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## INVESTIGACIÓN/RESEARCH

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### THE INTERACTIVE WHITEBOARD AS A MOTIVATION-ENHANCING RESOURCE

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#### ABSTRACT

The motivation of the student is a key factor in their learning. However, any teacher will have noticed how a high percentage of students lose motivation as they progress from Pre-school Education to Elementary Education, many of them decreasing their school performance. This way, in Pre-school Education, the great motivation of students can be noticed when they start to study, showing interest in everything and participating in any activity. However, it does not happen the same in Elementary Education, above all the in last years of this stage. Given these clear differences in the change of attitude of students of Elementary Education, the objective of this project arises: to increase the motivation of students through the Interactive Whiteboard, demonstrating what some authors say: "The use of the whiteboard in the classroom motivates students and teachers" (Gallego and Dulac, 2005). Probably it will not be an easy task, but it will be an advance in this new resource. The project was aimed at this end, in order to find out if the use of the interactive whiteboard in educational environments could achieve that increase in motivation. Through a series of timely validated questionnaires, many responses were obtained by teachers and students, whose analysis came to determine, among other things, the accuracy of the title of our article.

#### KEY WORDS

Interactive whiteboard - Motivation - Education - Elementary education - ICT - Hardware - Teaching - Research - Resources.

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# LA PIZARRA DIGITAL INTERACTIVA COMO RECURSO POTENCIADOR DE LA MOTIVACIÓN

## RESUMEN

La motivación del estudiante es un factor clave en su aprendizaje. No obstante, cualquier docente habrá observado cómo un alto porcentaje de alumnos pierde motivación conforme avanza desde los cursos de Educación Infantil a Educación Primaria, llegando muchos de ellos a bajar su rendimiento escolar. Así, en Educación Infantil se puede observar la gran motivación de los alumnos cuando comienzan su trayectoria educativa, mostrando interés por todo y participando en cualquier actividad propuesta. Sin embargo, no sucede de igual manera en Educación Primaria, sobre todo en los últimos cursos de esta etapa. Tras estas claras diferencias en el cambio de actitud de los alumnos de Educación Primaria, surge el objetivo de este proyecto que es incrementar la motivación de éstos a través de la Pizarra Digital Interactiva, demostrando lo que dicen algunos autores: "La utilización de la Pizarra Digital en las aulas motiva a alumnos y profesores" (Gallego y Dulac, 2005). Probablemente no será tarea fácil, pero será un avance en este novedoso recurso. A tal fin se dirigió este proyecto, con el propósito de averiguar si la utilización en entornos educativos de la Pizarra Digital Interactiva pudiera conseguir ese aumento de motivación. Mediante una serie de cuestionarios oportunamente validados, se obtuvieron numerosas respuestas por parte de docentes y discentes, cuyo análisis vino a determinar, entre otras cosas, la veracidad del título de nuestro artículo.

## PALABRAS CLAVE

Pizarra Digital Interactiva - Motivación - Educación - Educación primaria - TIC - Hardware - Magisterio - Investigación - Recursos

## 1. INTRODUCTION

In recent years, many young champions have placed Spain at the top of sporting success. However, this cannot be said as regards compulsory education, where we are also winners, champions of school failure. Thus, according to data collected by UNESCO in the 2012 edition of the annual study *Education for all*, one out of three young Spaniards between 15 and 24 dropped out before finishing high school. Given this staggering figure, there comes the big question addressed by different authors, what causes it?: "Loss of motivation explains educational failure" (Puig, 2006). "If there is loss of school motivation, there will always be failure later" (Bustos, 2001). I could go on writing similar quotes. And really, motivation is one of the factors that influence school failure.

But, is there a teaching strategy to enrich the teaching-learning motivation? Unfortunately there is not but, however, in recent years, with the advent of

information and communications technologies in education, different authors have “resurrected” motivation by using some of these tools, one of them being the interactive whiteboard: "The interactive whiteboard allows progressive innovation in teaching practices" (Miller and Glover, 2002), "improved motivation and attention of students" (Beeland 2002) "and availability of new tools to meet the diversity of students, especially those students with disabilities or severe or moderate difficulties to learn" (Pugh, 2001). "Students are more attentive, motivated and interested in the subjects even in those environments in which they find it difficult to maintain discipline. Students feel at home, in the audiovisual world of television, concentrated on their video games or playfully surfing the Internet. The topics covered in class are closer to their previous experiences. They find it easier to relate what is new with what they already know. They can have more meaningful learning" (Marques et al, 2006). "Satisfaction and motivation increase in both teachers and learners through the use of more varied, dynamic and funny sources" (Levy, 2002).

