

## El video en el desarrollo de competencias matemáticas, caso: Universidad Autónoma del Carmen

*The video on the development of mathematical skills, case: Autonomous  
University of Carmen*

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### Resumen

El presente trabajo tiene la intención de dar a conocer algunos retos que enfrentan las IES, la importancia del desarrollo de las competencias matemáticas y la inserción de los recursos tecnológicos en el currículo matemático. Además se plantea una de las necesidades de la educación matemática en el Estado de Campeche, donde es evidente el desarrollo de competencias matemáticas por parte de los alumnos en el proceso de aprendizaje y como la Universidad Autónoma del Carmen (UNACAR) da respuesta a esta demanda, mediante el curso de matemáticas I dentro de su modelo educativo centrado en el aprendizaje. Finalmente, se da a conocer la experiencia con el uso del video en el curso de matemáticas I a nivel superior y su apreciación por parte de los alumnos como complemento didáctico. Asimismo de algunas reflexiones sobre retos a los cuales se

enfrenta la comunidad docente al utilizar las Tecnologías de Información y comunicación (TIC) en el aula con la finalidad de alcanzar los objetivos del curso.

**Palabras clave:** Competencias matemáticas, video, TIC.

### Abstract

This paper intends to present some challenges faced by IES, the importance of math skills development and integration of technology resources in the mathematics curriculum. It also poses one of the needs of mathematics education in the State of Campeche, where it is clear the development of mathematical skills by the students in the learning process and as the Autonomous University of Carmen (UNACAR) responds to this demand through the math course I within its educational model focused on learning. Finally, discloses the experience with the use of video in the course of upper-level math I and appreciation by students to complement teaching. Also some thoughts on challenges that face the teaching community to use Information and Communication Technologies (ICT) in the classroom in order to achieve the course objectives.

**Key words:** Math skills, video, ICT

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### Introduction

In recent years, the education sector has undergone a series of changes due to the technological revolution in telecommunications and computing, and educational models that consider learning environments mediated by ICT. Consequently, knowledge and information societies have posed new challenges to HEIs, the development of mathematical skills and the inclusion of technological means, which on the one hand facilitate the comprehensive training of students and enable them to face a society where

information predominates, and on the other hand the development of necessary skills according to mathematics curricula (López, Díaz and Herrera, 2010).

Competences are considered as "the capacities that every human being needs to solve life situations effectively and autonomously" (Figuroa and Revuelta, 2010 p. 65). However, in an educational context, the concept of competencies refers to what the student is capable of doing with their knowledge and skills, for the benefit of society.

The Organization for Economic Co-operation and Development (PISA) Project defines mathematical literacy as "an individual's ability to identify and understand the role of mathematics in the world, to make informed judgments, and to use and relate to mathematics so that the needs of individuals' lives can be met as constructive, committed and reflective citizens" (Rico, 2006 p. 49). Within the 8 competencies to be developed according to PISA, here we will address those related to "using operations and using tools and resources", given that the use of cognitive tools can arouse student motivation and, as a consequence, significant learning.

Unquestionably, the mathematics learning process represents a challenge at each of its educational levels, since it is a difficult task for both students and teachers. Without a doubt, for mathematics education researchers, the use of technological resources in the learning process represents an inexhaustible source of study.

### **Background**

In Mexico there are deficiencies in the area of mathematics, according to the results of PISA 2000 and 2003, with these results it obtained the last place on both occasions, among the OECD countries. On the other hand, Bautista (2007) points out that the performance in mathematics of the students of the schools of the basic level of the state of Campeche that participated in the PISA 2003 was 378 points significantly lower with several states of the Mexican Republic, placing the state in the last places accompanied by: Puebla, Tabasco, Chiapas, among others. As can be seen, it is a problem that starts from the basic training of Campeche students and that in a certain way affects their

passage through the different educational levels: secondary, high school and why not mention the higher level.

For the Autonomous University of Carmen, this represents a challenge, since it is no stranger to this problem since it is a higher level institution, which receives students from upper secondary level institutions from different states such as: Campeche, Tabasco, among others.

Undoubtedly, the changes of recent decades have caused the Autonomous University of Carmen to accept the challenges demanded by the knowledge society, generating changes in the educational model since 2002. Transitioning from a traditional educational model to an educational model focused on learning , where the use of ICT stands out.

