

RAM memory: 16 Mb

Resolution: 800x600

Color Depth: 24 bits or more

Sound card: Yes

CD-ROM drive: Yes (10 x)

Mouse: Yes

Working platform: All types of Windows.

Storage support: All types of portable storage.

The future Cuban pedagogues of the specialty of Mathematics must drink from the source all the knowledge of history to bring to the present the most valuable and thus enrich their daily work and achieve a quality education and contribute to improve society through the love of the study of mathematical science, for these reasons that the multimedia "Men of Science" is proposed.

This multimedia has been elaborated for all types of education from elementary school to university, with the main objective of motivating towards the careers in Mathematics through the lives of five men of Science. The Physics career has also been socialized.

Conclusions

In the realization of this research, research methods and techniques were applied that allowed to verify that there are less and less students who opt for the study of the pedagogy of mathematical science and the lack of motivation towards it, inside and outside the career. They also made it possible to establish the theoretical frame of reference. Therefore, a multimedia is presented to contribute to the motivation for the Mathematics career.

As part of the studies of the impact of the implementation of the multimedia and this research work, opinions were collected from students of the different educational levels, mainly high school and pre-university, regarding the professional and vocational orientation for the Mathematics career, and those who are studying in the first two years were also interviewed, who confirmed the applicability and usefulness of the proposal. Relevant results were obtained in FÓRUM and in scientific events, for which the student Marcos Sánchez Moreira obtained the CITMA National Award.

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