As we can see, the interactive whiteboard is now the strongest techno-educational option in the context of education and training in the 21<sup>st</sup> century. We frequently find the educational innovation of this option in different media, as well as investments made or planned by the various education authorities about it. But does the use the interactive whiteboard really increases students' motivation? It is a question that different authors have already asked, however, through this project it has been researched.

To do this, it was considered necessary to sustain this piece of research with a theoretical framework before starting the practical application, so it was necessary to delve into different papers and pieces of research that address these two factors: motivation and the interactive whiteboard. After the first stage of research, work was targeted at to the core of this paper, collection of empirical data and their respective conclusions.

## **1.1 PRIOR THEORIES AND STATE OF THE QUESTION**

### **1.1.1. Theories of motivation.**

Motivation has been and will be a topic widely studied at all levels, including education where it is considered an important factor in children's learning, and Robert E. Slavin said that "students who are not motivated do not learn" (Slavin, 1987). So much so that there are many theories about it; however, in order to keep the extension of this study within reasonable limits, a brief summary of the most important theories based on the ideas expressed by KB Madsen in *Theories of Motivation* (Madsen, 1972) will be presented.

In the theories of motivation of antiquity, Aristotle and other philosophers described the desire or impulse as one of the mental forces or faculties in the same level of perception, imagination and feeling. In the Middle Ages, Thomas Aquinas and others distinguished sensual desire from the rational will. To Descartes, Hobbes and Spinoza, philosophers of more modern times, the pulses were still an important class of psychological variables, comparable in importance to that of the emotional and intellectual processes. During the eighteenth and nineteenth centuries, hedonism

understood that man always acts to achieve pleasure and avoid displeasure. Meanwhile, the British empiricists Locke, Berkeley and Hume believed that intellectual variables considerably prevailed over other types of psychological variables. With input from Kant to psychology cognition, emotion, and will were put on the same level of psychological classification, a tripartition that prevailed until early this century. W. Wundt defined the will as a special series of emotions that ends with a deterministic feeling that spontaneously translates into action. In the late nineteenth century, influenced by Darwin's theory, psychologists began to see instincts as the primary reasons for behavior, both in man and animals; so, W. James said man was the creature that had more instincts and they were in primary relationship with will.

Later, in the twentieth century, different theories about motivation were also developed. Thus, instincts dominated in the theory of McDougall (1871-1938), a psychologist who energetically stressed the importance of motivation because, according to his theory, "all life processes (including mental life and behavior) are intentionistic" (McDougall, 1932) and motivated by innate propensities.

Edward Chase Tolman (1886-1959) was one of the authors who most influenced the development of theoretical psychology, he got to make a considerable amount of theoretical and psychological concepts: intervening variable, moral behaviorism, etc. (Tolman, 1932). His motivational theory states that every behavior is determined by various empirical and hypothetical cooperating variables and motivated by impulses, which are biological conditions of imbalance.

For his part, Paul Thomas Young, in his book *Motivation of Behavior* (1936), formulated his theory of motivation that, summarized in a motivational axiom, states that every behavior is motivated by a release and regulation of the energy caused by internal or external stimuli.

The American psychologist Gordon W. Allport (1897-1967) made a significant contribution to general psychology with his definition of personality and his hypotheses about the functional autonomy in adult individuals with his book *A Psychological Interpretation* (1937). His motivational theory states that dynamic behavior is determined by psychological variables (motivational traits) that, in adults, can operate independently of biological needs, but which are then influenced by external stimuli.

On the other hand, Kurt Lewin (1890-1947) according to his book *Behavior and Development as a Function of the Total Situation* (1946) presented his theory according to which the behavior (C) of an individual will always be a function (F) of the overall situation, the living space (Ev), which includes the conditions of the individual (P) and the environment (A), these factors are closely interdependent; therefore, in order to predict the behavior of an individual, it is then necessary to know the living space at any given point and the hypotheses that formulate the functional relationships between the living space and behavior.

A very interesting and fruitful theory of motivation is the American psychologist Henry A. Murray (1893-1988), according to whom every behavior is motivated by needs that are dominant brain processes determined by physiological processes or pressure situations, which can influence bio-social conditions of life of the individual.

Regarding the theory of motivation of Hurk L. Clark (1884-1952), it shows that even the simplest innate reaction can exist without motivation, which is therefore a necessary condition for the emergence of behavior.