In accordance with the educational model focused on learning, the activities and resources used must provide students with the tools that allow them to acquire the Desirable Dispositions, understood as: "the set of attributes: knowledge, skills, attitudes and relationships, that in an intentional, systematic, explicit or tactical way, the institution considers that they should be developed in the student, as they go through their educational programs, organized to achieve significant learning experiences" (Salazar, 2006, p. 69), of course as an additional attribute in the acquisition of knowledge.

Among the desirable dispositions (some competencies) to be developed are: learning to learn, identifying and solving problems in their profession, thinking and acting with the logical rigor of the scientific method, mastering Spanish, expressing their ideas clearly, mastering information technology , among other. To achieve these desirable provisions, the Institutional Committee for Curriculum Design created strategies in order to contribute to the achievement of these competencies through "signature courses" with the objective that all students of the Autonomous University of Carmen take these courses. Consequently, these courses are included in all educational programs offered at the University.

To respond to this demand, the Autonomous University of Carmen, through the Educational Mathematics Academic Body, designed a hallmark course in Mathematics I, which is a common factor in all the curricular maps of the educational programs of the institution.

Undoubtedly, there are many advantages offered by an educational model focused on learning, one of them is that teachers must plan learning experiences differently, at least differently than they traditionally did (Salazar, 2006). This means that the teacher can use cognitive tools with the use of ICT that are considered as activities in the programming of the courses.

For Santandreu (2004), the use of technological resources as mediators is essential in the mathematics learning process, although he recommends being careful when using them, since their objective is not to replace the role of the teacher, much less that of the students.

Currently one of the most used technological resources in educational centers are audiovisual media in video format, these play a role of teaching aids in the area of science, so that it can be used as a starting point to generate motivation in students, to add or complement information from a math course, Spanish, among others (Pérez and Amoragüedad, 1993).

Pérez (2007) mentions that the video from a pedagogical point of view and as a didactic resource in the classroom fosters enriched environments, centered on the student, especially the possibilities of interaction with the contents of the course. Undoubtedly, the incorporation of these audiovisual media in the educational environment is a fact, and more so when it comes to video, due to the accessibility of a large number of these resources as a result of the digitization phenomenon. It must be recognized that an important source for the acquisition of these audiovisual media is the internet, however, after the technological revolution, video is part of everyday life.

The video in the educational context according to its didactic objectives such as:

- a) Instructions. Its objective is to guide or ensure that students achieve mastery of the contents of a subject.
- b) Cognitive. They intend to make students aware of different aspects related to the subject being studied.
- c) Motivators. Its intention is to prepare the student in a positive way towards the accomplishment of a specific task.
- d) Modellers. They are playful or expressive aimed at students with the aim that they can learn and understand audiovisual language (Schmidt, 1987).

The theoretical bases that support the use of audiovisual resources as support in the development of skills, gave the guidelines for the members of the Educational Mathematics Academic Body to take the video to the classroom facing their own beliefs about learning mathematics, breaking paradigms. of the traditional teacher and encasing towards the role of facilitator, including in the programming of the mathematics course I attractive didactic resources for the students, not as an accident, but as an integral part of it.

## Methodology

The Academic Body of Educational Mathematics of the Autonomous University of Carmen is in charge of the hallmark course of Mathematics I of an institutional nature. Within the three learning experiences, it is intended that the student join teamwork for problem solving, information management, etc., emphasizing that many of them correspond to the desirable dispositions (competencies) that must be developed in Math I course.

To achieve the development of competencies, it is necessary that in each of the activities to be carried out the competency to be developed in the learning experiences is specified.

To achieve the development of mathematical skills, interactive learning environments have been designed and applied, where work is organized collaboratively, prevailing forms of interaction, communication and learning different from the traditional model. Under

this premise, the teacher can plan learning experiences differently to achieve the development of mathematical skills in response to the educational model of the institution.