In reference to the theory of Tinbergen (1907-1988), it is one of the most valuable modern psychological theories, because it is a link between psychology and the rest of biology, so this theory formulates that instinctive responses are determined by external factors that determine mainly initiation and conduct orientation and internal factors that determine the motivation of the central nervous system and behavior.

The psychologist David C. McClelland (1917-1998) contributed a series of experimental and theoretical papers to the psychology of motivation. In his book *Studies in Motivation* (1955), he defines motive as an affective association that is manifested as an intentionistic conduct determined by prior association of signs and pleasure or pain (McClelland, 1955). According to this definition, all motives are acquired and every motivation is based on emotions; two types of motives being stated: the positive or approach motive, which is an expectation of pleasure or satisfaction, and the negative or avoidance motive, which is an expectation of displeasure or pain.

We have also deemed it convenient to mention, even in a very abbreviated form, other existing representative theories of this period such as the theory of Frenkel-Brunswik (1942) which defines impulse as the most important and the only motivational variable; the theory of Masserman (1946) who, in his first biodynamic principle called "principle of motivation", defines need as the most important motivational variable understood as a physiological deficiency or imbalance dynamically transferred to behavior; the theory of Freeman, which in Chapter V states that "any total behavior is motivated, at least in the sense of shooting some organic movement" (Freeman, 1948); the theory of Moore (1948) who, in his book *The Driving Forces of Human Nature* (1948), defines desire as a "yearning we experience to seek or produce a situation where the impulsive tendencies and natural desires are met" (Moore, 1948); for its part, the American psychologist Maier defines motivation as "the process that determines the manifestation of behavior or influence its future expression, due to the consequences leading to such behavior " (Maier, 1949); the theory of Cattell (1950) states that every action expresses cooperation between traits of temperament, ability and dynamic, or it is determined by said cooperation, but to varying degrees; for its part, in the theory of Thomas M. French (1952), need and hope are considered the most important motivational variables; at the introductory beginning of the theory of Ross Stagner and T.F. Karwoski (1952), the importance of motivation is pointed out, and they affirmed that "motivation ensures the power that impels adaptive behavior, including learning, understanding of the medium, thought and reasoning "(Stagner and Karwoski, 1952); the theory of Skinner (1953) states that the variables that can explain the behavior of an individual are not inside the body but in its immediate environment, in its environmental history; finally, the theory of the Danish psychologist Holt-Hansen (1956) asserts that motivation is given by the individual's needs.

Finally, to conclude this section, we should mention some studies conducted in recent years on the relationship between motivation and Information and Communication Technologies in education. According to these pieces of research, the use of ICT in the classroom brings about increased interest and motivation of students; so several specialists and researchers in this field such as Manuel Area (2010), Maria Domingo and Pere Marquès (2011) or others like Micaela Manso, Paula Perez, Marta Libedinsky, Daniel Light and Magdalena Garzón (2011) have already ratified it.

## **1.2. Theories on the Interactive Whiteboard.**

In recent years, the implementation of information and communications technologies in all areas of society is an indisputable fact, but their level of integration in the classroom is still a process that many scholars have classified as arduous and full of obstacles. Thus, in the late eighties and early nineties, the computer was disseminated by the schools. In the mid-nineties, the spread of the Internet promoted learning through texts and images. A little later, in the late nineties and in the dawn of the twenty-first century, a new methodology known as e-learning was introduced. And during the first decade of this century, some innovative tools among which we can mention the so-called interactive whiteboard have become popular.

With the integration of these technologies in education, the roles of teacher and student have been renewed, so that the teacher is no longer the instructor of the contents but an adviser, counselor, facilitator and mediator of the teaching-learning process. Meanwhile, students are not accumulators of knowledge but, above all, they should know how to use them so they must learn to search for information, evaluate it and turn it into knowledge, that is, they should learn to learn.

Children have a need to know and make use of ICT and it is demonstrated by a data of the National Statistics Institute in 2011, since 2,572,073 children between 10 and 15 years make use of Information and Communication Technologies at home. With such a significant figure, the Royal Decree 1513/2006 as of December 7 that establishes the minimum lessons at Elementary Education, states that information processing and digital proficiency is one of the basic skills that students must acquire in basic education. This proficiency includes the student must be proficient to search, locate, organize and communicate information through the basics of computing and its utilities (surf the web, communicate by email, use word processing ...). For this reason, in 2009 the Escuela 2.0 project was launched by the Ministry of Education and the Autonomous Communities that collaborate to innovate and modernize education systems with the integration of ICT in both elementary and secondary education. With this project, one of the educational tools that have been introduced in the classroom is the interactive whiteboard.

To give an exact definition of this resource, it is first necessary to make a distinction, namely, not all boards are digital and interactive. A whiteboard is a "technological system composed of an Internet-connected multimedia computer and a video projector that presents, on a large screen or wall, what the computer monitor shows " (Marques and DIM Group, 2006). The interactive whiteboard, in turn, differs from the previous one because it adds a pointer control device that allows direct interaction on the surface

projection of digital content in a format suitable for group viewing (Marques, 2008). There are several models on the market and, although most of them maintain common and basic features, there are important differences that may determine their adequacy and convenience. Some of the existing types of Interactive Digital Whiteboards in the market are: eBeam, Hitachi, Smartboard, TeamBoard, Mimio, ActivBoard, Promethean, Numonics, StarBoard and Eno, among others. Although it was created more than a decade ago, its use is still not widespread. Internationally UK, US and Australia are the countries with greater deployment of this technology due to the heavy investment developed by their governments (Armstrong, 2005; Holmes, 2009). Followed by countries such as Canada, France, Denmark and Mexico, places where there have also been a number of pieces of research. While the large-scale adoption is a phenomenon in the UK, there is a growing interest in the potential of this technology worldwide (Bell, 2002; Hodge and Anderson, 2007). At the national level, according to Red.es report (2006) of the Ministry of Industry, Tourism and Trade of Spain, the number of interactive whiteboards available on teacher training centers and schools of non-university education centers was around 700 units. A more recent piece of information by professor and researcher Joseph Dulac indicates that, in 2009, the introduction of interactive whiteboards is about 12% and the teachers trained to work with this technology are below 10% (León, 2009).

As can be seen, the interactive whiteboard is a tool that has revolutionized the world and, as envisaged by Domingo Gallego and Nibaldo Gatica in 2000. it would soon be incorporated into the educational world; however, in that year too, Greiffnhagen (2000), despite noting its educational potential, pointed out the lack of empirical studies to prove it. It was from that moment when different studies to indicate the effects resulting from adding these technologies to education began to be conducted. Some aspects being investigated are the motivation or the ease of understanding of concepts with the use of interactive whiteboards (Beeland 2002; Miller and Glover, 2002). Others deal with the perceptions and attitudes of students with regard to the PDI (Goodison, 2002; Hall and Higgins, 2005) or its use by teachers (Cogill, 2002; Kennewell and Morgan, 2003). There are also case studies of their actual use in different contexts and educational levels (Lee and Boyle, 2003; Miller and Glover, 2002, 2006) and reports evaluating the use of the PDI (Smith, 2000). Finally, there are publications that are limited to a review of the literature so far (SMART., 2005; Smith et al, 2005).

The use of the interactive whiteboard is easy for most people because it requires basic computer skills. Although Quashie (2009) attributes the responsibility for its management to teachers in order to develop interactive lessons that engage and motivate their students. Moreover, Gallego, D. and Dulac, J. (2005) consider it "necessary technical, educational, methodological training that enhances creativity for proper use and exploitation" of this tool. In general, there are many possibilities and actions that each teacher can exploit according to their own uses, needs and experiences. San Pedro (2008) notes that the PDI shows its full potential when used as an application or as an environment of applications and, in this case, as a specific virtual desktop in which all the applications contained in a computer are integrated.

Besides, they have a great advantage: they are adapted to all ages, from kindergarten to higher education (Smith et al., 2005).

In order to identify good practices that teachers do with the use of the PDI, Haldane and Somekh (2005) describe a five-level model of teacher education: Level 1, basic or fundamental, the teacher uses it as a presentation tool ; Level 2, training, the teacher begins to use the most simple features like the electronic pen and the eraser; Level 3, facility, the teacher masters all the features available on the whiteboard and starts using it very often and easily; Level 4, fluency, teachers feel there are horizons to be explored and become active seekers and hunters and harvest new ideas and new content; Level 5, flying, teachers at this level are virtuoso performers of PDI with a wide repertoire, techniques and interaction with students. In addition, Kennewell (2001) points out the importance of using this tool not only by the teacher but also by students because he believes it is vital in increasing motivation and learning.