To carry out the experience with the use of video in the Mathematics I class, groups formed by different Higher Education Units (DES) were taken. For three weeks, videos were projected in the classroom on the subject of polynomials corresponding to the third learning experience with the intention of promoting the use of video as a didactic complement to reinforce previous knowledge, motivate students to study the subject and to promote collaborative work in students. In addition, the students were asked to pay close attention to the videos, since at the end of each session activities would be applied to reaffirm the contents exposed in the videos with the aim of reaching a more enjoyable learning. Without a doubt, this experience allowed the teacher to evaluate the student's attitude when facing each of the activities. As well as observing their collaborative work and their progress in mastering mathematical knowledge and skills.

To see the effect that the use of video had as a didactic aid in the Mathematics I class, a pilot test was carried out based on the application of a survey to new students who were taking the subject of Mathematics I at the Autonomous University del Carmen, the sample was intentionally non-probabilistic. The sample consisted of 55 students, who were distributed in four DES as shown in table 1.

Table 1. Distribution of students in the sample by DES

Nombre de la DES	Número de alumnos por DES
DES de Educación y Humanidades	11
DES de Ciencias de la Salud	14
DES de Ciencias Económicas Administrativas	18
DES de Ciencias de Tecnologías de la Información	12

Total

55

In order to publicize the impact of the use of video in math class I on the subject of polynomials, an instrument was designed to determine the acceptance and impression of students about the usefulness of video in math class. as a teaching assistant. The type of response used was the ordinal-type Liker scale and the variables proposed are statements about the degree of acceptance.

The videos used in the math class I were the product of a research project on the mathematics didactics line of research. The theme contained in the videos was on the subject of polynomials, of course taking as a reference the problems presented by students of different educational levels on learning algebra. In addition, the videos contemplate three areas of analysis according to the specific objectives of the Mathematics I program of the subject of polynomials: Analyze the basic concepts, formulate strategies for problem solving and problem solving. Below are some of the results obtained after the application of the instrument to validate the relevance of the usefulness of the videos in the mathematics class.

**Some results**

In this section, the results obtained from the information collected by the instrument that was applied to the new students who used the video in math class I are disclosed.I.

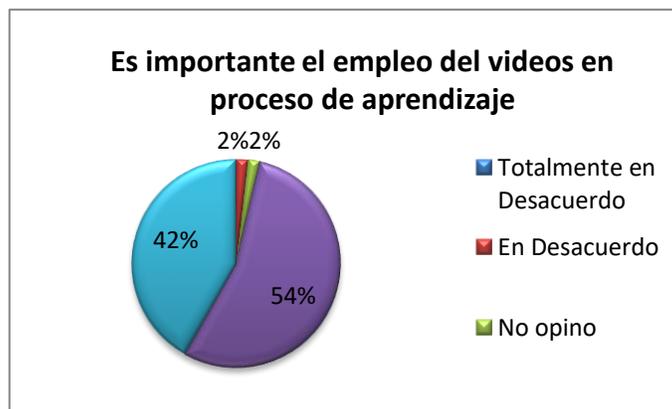


Figure 1.

The instrument shows that 96% of the students surveyed agree and totally agree that the use of videos in the learning process is important.

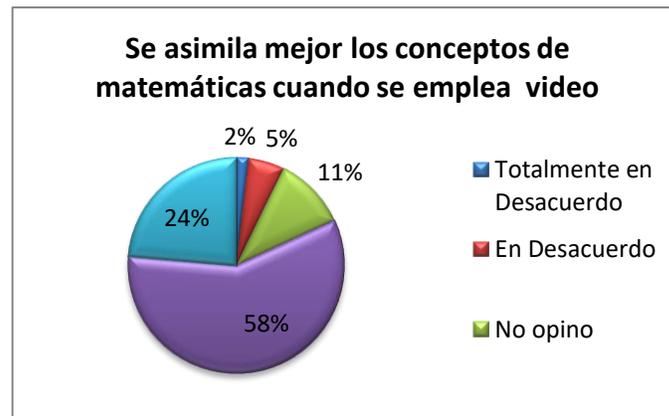


Figure 2.

82% of the students agreed and totally agreed that math concepts are better assimilated when the video is used, however, 11% did not think so and the remaining 7% disagreed and totally disagreed..