Meanwhile, Jenny Gage (2002) states that the PDI can be very useful for mathematics as a result of its ability to allow the user to draw straight lines, circles, triangles and squares; and a study on the teaching of mathematics by Clemens, Moore and Nelson (2001) concluded that significant academic achievement and positive attitudes in students are the result of the use of the SmartBoard whiteboard. Moreover, Forrest (2005) notes it is an indispensable element in his math classes.

With respect to the benefits that this resource provides in education, Smith (1999) points out that it is a very versatile resource, with applications for all ages and all curricular areas. Bryant and Hunton (2000) report the interaction between teacher or student and the environment, thus increasing the participation of students. Derek Glover and David Miller (2001) state that it makes easier for teachers to share and use teaching materials several times. Smith (2001) highlights a greater understanding of the most complex concepts by students through clearer, more dynamic and more efficient presentations. Meanwhile, Beeland (2002) states that it promotes three types of learning: visual. Through the use of the PDI, one can range use texts and drawings and use animations and videos; hearing, through the use of sets of words for pronunciation, speeches and poems, besides listening to sounds or music; and tactile, that allows students to physically interact with the board and can help to meet your needs.

The author concludes that the addition of these three types of learning in a learning unit can determine the extent to which students participate in the teaching-learning process and, therefore, they are motivated to learn. Goodison (2002) states that this tool provides access to the computer without using the keyboard, thanks to the tactile macroscreen, thus making the use of information technology easier to small children and special education students or disabled students. Bell (2002) claims it is a magnet for children, in addition to being able to take into account the different learning styles of students as teachers can go to many different sources and resources to meet the specific needs of the student. Walker (2002) shows another of its many benefits: it enables teachers to keep and print what is on the board, including notes taken during class, thus facilitating the review.

For his part, Levy (2002) notes that it increases satisfaction and motivation in both teachers and learners through the use of more varied, dynamic and funny sources

and increases opportunities for participation and collaboration, helping to develop the students' personal and social skills.

Edward, Hartnell and Martin (2002) argue that it not only enhances the enjoyment of students in learning, but usually results in more accurate answers of students. Pere Marquès with Pilar Casals (2003) express that it induces remarkable renewal of teaching methods and teaching and learning processes, increases the motivation of students, revitalizes the professional esteem of teachers and facilitates the achievement of more significant learning in line with today's society. Walker (2003) highlights the increased availability of time allowing teachers to easily and effectively present Internet resources or another information source. Knight, Pennant and Piggott (2005) find out that it contributes to increase self-esteem of some children. Domingo Gallego and Jose Dulac (2005) contribute that the PDI greatly enhances the teaching-learning processes, motivates students and teachers and also promotes the teaching creativity. Joseph Dulac discovers that "the greatest motivation of teachers and pupils who are users of the whiteboard involves improved self-esteem and more active participation in the class dynamics" (Dulac, 2006).

Researchers like Higgins, Beauchamp and Miller say it can be "the most significant change in the learning environment of the classroom in the last decade" (Higgins, Beauchamp and Miller, 2007). Based on his research, Martin (2007) concludes that this resource is likely to increase student's motivation and participation. Nieto and Bode (2008) state that it is appropriate to teach children from different cultural backgrounds. Pere Marquès (2008) states that it increases student's participation, increases attention and retention of students, motivates, increases understanding, facilitates management of diversity and helps in special education by compensating problems with vision, hearing and motor skills. In short, we can conclude that "the use of the whiteboard in the classroom motivates students and teachers" (Gallego and Dulac, 2005). "It increases satisfaction and motivation in both teachers and learners through the use of more varied, dynamic and funny sources " (Levy, 2002).

## **2. OBJECTIVES**

From theoretical review and practical intervention in education, a change of attitude was perceived in students with the integration of ICT in the teaching-learning process, the main protagonist being the interactive whiteboard. And hence the objectives of this paper:

1. Know the integration of the interactive whiteboard in the classrooms of the third cycle of Elementary Education.
2. Identify the effects of the interactive whiteboard in students.
3. Confirm that the interactive whiteboard causes a change of attitude in students.
4. Verify that the interactive whiteboard is a motivation-enhancing resource.

## **3. METHODOLOGY**

### **3.1. Research questions.**

Specifically, the general issues that have guided the planning and development of this study were:

To know the integration of the PDI in the classroom:

1. I1. Is there any PDI in the classroom?
2. I2. Does the teacher uses the PDI?
3. I3. How many days a week the PDI is used in the classroom?
4. I4. What subjects is the PDI used in?
5. I5. Do students use the PDI?

To know whether the use of the interactive whiteboard potentiates motivation in students:

6. M1. Does it increase interest in the classes?
7. M2. Does it increase attention?
8. M3. Does it encourage participation in the proposed activities?
9. M4. Does it encourage understanding of the content addressed?
10. M5. Does it favor the variety of activities?

In order to gather information on the issue addressed by this paper, the questionnaire has been used as a data-collecting tool.

This allows us to perform a quantitative and qualitative interpretation of data. It is quantitative in the way for collecting data since they have been collected at the end of the process and are quantified to enable analysis. But at the same time, it is qualitative because data are interpreted not only through the statistical treatment but by analyzing and regrouping them into categories that give rise to new analyses and explanations. The procedure for the preparation of a questionnaire is paramount to solve any problem and avoid later insurmountable errors. In this piece of research, it was decided to make the questionnaire used as rigorous, reliable and valid as possible by consulting a group of people that are supposed to be very knowledgeable about the subject to be treated. The collaborating expert in this piece of research to make the questionnaire used for data collection were (in alphabetical order):

1. Cruz Cruz, Maria Purification. Professor of Didactics and School Organization at the University of Castilla La-Mancha.
2. Castromil Diaz, Javier. ELE teacher at Cervantes Institute in Bucharest. Spanish teacher for foreigners since May 2004 and he has worked in several countries, Italy, France, Serbia and Spain in both public and private institutions.
3. Duran Medina, José Francisco. Professor of Didactics and School Organization and coordinator of the Master's degree in High School Education at the University of Castilla La-Mancha. Researcher in several projects: "Digital Citizenship and Open Data Access: Citizen Empowerment and social media in the digital environment" and "The policies of a computer per child in Spain. Visions and practices of teachers with the School 2.0 program. A comparative analysis between regions ".
4. Fernández Muñoz, Ricardo. Professor of Didactics and School Organization at the University of Castilla La-Mancha. Coordinator of Research at the

University of Castilla la Mancha: "The policies of a computer per child in Spain Visions and practices of the teaching staff with the School 2.0 program. A comparative analysis between regions..". Member of the teaching innovation project "AulaCiencia, wiki as a common workspace of the Faculty of Education at the University of Castilla-La Mancha with the Faculty of Education of the Catholic Pontifical University of Chile, in the area of didactics of experimental. sciences".

5. Macias Alegre, Adrian. Blog Editor of Free Software (COBDC) Grup de Treball of Programari Lliure pels Professionals de la Informació. Member of the Scientific Committee of the Conference 17<sup>th</sup> Librarians Days of Andalusia at the Andalusian Association of Librarians. Librarian at University Pablo de Olavide. Managing director and professor at A4Formacion and Dokumentalistas.
6. Martin Espinosa Alvaro. Professor of Theory and History of Education at the University of Castilla La-Mancha. Researcher on several projects: "School in the Second Republic and in Franco's regime. Life stories ", research fellow of the project "The policies of a computer per child in Spain. Visions and practices of teachers at the School 2.0 program" and researcher of the UCLM Ciberimaginario-Group.

### 3.2. Sampling

For the purposes of our research, the population is defined by the teachers and students of the third cycle of Elementary Education of the College of Education and "Angel del Alcázar" Elementary School in the 2012/2013 course.

The impossibility that all the teachers immersed in the process of teaching and learning these academic courses could participate in this piece of research led us to select a representative sample of four teachers-tutors and seventy one students in fifth and sixth grades of Elementary Education .

## 4. RESULTS

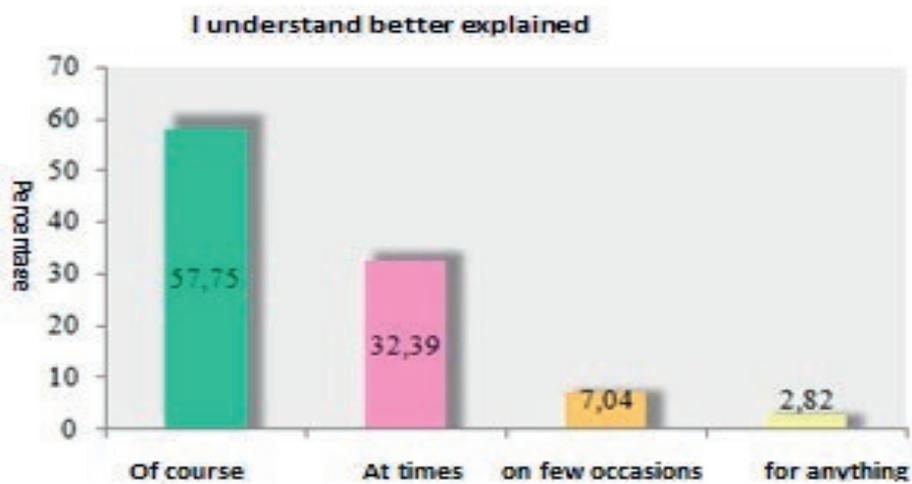
Considering all tests such as frequency tables, graphs and measures of central trend, we have a clear idea of the accuracy of the targets.