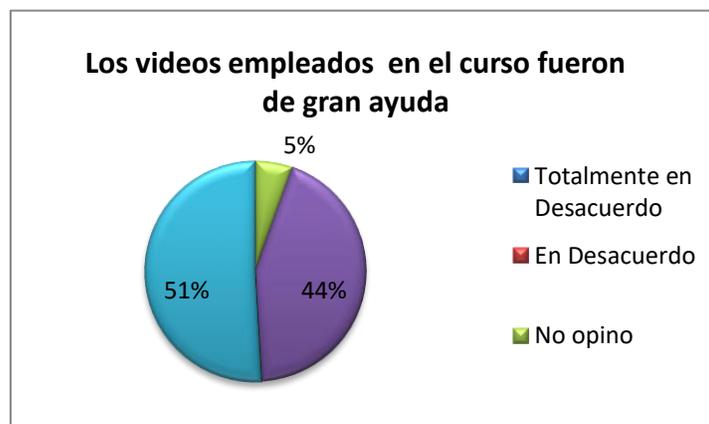


Figure 3.

Figure 3 shows that 95% of the students surveyed agreed and totally agreed that the videos used in the course were very helpful, and the remaining 5% did not think so.



Figure 4

82% of the students agreed and totally agreed that they like this method of teaching with video in math class I, on the other hand, 9% of the respondents did not think about it and the remaining 9% disagreed..



Figure 5

It can be seen in figure 5 that 96% of the students surveyed agreed and totally agreed that the video was educational, however the remaining 4% did not think about it.



Figure 6

As can be seen that 91% of the respondents agree and totally agree that the videos introduced as work material represent a novel, motivating and attractive strategy that promotes learning of the tasks, on the other hand, 9% of Respondents had no opinion on the matter



Figure 7

93% of the students surveyed agree and totally agree that at the end of each session she learned something, however 7% did not share their opinion on the matter.

It is prudent to point out that ICTs are not only one more means available to the teacher and student, leaving their usefulness to the students' discretion, but rather it is a content to be developed, focused on the training of competent students in their reflective, critical

and autonomous use; they assume part of the responsibility for their learning, and develop some of the functions that in traditional teaching are reserved for the teacher (López, Díaz and Herrera, 2010).

## Conclusions

In the didactic planning of mathematics learning experiences, it is not only intended that the student acquire knowledge, but also skills and attitudes that are required for his professional life, and not only accumulate information during his career. In addition, with competency-based learning, the student's autonomy and mastery of knowledge is developed. However, it must be taken into account that the competency-based approach requires aggregates such as motivation and effort, as well as cognitive tools that guide the student in the construction of knowledge by combining theories and practices.

It is necessary for the student to be actively involved in the acquisition of knowledge. In addition to the development of skills to achieve their autonomy.

Some researchers consider that learning using ICT as teaching tools can be taken into account for the formation of skills.

The video as a didactic aid stimulates learning in the subject addressed, in this case, mathematics. Since 82% of the students surveyed agreed and totally agreed that mathematical content is better assimilated using the use of videos.

Video helps teachers design more dynamic classroom experiences with the intention of creating more engaging classes for students. That is why the importance of the use of ICT to create new learning environments that surprise the student, motivating him to study the subject, promoting learning.

The use of video in math class represents a novel, motivating and attractive strategy for students, but also the use of technology fosters an enriched environment that facilitates

the learning of tasks, such is the case of students who used the video for learning polynomials where 91% agreed that this work material generates different learning environments.

Undoubtedly, the use of video in math class represents a teaching resource that can be used by teachers with the intention of breaking with the paradigms of the traditional math class, promoting new roles in the teacher, becoming a facilitator of the learning.

It is necessary to emphasize that the use of video in the classroom must be carried out in a planned way, since the success or failure of the class depends on this planning, so it is recommended that its use is not by chance or the result of a fad. .

The applied survey shows that the majority of students like the video teaching method, this gives the guidelines to incorporate more videos in the math class, so that it serves as a didactic aid or as a didactic complement to strengthen the students' mathematical abilities.

Inserting technological resources such as video in the mathematical curriculum leads us to achieve the development of mathematical skills. However, these must be chosen carefully, since they must directly impact the objectives planned in the course. So that they are not considered by students as a waste of time or as filler activities for the math course.

93% of the students surveyed considered that at the end of each session something was learned from it, so the use of video allows to reinforce mathematical knowledge and skills inside and outside the classroom.

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