Therefore, trying to make the results of this paper as concrete and true as possible, we will be present below the verification of the objectives, the following conclusions being obtained:

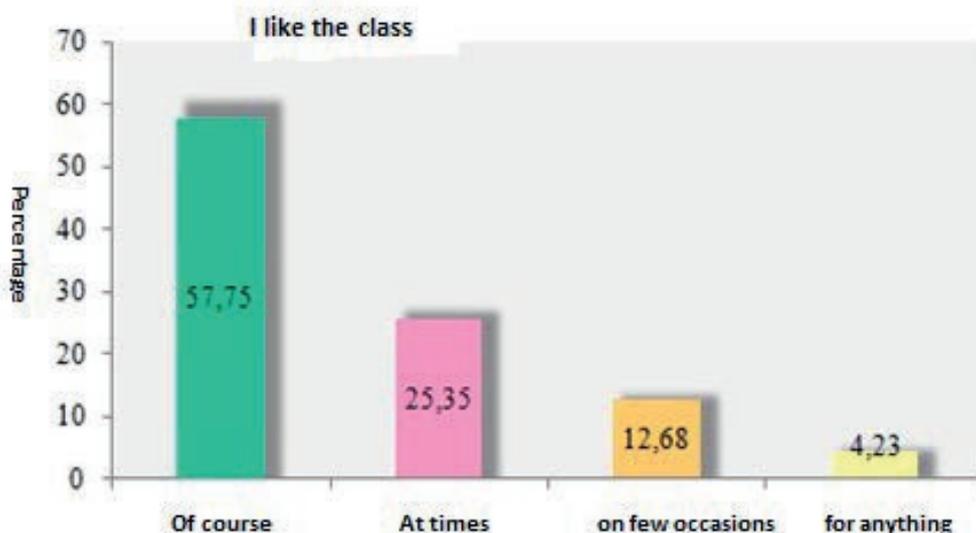
1. The effective agents of the teaching-learning process, teacher and student, know what an interactive whiteboard is.
2. The classrooms of the third cycle of Elementary Education are equipped with an Interactive Whiteboard although not in all cases they are in the best conditions of use.
3. The majority of teachers in the third cycle of Elementary Education use the interactive whiteboard in one of their lessons.
4. The area of Knowing the Environment is the subject in which the interactive whiteboard is more used.

5. The students of the third cycle of elementary school rarely use the interactive whiteboard.
6. The use of the PDI in the classroom promotes understanding of complex content.
7. The use of the PDI in the classroom increases interest in the lessons.
8. The use of the PDI in the classroom promotes the variety of activities.
9. The use of the PDI in the classroom encourages to participate in the proposed activities.

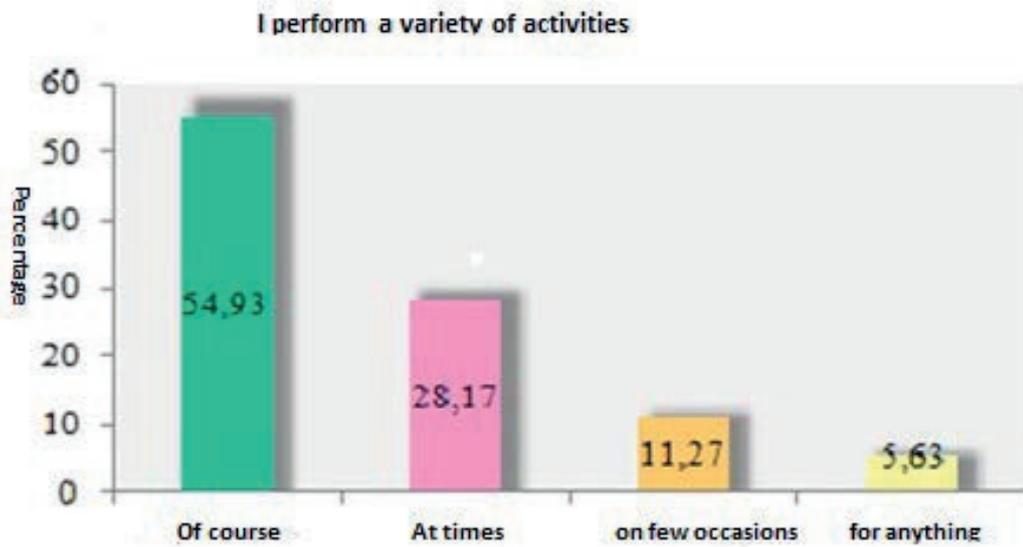
In the following two pages you can see, for example, the graphs for the analysis of the results of the last four resulting conclusions.



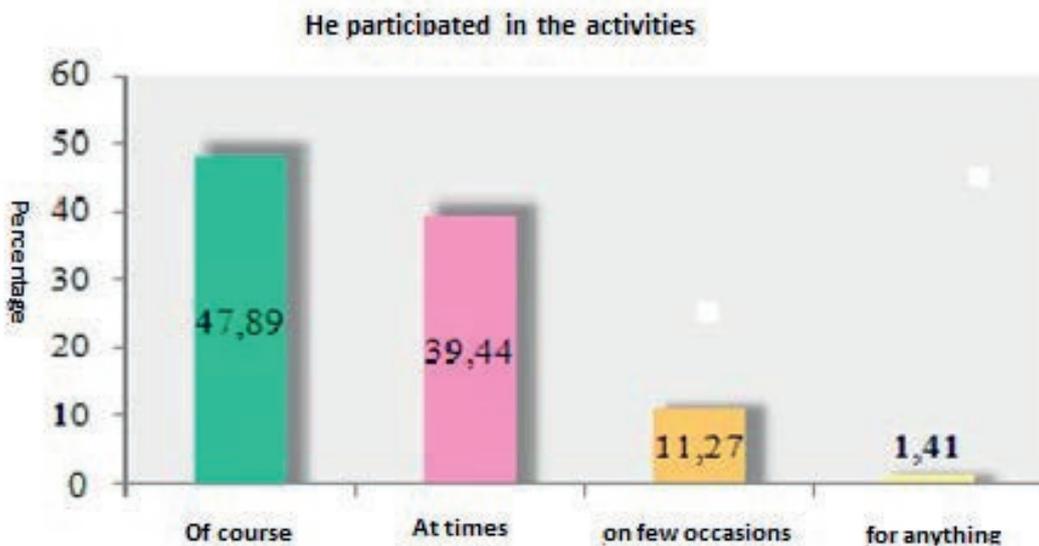
*Graph 1:* I understand better explained  
Source: own



*Graph 2: I like the clas*  
Source: own



*Graph 3: I perform a variety of activities*  
Source: own



*Graph 4: He participated in the activities*  
Source: own

## 5. CONCLUSIONS.

The obvious general conclusion that allows us to present everything seen so far, both what refers to theory and the statistical study that has been conducted, is the following: the use of the interactive whiteboard in the classroom acts as a motivation-enhancing resource in students.

With this, the veracity of the title of this paper is proved, the general objectives being reached.

However, to conclude this section, we deemed it convenient to make a SWOT analysis of the interactive whiteboard in the case under research:

	POSITIVE	NEGATIVE
<u>internal origin</u>	<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>✓ fortress available to a PDI in every classroom of the third cycle of primary education</li> <li>✓ acceptance of teachers and students of this educational resource</li> </ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"> <li>✓ Ignorance of teachers in the use and management of POI</li> <li>✓ <u>Technical</u> problems that hinder the correct use of the educational tool</li> </ul>
<u>external origin</u>	<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>✓ Availability Many educational technology resources</li> <li>✓ Possibility of exchanging teaching materials and resources online</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>✓ Lack of courses for teacher training in the use and management of the PDL</li> </ul>

*Graph 5:* SWOT analysis of the Pizarra Digital Interactiva.

**Source:** own

With this technique, we intend to show the situation of the researched school as regards the integration of the interactive whiteboard to teaching, so that the diagnosis may act as an incentive to propose innovative actions in these classrooms, using this educational tool.

Finally and to finish this paper, we would like to say that the just want this paper to be an incentive for future work and other scientific articles on education and, at the same time, we would like to highlight the importance and desirability of the use of information and communication technologies in education, pointing out the

possibility of successfully using the interactive whiteboard in the classroom and emphasizing the importance of motivation in the teaching-learning processes.

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